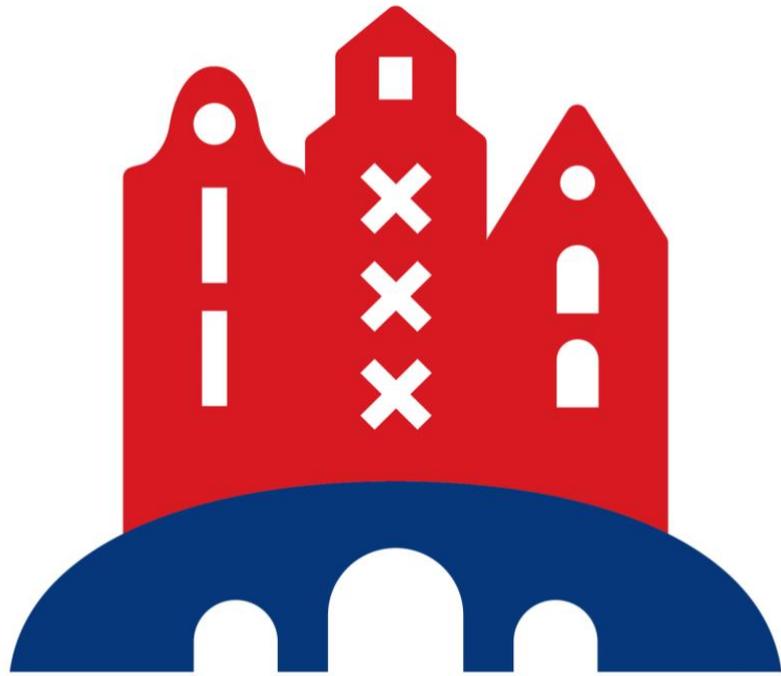


ABSTRACT BOOK



EMSOS 2018

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ORAL PRESENTATIONS

EMSOS 2018



1: Implant and limb survival after resection of bone tumors of the lower extremities and reconstruction with mega-prostheses

by Christina E. Holm, Christian Bardram, Peter Horstmann, Anja Falk Riecke, Michale Mørk Petersen

Abstract ID: 1

Objective: Previous multicenter studies reported variable outcome and failure rates after megaprosthesis reconstructions in the lower extremities. Purpose with this study was to make a long-term one center evaluation of patients treated with limb sparing surgery and reconstruction with mega-prostheses in the lower extremities. Our aim was to address the outcome of our first generation reconstructions in terms of implant failure, limb survival and patient survival.

Study design: Restrospective study

Methods: A retrospective search at our database at Department of Pathology was conducted. We identified 50 patients who underwent limb-sparing reconstruction between 1985 and 2005. Surviving patients not lost to follow-up were evaluated using the Enneking score (MSTS). Causes of failure were classified according to Henderson et al. in five types. Kaplan-Meier survival analysis was used for evaluation of patient, prosthesis and limb survival.

Results: Twenty eight patients were alive at followup. 57% had revisions (n=27). The 10 year patient survival was 60% (95%CI 46-74%); the 10 years implant survival was 24% (95%CI 9-41%), and the 10-year limb survival rate was 83% (95%CI: 65%-96%). Type 1 failure occurred in 9%, Type 2 in 16%, Type 3 in 28%, Type 4 in 18%, and Type 5 in 3%. Mean MSTS score was 21 (range, 6-30) representing a median score of 71%.

Conclusions: Our results with first-generation mega-prostheses, justifies the use of limb salvage surgery. Our results are fully comparable with other findings, with regards to limb and prostheses surveillance, but also functional outcome.

2: Surveillance for lung metastasis from giant cell tumor of bone

by Ilkyu Han

Abstract ID: 2

Background and Objectives: Early detection of lung metastasis from giant cell tumor of bone (GCTB) would be beneficial in establishing treatment and follow-up strategy. However, literature on surveillance for lung metastasis from GCTB is scarce. We aimed to develop one

by determining: (1) the optimal surveillance schedule by analyzing time-to-event data, taking into account the predictive factors, and (2) the effective diagnostic modality.

Methods: A total of 333 patients who underwent surgery for GCTB were followed for at least 2 years. All had chest radiography, and 169 had additional CT for surveillance. Time to lung metastasis and cumulative incidence were calculated, and diagnostic performance between chest radiography and CT were compared.

Results: Twenty-five (7.5%) of 333 patients developed lung metastasis, and local recurrence (LR) was the only predictive factor (RR = 6.54). The median interval from LR to metastasis was 15 months, and 17 (85%) of the 20 metastases with LR occurred within 3 years of LR (Table). Cumulative post-LR incidences of lung metastases at 1, 3, and 5 years were 15.4%, 21.5%, and 21.5%, respectively (Figure). CT was more sensitive (100% vs 32%), and had higher positive predictive value (81% vs 57%) and accuracy (96% vs 93%).

Conclusions: Intensified lung surveillance is warranted for GCTB patients with LR, especially for 3 years from diagnosis of LR. CT is effective for detecting lung metastasis from GCTB.

3: Metachronous metastasis of soft tissue sarcoma: Benefit of metastasectomy. A bi-centre study.

by Maria Anna Smolle, Veroniek van Praag, Florian Posch, Marko Bergovec, Lukas Leitner, Jörg Friesenbichler, Ronald Heregger, Jakob M Riedl, Martin Pichler, Armin Gerger, Joanna Szkandera, Herbert Stöger, Frejya-Maria Smolle- Jüttner, Bernadette Liegl-Atzwanger, Marta Fiocco, Michiel AJ van de Sande, Andreas Leithner

Abstract ID: 3

Objective

The aim of this study was to evaluate the benefit of metastasectomy in metachronous metastasis of soft tissue sarcoma (STS) using advanced comparative effectiveness models.

Study design

Out of a cohort of 1578 STS-patients, 135 were retrospectively identified with high-grade (G2/3) STS who later developed metachronous metastasis. Eighty-seven patients were from centre A and 48 from centre B. All patients had primarily undergone surgery between 1998 and 2015 for localised STS.

Methods

Patient, pathologic and treatment related information with specific focus on treatment of metastases as well as follow-up data were ascertained from all 135 patients.

Propensity-score analyses with inverse-probability-of-treatment-weights (IPTW) and landmark analyses were performed in order to control for a potential selection and immortal time bias, respectively.

Results

On average, patients developed metastases after a median follow-up of 11 months, most commonly to the lungs (n=99, 73%), followed by metastases to soft tissue and lymph nodes (n=21, 16%).

Those 68 patients who underwent metastasectomy had a significantly longer overall survival (OS) than patients treated “non-invasively” (n=67; 5-year OS: 34% vs. 11%; hazard ratio (HR)=0.34, 95% confidence interval (CI): 0.22-0.53, p<0.0001). After IPTW-weighting of the data to control for favourable prognostic factors prevailing at baseline in the surgery-group, this association prevailed (5-year OS: 31% vs. 10%; HR=0.33, 95%CI: 0.20-0.52, p<0.0001). In patients who had undergone metastasectomy within the first 3 months after diagnosis of metastasis, 5-year OS was 33% compared to 19% in patients who had not (p<0.0001).

Conclusions

In the present retrospective bi-centre study, a large OS benefit of metastasectomy that prevailed after application of advanced comparative effectiveness research models could be demonstrated. Taking into account that randomised studies on this issue are missing, our results indicate that for metachronous STS metastases, metastasectomy should clearly be considered as an important therapeutic option.

5: External validation and optimization of the SPRING-score: a score for prediction of patient survival after surgical treatment of bone metastases of the extremities.

by Michala Skovlund Sørensen, Thomas Alexander Gerds, Klaus Hindsø, Michael Mørk Petersen

Abstract ID: 5

Objective:

The SPRING-score (Sørensen, PeterRsen, hINsø, Gerds) presented in 2016 enables the clinician to predict expected survival prior to surgery for MBDex. Aim of study: to refit the SPRING-score with more modern cohort and externally validate the score in a clinically relevant and unselected cohort.

Design and Methods

The SPRING-score was refitted with a cohort (n=270) having surgery for MBDex between 2003-2013. We externally validated the score on a prospective population-based cohort (n=164) having surgery between May 2014-May 2016. Variables included: hemoglobin, complete fracture/impending fracture, primary cancer, visceral metastases, multiple bone metastases, Karnofsky Performance Status and ASA-score.

We performed area under receiver operator characteristic curve (AUC-ROC) analysis and Brier-score to evaluate the SPRING-score in the external validation and compared the historic model's performance with the refitted model.

Results

The SPRING-score was successfully refitted. External validation showed better performance of the updated score compared to the historic score. AUC_ROC was 82% (C.I.: 73% - 91%), 85% (C.I.: 76% - 93%) and 86% (C.I.: 77% - 95%) for prediction of survival at 3, 6 and 12 months. Brier-score was 0.156 (C.I.: 0.12-0.19), 1.62 (C.I.: 0.13-0.20) and 0.15 (C.I.: 0.12-0.19) for prediction of survival at 3, 6 and 12 months. Analysis showed that the refitted model was statistically significant better to predict survival compared to the old model and better refitted (figure 2).

Conclusions

The refitted SPRING-score outperformed the historic score in external validation. We hereby provide the orthopedic surgeon with a better tool for treating MBDEX. To our knowledge the SPRING-score is the first to be externally validated on a population-based prospective cohort which is important if it is to be used at other institutions than highly specialized centers - bearing in mind that literature describes 40 % of MBDEX lesions are treated outside these.

9: Prediction of long bone fractures in multiple myeloma patients in an advanced imaging world

by Omer Or

Abstract ID: 9

Objective: Bone disease occurs in 90% of multiple myeloma patients. The advent of hybrid PET/CT scanners has offered metabolic and morphological information. This is the first study that correlates these two factors to long bone fractures in multiple myeloma (MM) patients. **Study design:** Prospective cohort, retrospectively collected.

Methods: We reviewed the medical records of all bone marrow biopsy proven multiple myeloma patients with long bone lesion from 1.1.2010-12.31.2015 at a single institution who had PET/CT scan. Data collection included anatomical location of the lesion, PET/CT SUVmax, cortical involvement, Mirel classification (MC), fractures, and indication for fracture. The relationship between SUVmax and other variables were calculated with P value<0.05.

Results: 119 patients (59 males/60 females) were identified with 256 long bone lesions. Mean age at diagnosis was 58. Most lesions were in the femur (n = 150, 59%). 13 lesions (10 patients) required surgery for impending (n = 9) or actual fracture (n = 4). Mean MC score was 10 in fracture group vs 7 in non-fractures. Higher median SUVmax was measured for those with cortical involvement (8.05, range 0-50.8) vs no involvement (5.0, range 2.1-18.1). Those with cortical involvement had 34 times the odds for developing a fracture (p = 0.0018). Higher median SUV uptake was measured in fractured vs non-fractured lesions (6.9 vs 5.4, p-value = 0.38). No significant correlation was found between SUVmax and pain or fracture (p = 0.43).

Conclusion: With the use of routine PET/CT scan in MM patients, additional information as SUVmax and better imaging may guide the surgeon for surgical treatment. The strongest predictors for fracture we found were cortical involvement and Mirel classification. We have

not found the SUVmax to be a significant direct predictor for fracture of long bones however; a larger study may show a more significant prediction.

10: Should zoledronic acid loaded bone cement be used in major acetabular reconstruction for pathological fractures?

by Omer Or

Abstract ID: 10

Objective: Symptomatic bone metastases of the acetabulum have detrimental effects on patients' quality of life. Acetabular cages, cement and screws are used for complex acetabular reconstruction with a high complication rate including loosening and local recurrence. Little is known of the local effect of zoledronic acid in this setting. We present a case series of acetabular reconstruction using zoledronic acid loaded bone cement.

Study design: Case series

Methods: A Retrospective chart review of all patients having complex acetabular reconstruction at a single institution from 10.2009 to 3.2017 was conducted. Patients demographic, histology, reconstruction technique, mobility and pain medications were collected.

Results: 20 patients (11 females) with 21 lesions were identified. Mean age at surgery was 60 years with mean follow up of 12 months. 13 patients were alive at last follow up. Breast (n=7) and lung (n=6) were the most common histology. All lesions had surgery for an actual (n=14) or impending (n=7) fracture. Lesions were classified as Type 1 (n=8), 2 (n=5), 3 (n=6) and 4 (n=2) according to the Harrington classification. Zoledronic acid loaded bone cement was used in all patients. All patients were ambulatory post operatively including 5 who were non ambulatory prior to the surgery (p=0.06). 95% of patients required the use of pain medications pre operatively with only 57% using pain medication within 45 days post operatively (p=0.125). There were 5 major complications: 1 death post operatively from fat emboli, 2 dislocations treated with closed reduction and 2 revisions for protruding pin and periprosthetic fracture, respectively.

Conclusion: Complex hip reconstruction for acetabular lesions improves mobility and pain. It out lives the patient's life expectancy. No loosening or local recurrence of tumor was seen. Zoledronic acid loaded bone cement may prevent implant loosening or local recurrence of tumor in the setting of complex acetabular reconstructions.

16: Combined Allograft/Prosthesis composite reconstruction of the proximal humerus for benign and malignant bone tumors: Long term functional outcome

by Samuel Kenan

Abstract ID: 16

Introduction: Restoration of glenohumeral stability and mobility following wide resection proximal humerus present a major challenge. The purpose of this study was to evaluate the long term oncological and functional outcome following wide resection and reconstruction proximal humerus using combined allograft prosthesis composite.

Methods: From 1987 to 2017 twenty five patients underwent wide resection proximal humerus and reconstruction using combined allograft prosthesis. Ages 11-60 years. Male (15), Female (10), Diagnoses osteosarcoma (12), GCT (5), Chondrosarcoma (4), Ewing (1), leiomyosarcoma (1), angiosarcoma(1), traumatic fracture(1). Primary resection and replacement in (19), revision of failed osteoarticular allograft (3), revision of failed metal prosthesis in (3). Resection level from 8 to17cm. Reconstruction modality using fresh frozen allograft with joint capsule and tendon attachment assembled into custom long stem prosthesis press fitted to the host bone

Results: Follow up from 1 years to 30 years. Follow-up was lost in (5). Six patients with osteosarcoma died during the follow-up period. No immediate complications. One local recurrence. Long-term rigid, stable fixation with complete healing of the allograft host bone achieved in all patients. All regained stable painless limited range of motion. One surgery for all, no revision. MSTS functional result score was excellent with respect to pain control, emotional acceptance and manual dexterity, Unsatisfied with respect to range of motion.

18: Joint Sparing Surgery using 3D printed Implants, outcome of 23 patients

by Ahmed Shehadeh

Abstract ID: 18

Introduction: Joint sparing limb salvage surgery (JLSS) is a further advancement in the techniques and concepts of limb salvage surgery, which make it possible to save not only the limb affected by malignancy, but also, the adjacent joint and/or the physis, added benefits is the preservation of important tendinous attachments like the patellar ligament at the proximal tibia and the gluteus muscle at the greater trochanter, but this procedure is technically demanding due to availability of small length of bone for implant purchase.

Objectives: to show the outcome of patients received this kind of surgery

Materials and Methods: Joint sparing in our study was defined whenever the length of remaining epiphysis segment for implant anchorage is shorter than 6 cm. 23 patients received JSLSS ,femur=12, tibia=8, humerus=3

In all patients we used custom made prosthesis, the range of the remaining epiphysis bone was 25-55 mm, mean=40mm, surgical margins were negative in all patients.

Results: At mean follow up period of 3 years, 4 patients developed local and systemic recurrences, all recurrences occurred in the soft tissue, 2 patients developed failure of osteointegration and required revision, MSTS score = 90%.

Conclusion: To the best of our knowledge this is the biggest series in literature for joint sparing surgery in which CAD Prosthesis was used..In our series, those implants with HA coated fins and side plates and those with short stem and HA coated side plates did well at the end of the follow up period, no increased incidence of local recurrence in comparison to joint sacrificing techniques , the early results of using custom made JS prosthesis is encouraging and functional outcome is outstanding.

21: Isolated Limb Perfusion in Patients with Locally Advanced Soft Tissue Sarcomas of the Extremities

by Nikolay Petrochenko

Abstract ID: 21

Objective: The purpose was to compare the results of treatment in patients with soft tissue sarcomas (STS) of extremities using the method of isolated limb perfusion (ILP) and amputation.

Study design: 78 patients with locally advanced STS of extremities were treated in Russian Cancer Research Center between the year of 2013 and 2016. In the first group there were 37 patients who underwent ILP. The group included 25 women (68%) and 12 men (32%). Median age was 49 ± 16.7 years, range from 21 to 79 years. Patients were treated using ILP according to the standard scheme on femoral (n = 28) and axillary (n = 9) levels. The second group (41 patients) underwent amputation. The group included 22 women (54%) and 19 men (46%). Median age was 47 ± 14.3 years, range from 23 to 71 years. Chemotherapy leakage into the systemic circulation was less than 6% (usually 0.5 - 2%).

Methods: Local toxicity was assessed using the Wieberdink scale. Systemic toxicity level was assessed using the NCI-CTC.

Results: In our study, the level of local toxicity was not raised above the level 2 on Wieberdink scale. No cases of systemic toxicity were determined. Median follow-up period for all 78 patients was 21 months (range from 1 to 57 months). In the first group (patients were treated

using ILP) the overall response was revealed in 30 patients (81.8%), complete response - in 7 patients (18.1%), partial response - in 23 patients (63.6%), there were no changes in 7 patients. Limb salvage in patients of the first group was 76.5%. Overall 2-years survival after perfusion was 90.5%. At the same time, the overall 2-years survival rate in patients after amputation (the second group) was 75.5%.

Conclusions: The method of ILP improves not only patients quality of life but also 2-year survival probability.

23: Reconstruction methods after internal hemipelvectomy in malignant pelvis tumors in children and adolescents.

by Andrzej Szafranski, Magdalena Rychlowska-Pruszyńska, Bartosz Pachuta, Iwona Malesza, Justyna Dusinska, Tomasz Walenta

Abstract ID: 23

Purposes: summary of reconstruction methods after hemipelvectomy in malignant bone tumours resection in children and adolescents.

Methods: retrospective analysis of the patients treated in Institute of Mother & Child with malignant bone tumors of the pelvis in the period 1994-2017.

In the period 1994 to 2017 in our Clinic 74 patients have been operated with primary malignant bone tumors in pelvis localization;

41 boys and 33 girls, in age from 5 to 18 years, average 13 years. Operations have been made in second step, after neoadjuvant chemotherapy. In histopathologic diagnosis were sarcoma Ewingi in 45 pts., osteosarcoma in 21 pts., chondrosarcoma in 8 pats.

Localization by Enneking classification; stage I were in 22pts, stage II in 41 and stage III in 11 pts. Total hemipelvectomy have been made in 4 pts and internal hemipelvectomy in 70 pts In reconstruction were used different systems; bone grafts, AO plates, endoprotheses and trevira tube. Custom made endoprotheses, Lumic endoprothese, 3D custom made implants.

Results. Alive 53 from 74 pts, follow up 2 to 23 yrs, mean 6,2 yrs. Early and late complication were observed in 34 cases. Satisfactory functional results in 68 %

Conclusion; Possibility of internal hemipelvectomy depends on; 1) localization and extent of the tumor; 2) tumor reaction after neo-adjuvant chemotherapy 3) patients age. Internal hemipelvectomy as limb salvage surgery is satisfactory, but sufficient results of surgery depend on extent of operation and good rehabilitation. 3)Operator experience is of basic importance for surgery.4) In our opinion best results we can achieve by closing the pelvic ring after the end of patients growing 5) In children the mixed – lumic and 3D implants solution seems to be the better reconstruction in spite of pelvis growing.

24: Advantages and disadvantages of growing endoprosthesis – in Children and Adolescents after Malignant Bone Tumour Resection

by Andrzej Szafranski, Bartosz Pachuta, Magdalena Rychlowska-Pruszyńska

Abstract ID: 24

Purposes: metaanalysis of the patients treated in the Institute of Mother and Child in last 17 years.

Methods: In the period 2000-2017 283 children with primary bone tumors were treated. They were 143 boys and 140 girls. The age of the patient was from 4 to 25 years old. Median was 13 yrs. old. The treatment was begun from neoadjuvant chemotherapy. After achievement the regression or stabilization of primary lesion, the patients were qualified to surgery procedures. It was excision of the tumor end reconstruction by the using of the growing endoprosthesis in spite of young age of the patients. After that adjuvant chemotherapy was used with or without metastasis treatment.

Results: In this study the own department experience in implantation of variety types of expandable endoprosthesis were shown. The defects and advantages of each type of expandable endoprosthesis were introduced. The all data were displayed as peer analysis of the patients with variety types of endoprosthesis.

Conclusions: As the summary the authors published the guidelines according the handling of, service the variety types of expandable endoprostheses.

Instead of conclusions (authors' experience)

Recommendations for non-invasive limb lengthening:

- careful qualification to operation
- implantation receiver in soft tissue no more 2 cm depth
- start with lengthening procedure quickly after operation
- repeated procedures in short time intervals (50 impulses)
- Lengthening procedure in ambulatory manner
- avoiding of general narcosis risk minimalization of infection in endoprosthesis area
- change the construction of electric cable (see the picture) to prevent of its rupture

28: Evaluation of usefulness of contrast enhanced ultrasonography using Sonazoid® for detecting the tumor extent area of subcutaneous soft tissue sarcomas

by Kazutaka Kikuta, Sota Oguro, Hideo Morioka, Aya Sasaki, Kaori Kameyama, Robert Nakayama, Masaya Nakamura, Morio Matsumoto

Abstract ID: 28

Objective: In the wide resection of subcutaneous soft tissue sarcoma, accurate tumor extent area evaluation is indispensable. However, actual evaluation is difficult because there is no landmark on the skin. In recent years, Sonazoid® enhanced ultrasonography is used for mammary gland and gastrointestinal surgeries. Sonazoid® is a highly safe contrast medium that can be used even in patients with renal disorder. In this study, we compare tumor extent area between enhanced ultrasonography and contrast MRI to evaluate the utility of Sonazoid® enhanced ultrasonography.

Study design and Methods: This study included 8 patients with subcutaneous soft tissue sarcomas. Enhanced MRI and enhanced ultrasonography were performed to evaluate the tumor extent area before surgery. The actual resection was performed based on the contrast MRI. After surgery, we histologically compared the tumor extent area between contrast MRI and enhanced ultrasonography.

Results: The error of tumor extent area between contrast MRI and histological evaluation was average 1.1 cm on the cranial side, average 1.3 cm on the caudal side, average 0.7 cm on the anterior side, and average 1.1cm on the posterior side. The error of tumor extent area between enhanced ultrasonography and histological evaluation was average 0.4 cm on the cranial side, average 0.6 cm on the caudal side, average 0.3cm on the anterior side, and average 0.3 cm on the posterior side. These results indicated that tumor extent area of enhanced ultrasonography was much more consistent with the histological evaluation.

Discussion: The tumor extent area by enhanced ultrasonography was less error from histological evaluation. The enhanced ultrasonography can be performed in the same posture at surgery. In addition, Sonazoid® is safe and easy to use. Therefore, the enhanced ultrasonography was considered to be a useful method for tumor extent area evaluation.

29: Denosumab May Increase the Risk of Local Recurrence in Patients with Giant-Cell Tumor of Bone Treated with Curettage

by Costantino Errani, Shinji Tsukamoto, Giulio Leone, Alberto Righi, Manabu Akahane, Yasuhito Tanaka, Davide Maria Donati

Abstract ID: 29

Objective

Recent clinical studies suggest that denosumab is associated with tumor response and reduced surgical morbidity in patients with giant cell tumor of bone (GCTB).

Study Design

We therefore evaluated the recurrence-free survival rate after treating extremity-located GCTB with surgery and denosumab to determine the influence of denosumab and clinical factors on the risk of local recurrence.

Methods

We retrospectively reviewed the medical records of 408 patients treated for extremity GCTB in a single institution during 1990–2013. Altogether, 247 patients underwent curettage (intralesional surgery) with a high-speed burr, and 161 underwent resection. Phenol adjuvant was used in 221 of the 247 curetted patients. We also reviewed medical records of 30 patients treated surgically (25 with curettage, 5 with resection) and denosumab during 2010–2013 and compared their clinical results with 378 historical controls. Overall minimum follow-up was 24 months.

Results

The local recurrence rates were 60% (15/25) for patients treated with curettage and denosumab and 16% (36/222) for those with curettage alone. The joint preservation rates were 80% (20/25) for patients treated with curettage and denosumab and 94% (209/222) for those with curettage alone. Univariate and multivariable analyses showed that denosumab was the only independent factor associated with a poor prognosis when considering recurrence-free survival and joint preservation. The overall median follow-up was 85.6 months (interquartile ratio 54.3–125.1). Viable tumor was present in all 30 specimens involving patients treated with denosumab.

Conclusions

There was a higher incidence of recurrence in the cohort exposed to denosumab. Because there were substantial differences in the cohorts and randomization was not applied, however, causation could not be evaluated. Scientific community (EMSOS) should be aware regarding the ability to perform a correct curettage after denosumab treatment in GCTB of the extremities.

31: Complication Rates According To The Implant Type In Limb Salvage Surgery For Lower Extremity Osteosarcoma

by Murat Hiz, Bedri Karaismailoglu, Suat Ulutas

Objective: The aim of this study is to determine the incidence of complications such as aseptic loosening, implant failure and implant infection according to implant types in patients treated with limb salvage surgery due to lower extremity osteosarcoma.

Study Design: 95 lower extremity osteosarcoma patients(64 distal femur, 25 proximal tibia and 6 proximal femur) who were treated between 1986-2015 were included. The mean age was 23.5(range 14-69) years. The average follow-up period was 75 months(24-288).

Methods: The surgical technique applied in the osteosarcoma patients, the type of implant used and the complications that occurred during the follow-up were recorded.

Results: Aseptic loosening was seen in 23 patients(24%). Out of 95 prostheses; 55 were cemented, 40 were cementless. Aseptic loosening was observed in 20(36.2%) cemented prostheses and 3(7.5%) cementless prostheses. The cemented prostheses had a higher aseptic loosening rate($p=0.001$). 89 patients with distal femur or proximal tibia osteosarcoma had 55 fixed-hinge and 34 rotating-hinge prostheses. In 17(31%) fixed-hinge and 3(9%) rotating-hinge prostheses, aseptic loosening was observed. Fixed-hinge prostheses had a higher aseptic loosening rate($p=0.019$). 56 patients had titanium prosthesis, while 39 had stainless steel prosthesis. Aseptic loosening was observed in 19(48%) patients with stainless steel prostheses and 4(7%) patients with titanium prostheses. Stainless steel prostheses had a higher aseptic loosening rate($p=0.001$). Implant failure was observed in 6 stainless steel prostheses(15%) and only 1 titanium prosthesis(2%). The stainless steel prostheses had a higher rate of implant failure($p=0.018$).

Conclusions: Cemented, fixed-hinge and stainless steel prostheses showed statistically higher rate of aseptic loosening than cementless, rotating-hinge and titanium prostheses, respectively. In stainless steel prostheses, implant failure was statistically higher compared to titanium prostheses. Although no infection was found in silver-coated prostheses, this was not statistically significant because of the low number of patients with silver-coated prosthesis.

34: IlluminOss in metastatic bone disease

by Jason Hoellwarth, MD, Richard McGouhh, Paul Vegt

Background:

Fractures through pathologic lesions occur frequently. This significantly decreases quality of life (QOL) for patients with already short life expectancies. Current treatment of impending or

actual pathologic fractures is via either a titanium intramedullary nail (IMN) or cement-plate technique. Drawbacks of IMN are mismatched canal-implant geometry and inability to place proximal screws intra-articularly. Cement plating's downsides are extensive incisions and difficulty with fixing the entire bone. Both also require delaying radiation therapy until wounds heal.

Study design: Retrospective case series

Methods:

Treatment of Metastatic Bone Disease with the IlluminOss system

Patients:

24 patients with 28 fractures (4 imminent fractures)

20 humeral fractures (2 imminent)

4 femur fractures (2 imminent)

3 ulna fractures (1 imminent)

1 radius imminent

Primary tumor:

Kidney cell carcinoma, breast cancer, prostate cancer, myelodysplastic carcinoma

The IlluminOss (IO) intramedullary stabilization device, seeks to solve those issues.

Via a 1cm proximal incision a small diameter flexible catheter delivers to the intra medullary space a PET balloon. The balloon is inserted past the fracture, then filled with biocompatible liquid polymer that cures through the application of visible light emitted from a fiber optic catheter. The resultant implant is radiolucent, allowing for better visualization of the surgical site. This leads to no wounds in the radiation zone, conforming rigid fixation without intra-articular prominence, and a tamponade effect to stem bleeding.

Results:

No infections occurred, no revisions of the IlluminOss stabilization.

73% of the humeral patients received radiation therapy <24 hours (44% < 8 hours)

28% discharge < 1 day

One IO failed to polymerize due to rupture, immediately converted to IM nailing.

One imminent femur fracture progressed despite radiotherapy (kidney cell tumor).

Due to the IlluminOss stabilization there was no dislocation of the fracture. Stabilization with a LISS plate osteosynthesis led to a full weight bearing situation. The patient is still walking without pain, two years after.

Conclusions:

The IlluminOss intramedullary fixation technique has allowed us to change our approach to pathologic fractures. In our early experience, it has proven safe, fast, and reliable. There has been one intra-operative complication which was managed without delay or morbidity, no patients who required return to the operating room, and no infections. No implants broke post-operatively. IO seems to offer significant QOL benefits of rapid radiation and discharge home, often within one day and some the same day. Three patients (17%) seem to set a new ideal scenario, coming in from home for scheduled surgery which required less than one hour,

having radiation therapy immediately afterward, and going home with pain controlled that same day.

We have also modified our treatment protocol for renal cell carcinoma, and have omitted preoperative embolization, as the balloon seems to sufficiently tamponade bleeding as to eliminate this necessity. If successful in the future, IO could convert our pathologic fractures, including renal cell cancer, from up to three days inpatient (embolization HD1, surgery HD2, discharge HD3) to a single full service outpatient day.

35: Descriptive Epidemiology and Clinical Outcomes of Bone Sarcomas in Adolescent and Young Adult Patients in JAPAN

by Toru Akiyama, Koichi Ogura, Takashi Fukushima, Katsushi Takeshita, Akira Kawai

Abstract ID: 35

Objective

There have been far fewer improvements in the clinical outcomes of adolescent and young adult (AYA) patients with cancer compared to children and older adults, possibly because fewer studies focus on patients in this age group. Sarcomas represent one of the most common types of cancer in AYA. However, there have been a few studies that focused on the clinical outcomes of AYAs with bone sarcoma or on nationwide statistics that included a sufficient number of patients. The aims of this study were to determine the nationwide incidence of bone sarcoma in AYA patients compared to other age groups and to establish whether a correlation exists between the AYA age group and poor disease-specific survival (DSS) in Japan.

Study design

For this study, we utilized the Japanese nationwide database system, the Bone and Soft Tissue Tumor (BSTT) registry. The occurrence of tumor-related death were primary endpoints for prognosis. We defined disease-specific survival (DSS) as the period from the date of diagnosis until tumor-related death. The DSS was estimated by the Kaplan-Meier method. The factors associated with the survival were analyzed by the Cox proportional hazards models. The alpha level for statistical significance was set at a p value of 0.05.

Methods

A total of 3,457 patients with bone sarcoma (1,930 male and 1,527 female) were identified from among 63,931 records in BSTT registry, during 2006–2013. Of these, 521 were patients aged ≤ 14 years (children), 1,123 were aged 15–39 years (AYAs), 982 were aged 40–64 years (adults), and 831 were aged ≥ 65 years (elderly). We analyzed the epidemiological features of AYAs compared to other age groups.

Results

AYA patients did not exhibit any extreme patterns in any of the investigated parameters compared to other age groups. On multivariate analysis, AYA patients with bone sarcomas

overall did not exhibit worse DSS rates; however, the DSS correlated inversely with age. The same tendencies were observed for each of osteosarcoma, chondrosarcoma, and Ewing's sarcoma. Overall, the poor prognostic factors in patients with overall bone sarcoma were age >65 years (HR: 3.74; 95% confidence interval [CI]: 2.66–5.28; P < 0.001), high tumor grade (HR: 3.77; 95% CI: 1.93–7.37; P < 0.001), tumor size >16 cm (HR: 2.20; 95% CI: 1.52–3.19; P < 0.001), and positive surgical margins (HR: 1.78; 95% CI: 1.21–2.62; P = 0.004)

Conclusion

This study is the first to provide data on the descriptive epidemiology and clinical outcomes in AYA patients with bone sarcomas using a nationwide large-scale database. Our data demonstrated that DSS rates of AYA patients with bone sarcomas were not inferior to those of other age groups. Our nation wide data can be helpful to understand the European situation more precisely with comparison of these two areas.

36: Intercalary Femur Reconstruction After Bone Tumor Resection: Are Failure rates and Outcomes of Endoprosthetic Replacement and Allograft Similar?

by Jose Ignacio Albergo, Louie Czar Gaston, Minna Laitinen, German Luis Farfalli, Michael Parry, Miguel Angel Ayerza, Marcelo Risk, Lee Jeys, Luis Aponte-Tinao

Abstract ID: 36

Objective: To compare 2 groups of patients treated with intercalary endoprostheses (EPR) or intercalary allograft reconstruction after diaphyseal femoral bone tumours resections and analysed: (i) the reconstruction failure rate (ii) the cause of failure, (iii) the risk of amputation (iv) functional result (MSTS), (v) time to full weight bearing.

Study design: multicentre comparative study.

Methods: Patients with primary bone tumors of the femoral diaphysis, treated with resection and reconstructed with an intercalary EPR or allograft were reviewed. Two oncologic unit were involved. A total of 107 patients were included in the study (36 EPR and 71 intercalary allograft reconstruction). No differences were found between the 2 groups in terms of follow-up, age, gender, resection length and the use of adjuvant chemotherapy. Failure of the reconstruction was defined as revision for any cause and grouped according to the Henderson classification. The functional assessment was performed using the MSTS score and time for full weight bearing recorded from the reports.

Results: The probability of failure for EPR was 36% and 22% for allograft at 5 years (p=0.26). Mechanical failures were the most prevalent in both type of reconstructions. Aseptic loosening and implant fracture the main cause in the EPR group. For intercalary allograft reconstructions fracture and non union were the most common complications. Ten- year risk of amputation after failure for both reconstruction was 3%. There were no differences between the groups in terms of the mean MSTS score (27.4 versus 27.6). Time to full weight

bearing was significantly shorter in the EPR group (3 weeks versus 22 weeks) ($p < 0.001$).

Conclusion: We have demonstrated the durability of both the reconstruction options studied. Both result in good implant survival, with a failure rate of 22%-36% at 5-years. In both techniques, mechanical failure was the most common complication, however, the amputation rate remained low, only 3% in both groups.

37: Surgical outcome of extracorporeal irradiation and re-implantation in extremities for high grade osteosarcoma: retrospective cohort study and systematic review

by Dumnoensun Pruksakorn

Abstract ID: 37

Objective: To assess the rate and mode failure of high grade osteosarcoma patients who received extracorporeal irradiation and re-implantation (ECIR) in extremities.

Study design: Retrospective cohort and systematic review

Methods: We retrospectively evaluated osteosarcoma patients who received ECIR in single institute between January 1996-December 2014. Characteristic of failure and time to failure was recorded and analyzed. In addition, we systematically searched literature for clinical studies which using ECIR for osteosarcoma. Incidence of failure and mode of failure were determined from pooled data. The significant different of studied parameters was determined when $p < 0.05$.

Results: Sixty-three cases of ECIR were reviewed and 50 cases were reached criteria for analysis. The overall failure of reconstruction was 23 cases (46.0%) which 40% was non-mechanical failure, and 6% was mechanical failure. In the systematic review, there are 174 cases which reached criteria for analysis (56 diaphysis, 97 osteochondral of lower extremity, and 21 others). Overall failure was 29.3% (51 from 174) which 20.7% was non-mechanical failure, and 8.6% was mechanical failure. Diaphyseal resection with intercalary resection was the significant lower failure rate than other types of reconstruction, $p < 0.02$. There was no presenting mechanical failure from diaphyseal resection.

Conclusions: Diaphyseal resection and intercalary re-implantation presented the promising outcome. Availability, less structural complication, and biologically permanent are advantages of this reconstruction. Osteochondral re-implantation in lower extremity still presented high complication rate.

40: Wide margins give the possibility of getting disease control after local recurrence in chondrosarcoma

by Minna K Laitinen, Michael C Parry, Louis-Romee Le Nail, Catrin Wigley, Jonathan D Stevenson, Lee M Jeys

Abstract ID: 40

Objective

The study investigated the possibility of getting disease control after local recurrence (LR) in chondrosarcoma (CS).

Study design

A retrospective study of 126 patients with local recurrence (LR) following previously operated chondrosarcoma (CS) of the pelvis or extremity at a mean follow-up of 49 months (range 44-126 months).

Methods

Details of patients' characteristics, clinical, surgical and oncological outcomes were analysed.

Results

Histological grade for LR was available in 81 patients. In 18 patients, the grade of LR increased from original resection specimen; in grade 1 tumours 8/18 increased to grade 2, 3/18 to grade 3 and one to de-differentiated (DD) CS. In grade 2 CS, 5/33 increased to grade 3 and 2 into DD CS. The grade of LR remained the same in grade 3 and DD LR. In grade 1 CS tumours, treated originally intralesionally, only tumours with increased grade in LR had decreased DSS. 46/126 (37%) had metastases prior or at the time of LR. For patients without metastases at the time of LR (81/126), significant factors for disease specific survival (DSS) after LR was grade of the primary tumour ($p=0.000$) (figure 1) and wide margin ($p=0.030$) (figure 2). Method (limb salvage vs amputation) ($p=0.962$), location (pelvis versus extremity) ($p=0.456$) or pathologic fracture ($p=0.698$) were not significant factors in univariate analysis. Grade remained the only significant factor in multivariate analysis. 27 patients had a second LR after the surgery for the first. Wide margin in the first LR surgery was statistically significant factor ($p=0.011$) in preventing secondary LR (figure 3).

Conclusions

For patients without metastases at the time of LR, the possibility of getting disease control is difficult, but possible with wide surgical margins. Wide margin in LR surgery is effective in preventing secondary LR.

43: Bone Sarcoma Incidence in the Netherlands

by Louren M Goedhart, Vincent KY Ho, Sander PDS Dijkstra, Bart HW Schreuder, Gerard R Schaap, Sjoerd K Bulstra, Albert JH Suurmeijer, Paul C Jutte

Abstract ID: 43

Objective / Study Design

Osteosarcoma, chondrosarcoma and Ewing sarcoma form the majority of malignant primary tumours of bone. High-grade bone sarcomas require radical treatment due to their rapid and invasive growth pattern and metastasizing capabilities. This nationwide study covers overall incidence, treatment and survival patterns of bone sarcomas in a 15-year period (2000–2014) in the total population of the Netherlands.

Methods

Data for this study were derived from the Netherlands Cancer Registry which receives primary notification from the national pathology database. Classification and categorisation was based on the ICD-O-3 classification and the WHO classification 2013 applied according to our clinicopathological expertise. Overall incidence over the 15-year-period was calculated as a rate per 100.000 person-years (using the European Standardised Rate, ESR). Survival was analysed with Kaplan-Meier curves and Cox proportional hazards regression.

Results

The incidence for high-grade chondrosarcoma (n=429) was estimated at 0.15 per 100.000 ESR, and 5-years-overall survival at 65.9% (95% confidence interval (CI): 61.0%–70.4%). For high-grade central osteosarcoma (n=605), incidence was estimated at 0.25 per 100.000 ESR and 5-years survival at 53.9% (95%CI: 49.7%–58.0%). Ewing sarcoma incidence (n=334) was estimated at 0.15 per 100.000 ESR and 5-years survival at 59.3% (95%CI: 53.5%–64.6%).

Conclusions and relevance for EMSOS

This study provides comprehensive incidence estimates for all the main primary bone sarcomas over a 15-year time period in a North European country. Survival rates did not significantly improve between 2000-2014 for high-grade chondrosarcoma, central high-grade osteosarcoma and Ewing sarcoma.

45: Complications and survival of megaprotheses after resection of bone metastases

by Marco De Gori, Antonio D'arienzo, Lorenzo Andreani, Giovanni Beltrami, Domenico Andrea Campanacci, Francesco Rosario Campo, Stefano Giannotti, Federico Sacchetti, Francesca Totti, Rodolfo Capanna

Abstract ID: 45

Treatment of bone metastases is often palliative, aiming at pain control and stabilization or prevention of pathological fractures; however, a complete resection with healing purposes can be performed in selected cases. The aim of our work was to evaluate the survival of megaprotheses used for reconstruction after bone metastases.

Between January 2001 and March 2015, we have implanted 169 Megsystem-C® (Waldemar LINK® GmbH & Co. KG, Hamburg, Germany) after bone metastasis resection. Patients, 95 females and 74 males, were operated at an average age of 61 (12-87) years for proximal femoral resection in 135 (79.9%) cases, distal femur in 24 (14.2%), proximal tibia in 6 (3.6%), total femur in 3 (1.8%) and intercalary femur in 1 (0.6%). Mostly, breast cancer metastases (30.8%), kidney (17.8%) and lung (14.2%) were treated.

At an average follow-up of 21 (1-150) months, we found a 99.4% overall limb salvage and a 96.1% overall survival rate at 1 year, 92.8% at 2 years, and 86.8% at 5 and 10 years. We found 9 (5.3%) mobilization cases of the proximal femoral implant, 3 needed surgical reduction; 2 (1.2%) cases of aseptic loosening of the prosthetic stem; 2 (1.2%) periprotetic infection cases, one requiring a 2-stage revision. Few literature studies have evaluated the survival of megaprosthesis implant in the treatment of bone metastases. Our data show how in this specific context the rate of complications is significantly lower than expected in general orthopedic surgery.

The use of modular prostheses is a valid reconstructive strategy after bone metastasis resection in selected patients. The rate of short-term complications is exceptionally low; further studies will have to confirm this in the longer term.

48: Leiomyosarcoma affecting major vessels of the lower limb

by Roger Rojas, Ana Peiró, Laura Trullols, Isidro Gracia

Abstract ID: 48

Objective: The aim of our study is to evaluate the results of en bloc resection and vascular reconstruction surgery of leiomyosarcomas with involvement of major blood vessels in the lower extremities.

Study design: Retrospective observational study.

Methods: From January 1983 to December 2016, 42 patients were diagnosed with leiomyosarcomas at our institution. Six of these leiomyosarcomas affected major vessels of the lower extremities. Epidemiological data, imaging studies, surgery performed, adjuvant treatments, as well as recurrences and mortality were retrospectively recorded.

Results: All the patients were affected by high-grade leiomyosarcomas, with a larger tumor average diameter of 9.1cm and a mean follow-up of 24months. The average age was 64 years. In four of them, the first symptom was a palpable tumor. The other two cases debuted with

thromboembolic phenomena. 5 cases arose from the femoral vessels, while the remaining case was at the popliteal level. All patients underwent wide resection including the affected vessel and vascular reconstruction with a bypass. The bypass was permeable in all cases except one, which required the realization of a new bypass. Although all the cases preserved the limb, there was a 50% of pulmonary dissemination, 16% of local recurrence and 33% of mortality at the end of the studies.

Conclusions and Discussion: Leiomyosarcomas are highly aggressive tumors with a low survival rate at 5 years. They can debut with thrombotic phenomena.

Limb-sparing surgery can be performed; this should include complete resection of the tumor and the affected vascular segment with negative margins. In the absence of collateral arterial blood supply, interposition grafts with vascular reconstruction is required, whether autologous saphenous vein grafts or vascular prostheses. Venous reconstruction will depend on the presence of a competent superficial system. Chemo and radiotherapy improve survival and local recurrence so multidisciplinary planning is needed.

50: Cohort analysis of patients with MUTARS® modular system reconstructions - 107 cases with up to 9 years of follow-up

by Blaz Mavcic, David Martincic, Marko Spiler

Abstract ID: 50

Objectives: In the last decade, many tumor endoprosthetic systems have become available on the market, but there are hardly any reports published independently from implant manufacturers or developing institutions. Our aim was to analyze the clinical results of the MUTARS® modular endoprosthetic system in the entire cohort of 107 patients, who were operated at a single institution with up to 9 years of follow-up.

Study design: Retrospective cohort analysis with clinical follow-up.

Methods: The study included all patients who were operated at our institution between January 1, 2009 and December 31, 2017 and had bone defect reconstruction with MUTARS® modular system. Patients' follow-up was based on particular oncological protocol for specific tumor type and all nonmechanical (haemathoma, infection, local tumor recurrence) or mechanical complications (loosening, implant breakage, periprosthetic fracture, luxation) were recorded.

Results: The study included 107 patients (60 sarcomas, 26 metastases, 16 arthroplasty revisions, 5 benign aggressive tumors) with implanted MUTARS® modular endoprostheses of total femur (3), proximal femur (31), distal femur (38), proximal tibia (9), arthrodesis (2), humerus (16) and pelvis (8). The mean follow-up period of unrevised patients was 35 ± 27 months (range 2 – 99 months). Local tumor relapse occurred in 4 cases and 20 patients died due to oncological disease. Out of total 26 patients requiring surgical revision, 17 (16 %) endoprostheses had to be at least partially replaced/removed eventually. The overall deep-infection rate was 6 %. Implant failure rates due to mechanical reasons were 10% altogether, 13 % after minimum 2 years of follow-up and 14 % after minimum 5 years of follow-up.

Conclusions: Endoprosthesis survival and complication rates at our institution are comparable to the previously published data of clinical institutions involved in development of MUTARS® endoprostheses. It remains to be seen whether follow-up over 10 years will corroborate the promising midterm results.

51: Long-term results of rare anatomical localizations endoprosthesis. (The East-European Sarcoma Group)

by Vladimir, Anatoly, Romi, Mamed, Sokolovsky, Sokolovsky, Badyrov, Aliev

Abstract ID: 51

Introduction/Purpose: Cardinal positive changes in oncological results of treatment, actualized the need to improve the quality of life in group of patients with tumor lesion located in rare anatomical localizations and move from amputational surgery to organ- preserving. The purpose of this study was to analyze long-term oncological and orthopedic outcomes, the incidence of complications depending on the anatomical area of endoprosthetics in patients with primary tumor and metastatic lesions of long tubular bones over a period of 22 years.

Material/methods: Since 1995 to 2017, 138 primary and revision endoprosthetics were performed in rare anatomical localizations. Primary/revision endoprosthetics was performed in the following rare anatomical regions: 1) diaphysis of the humerus 8/3; 2) total endoprosthesis of the humerus 8/2; 3) elbow joint 15/4; 4) wrist joint 1/0; 5) femoral diaphysis 10/3; 6) total femoral arthroplasty 66/25; 7) diaphysis preserving the total hip replacement of the femur 1/0; 8) total endoprosthesis of the tibia 4/1; 9) ankle joint 25/8. The study included 79 men and 59 women. The age of the patients ranged from 16 to 69 years, the average age was 35.8 years. In the morbidity structure, 106(76.8%) were diagnosed with a primary malignant tumor (chondrosarcoma, osteosarcoma, Ewing's sarcoma, undifferentiated pleomorphic sarcoma, periosteal, parostal sarcoma, angiosarcoma, reticulosarcoma), 14(10.1%) with metastatic damage, 18 patients (13%) had a benign diagnosis.

Results: In group of 138 patients, the total number of orthopedic and oncological complications was 29.7%. Complications associated with soft tissue failures arose in 3%. Aseptic instability in 8%. Structural failures in 5.8%. Bone fracture 0.7%. Endoprosthesis infection 5.8%. Tumor recurrence in 6.5%. The total number of complications: 1) ankle joint 52%; 2) diaphysis of humerus 50%; 3) total femoral endoprosthetics 27.2%; 4) total endoprosthesis of the tibia 25%; 5) femoral diaphysis 20%; 6) elbow joint 13.3%; 7) total shoulder arthroplasty 12.5%. The average period before non-oncological complications was 22.8 months. The average time to oncological complications was 25 months. The average time to relapse was 22 months. The average time to metastasis was 28 months. The prevalent number of complications of rare anatomical localizations occurs with endoprosthetics of the ankle and diaphysis of the humerus.

Conclusion: Reconstructive primary and revision arthroplasty of rare anatomical areas have a significant potential, the development of which requires the joint work of surgeons and engineers. The production of endoprostheses that most fully imitates physiology and biomechanics of the human joint, the completion of the surgical technique of endoprosthetics will reduce the number of complications, increase the qualitative operational capabilities of the endoprosthesis, and reduce the frequency of revisions. Endoprosthetics of rare anatomical areas in some cases is an alternative type of endoprosthetics allowing qualitatively improve the functional capabilities, reduce the volume of endoprostheses and the traumatism of ongoing surgical treatment. Careful selection of patients, taking into account the effect on conservative treatment, allows to reduce the number of local relapses, achieve a good functional result. Performing more operations of rare anatomical areas will allow more objective and reliable evaluation of the results.

55: Mechanisms of failure and survival of total femoral endoprosthetic replacements

by Manuel Ricardo Medellin Rincon, Tomohiro Fujiwara, Rhys Clarke, Jonathan Stevenson, Michael Parry, Lee Jeys

Abstract ID: 55

OBJECTIVE: To evaluate the prosthesis characteristics and associated conditions that may modify the survival of total femoral endoprosthetic replacements.

STUDY DESIGN: Retrospective case series.

METHODS: 81 patients treated with total femur prosthesis from 1976 to 2017 with a mean follow up time of 10 years were retrospectively evaluated and failures were categorized according to Henderson classification. A survival analysis was performed followed by univariate and multivariate Cox regression to identify independent implant survival factors.

RESULTS: The revision free survival of the implant was 71% at 5 years, 63.3% at 10 years and 33.6% at 20 years with a mean MSTS score of 26 (23 – 28). The mechanisms of failure were

infection in 18%, structural failures in 6%, tumoural progression in 5%, aseptic loosening in 2% and soft tissue failures in 1%. Primary implants had lower infection rates than revision implants (8% vs 25%), ($p=0.001$). The rates of infection in silver coated and non-silver coated prosthesis were similar (17.4% vs 19.%) ($p=0.869$). The incidence of hip dislocation was 10%. Rotating hinge prosthesis had less failures than fixed hinge prosthesis (5.3% vs 11%). After Cox regression the independent factors associated with failures were the history of previous surgeries (HR 3.7, $p=0.041$), and the associated replacement of the proximal tibia (HR 3.8, $p=0.034$). At last follow up, eleven patients (13%) required amputation.

CONCLUSIONS: Total femoral replacement offers a reliable reconstruction option for massive bone loss of the femur, with good long term survival when is used as a primary implant. The use of rotating hinge at the knee, and dual mobility bearing at the hip may be adequate to reduce the risk of mechanical and soft tissue failure. Infection remains the main concern, and there is insufficient evidence to support the routine use of silver coated endoprosthesis.

56: Lengthening total femur arthroplasty, comparison between non-invasive and minimally invasive prosthesis

By Manuel Ricardo Medellin Rincon, Tomohiro Fujiwara, Rhys Clark, Lee Jeys

Abstract ID: 56

OBJECTIVE: To describe and analyse the survival and complications of non-invasive and minimally invasive lengthening total femoral prosthesis.

STUDY DESIGN: Retrospective case series.

MATERIALS AND METHODS: 24 expandable total femoral prosthesis (11 minimally invasive and 13 non-invasive) were implanted from 1991 to 2016. Implant characteristics, complications and functional results were recorded. A survival analysis was performed, followed by the classification of failures according to the Modified Henderson System.

RESULTS: The median age at surgery in the group was 11 years old. Minimally invasive implants had a 79% overall survival at 5, 10 and 20 years. The overall survivals for Non - Invasive implants were 84% at 5 years and 70% at 10 years. At last follow up 13 implants did not require further surgery. The overall complication rate was 46%. Complications were more common in minimally invasive prosthesis compared to non-invasive ones (54% vs 38%). The mean revision free survival times for minimally invasive and non-invasive prosthesis were 59 months and 49 months respectively. No statistical differences were observed in the overall implant survival, revision free survival or the distribution of complications between the two types of implant. Infection rates were also comparable in the two types of prosthesis (9% vs 7%). Comparing the function at last follow up, minimally invasive implants presented higher rates of leg length discrepancy (36% vs 23%), a smaller range of movement in the knee (0 – 62 degrees vs 0 - 83 degrees), longer times to recover the flexion contracture after lengthening

(3 vs 1 month) and a lower mean MSTs score (24.7 vs 27)

CONCLUSIONS: The survival and complications of non-invasive and minimally invasive lengthening total femurs are comparable; however, patients with non-invasive prosthesis have a more accurate limb length discrepancy correction, a better knee range of movement and an improved overall function.

57: Prognostic factors in the management of extremity located of giant cell tumours of bone with pathological fracture

by Manuel Ricardo Medellin Rincon, Tomohiro Fujiwara, Roger Tillman, Lee Jeys, Jonathan Stevenson, Jonathan Gregory, Michael Parry, Adesegun Abudu

Abstract ID: 57

OBJECTIVE: To investigate the prognostic factors for local recurrence in patients with pathological fracture through Giant Cell tumors of Bone (GCTB).

STUDY DESIGN: Retrospective case series

METHODS: 107 patients presenting with fractures through GCTB treated at our institution between 1995 and 2016 were retrospectively studied. A univariate analysis was performed, followed by multivariate analysis.

RESULTS: The initial treatment was conservative curettage +/- adjuvants in 61 patients (56%) and en-bloc resection with or without reconstruction in 48 patients (44%). The choice of treatment depended on tumour location, Campanacci tumour staging, intra-articular involvement and fracture displacement. Neoadjuvant Denosumab was used in nine patients with fractures through Campanacci stage 3 tumours. Local recurrence occurred in 28 patients (25%). Surgery > 6 weeks following fracture did not affect the risk of recurrence in both surgical groups. In Campanacci stage 3 tumours, en-bloc resection had lower local recurrences (11%), compared with curettage (46%). In tumors classified as Campanacci 2, intralesional curettage and en-bloc resections had similar recurrence rates (21% and 24%, respectively). After univariate analysis, the type of surgical treatment, location and the use of Denosumab were independent factors predicting local recurrence. Further surgery was required 33% more after intralesional curettage in comparison with resections (mean 1.59 vs 1.06 surgeries). All patients treated with denosumab followed by intralesional curettage developed local recurrence.

CONCLUSIONS: En-bloc resection offers lower risks of local recurrence in patients with pathological fractures through Campanacci stage 3 tumours whilst curettage remains a viable

option in terms of the risk of local recurrence for those with Campanacci stage 2 tumours. The benefits of Denosumab followed by intralesional curettage for patients with a pathological fracture still remain unclear.

60: Development of a New Single Metric for the Prediction of Pathological Fractures in Patients with Metastatic Disease of the Lower Limb

by Emma Howard, Gillian Cribb, Paul Cool, Robert Jones, Agnes Hunt

Abstract ID: 60

Objective: To evaluate the use of a new single metric in patients with metastatic disease involving the lower limb to predict impending pathological fractures, comparing it against the commonly used Mirels score.

Study Design: A prospective observational study was conducted, using existing data from a Tumour Units departmental database on the proportion of body mass that patients with metastatic lower limb disease can put through their affected and unaffected limb.

Methods: Data on the proportion of body mass that 76 patients with metastatic lower limb disease can put through their affected and unaffected limb, along with data on patients BMI, Mirels scores, and outcomes were collected. Exploratory statistical analysis was conducted initially, before survival analysis and simple regression analysis was performed. ROC curves were used to identify the optimum threshold level of single stance weight bearing and the Mirels score and new metric were compared using Bland-Altman plots and confusion tables.

Results: The Mirels score was shown to have poor inter and intra observer reliability. Analysis showed that the new metric was more objective than the Mirels score, and no patient below the threshold level of the new metric sustained a pathological fracture.

Conclusion: The Mirels score is commonly used in clinical practice to predict impending pathological fractures, but is limited by the fact that variables are subjective. The use of single stance body mass is a more objective measure to predict pathological fractures, where meeting the threshold of proportion of body mass that can be put through the affected limb indicates prophylactic fixation of the affected bone should be considered.

61: Can radical margins improve prognosis in primary and localized epithelioid sarcoma of the extremities?

by Andrea Sambri, Giuseppe Bianchi, Luca Cevolani, Davide Donati, Adesegun Abudu

Abstract ID: 61

OBJECTIVE AND STUDY DESIGN

The aim of this retrospective multicentric study is to study the role of surgery and the extent of margins required for optimal management of patients with localized epithelioid sarcoma (ES) of the extremities.

METHODS:

We evaluated 77 patients affected by ES of the extremities treated at two different Institutions (Istituto Ortopedico Rizzoli, Bologna, Italy and Royal Orthopaedic Hospital, Birmingham, UK). Margins were considered radical if the whole compartment involved by the tumour was resected.

RESULTS:

Mean age at diagnosis was 33 years; mean follow-up was 70 months (range 4 to 382). Twenty-two patients had metastasis at diagnosis. An amputation was required in approximately half of the patients but only 20 out of 35 of these patients had radical margins.

Estimated survival was 65.5% at 5 years and 50.9% at 10 years, with a better prognosis in patients with localized disease at diagnosis ($p < 0.001$). Among patients with localized disease, a significantly better survival was found in patients with primary tumours in which radical surgical margins were achieved ($p = 0.043$). Among 47 patients presenting with primary tumours, local recurrence-free rate was 72.9% at 5 years and 61.9% at 10 years, with a better local control achieved in patients with radical margins were achieved ($p = 0.026$).

CONCLUSIONS:

We believe that the best approach to improve both local control and survival is to aim for radical margins in patients with primary tumours. Therefore, the best chance for cure is if the first treatment is the right treatment, which we believe to be radical margins. Furthermore, it should be considered that not all amputations can give a real radical margin as well as that in peripheral locations radical margins can also be achieved with ray resections which can be realistically considered a type of limb salvage procedure rather than a true amputation.

62: Medium to long-term results of the Stanmore non-invasive extendible endoprosthesis in the treatment of bone tumours in patients younger than 12 years

by Andrea Sambri, Eric Staals, Marco Manfrini, Davide Donati, Adesegun Abudu, Manuel Ricardo Medellin, Christian Gray Stephens, Rob Pollock, Will Aston, Andrew Johnston, Tim Briggs

Abstract ID: 62

OBJECTIVE and STUDY DESIGN

The aim of this multicentric retrospective study is to assess mid- to long-term survival and functional results of Stanmore (Elstree, United Kingdom) distal femur (DF) non-invasive extendible EPR (NIEPR) in patients younger than 12 years.

METHODS

A total of 107 patients who underwent DF resection for primary bone tumours and reconstruction with Stanmore NIEPR at three different Institutions were included in the study. Mean age at implantation was 9.5 years (5 to 12). Twenty-six (24.3%) patients had metastasis at the time of diagnosis

RESULTS

Thirty-one patients died of metastatic disease after a mean of 33 months (range, 9 to 102). In all, 51 (47.7%) patients underwent additional operations. Only 44 patients developed major complications requiring prosthesis removal after a mean of 42 months (range, 7-103).

Excluding prosthesis removed for lengthening potential achieved, implant survival rate was 66.0% at 5 years and 48.5% at 10 years. Leading causes of implant failure were aseptic loosening and prosthetic infection (9 and 7 patients, respectively).

No correlation was found between the complication rate and the age at insertion.

Functional evaluation of the 65 surviving patients with NIEPR in site at the last follow-up revealed a mean MSTS score of 26 (range 13 to 29).

CONCLUSIONS

The leading cause for NIEPR removal was represented by lengthening potential achieved. However, since the lengthening potential is related to the size of the prosthesis, we considered it as a predictable event in NIEPR, in particular in very young children in which a small prosthesis is implanted. We confirmed a reduced risk of infection in DF NIEPR when compared to other sites.

NIEPR achieved reasonable limb-length equality and a good functional outcome for nearly all our patients. Although NIEPR seem technologically very exciting, it is important to inform patients and their parents about the significant risk of further revision surgery associated with this type of implant.

63: Myxofibrosarcoma of the extremities: prevalence and prognostic value of the “tail sign” on magnetic resonance imaging

by Andrea Sambri, Giuseppe Bianchi, Paolo Spinnato, Davide Donati

OBJECTIVE and STUDY DESIGN

The aim of this retrospective study is to analyze magnetic resonance imaging (MRI) features of primary myxofibrosarcoma (MFS) of the extremities and their correlation with patients' prognosis.

METHODS

One hundred and five adult patients (>18 years, 57 males and 48 females) with primary MFS of the extremities were selected from the prospectively maintained oncology database of our Institution in order to analyze a clinically homogenous group. Preoperative MRI including T1-weighted, T2-weighted, and Gadolinium (Gd)-enhanced MRI was retrospectively evaluated.

Mean age at the time of surgery was 69 years (range, 39-92). Twelve patients had metastasis at diagnosis. Four patients had grade 1, 20 grade 2 and 81 grade 3 MFS. Eighteen tumors were superficial, 87 deeply seated. Nineteen were small (<5 cm), and 86 large (>5 cm). At MRI, 38 MFS had highly myxoid features, 44 intermediate and 23 low; 43 patients had high Gd enhancement. Forty-two patients had a "tail" pattern.

RESULTS

An adequate margin was achieved in 91 patients.

At latest follow-up (mean 33 months, range 3-106) 26 patients (25%) died of the disease and 9 (9%) died of other causes.

Estimated sarcoma-specific survival was 72.4% at 5 years. Local recurrence occurred in 22 cases after a mean period of 19 months with a local recurrence-free survival of 67.9% at 3 years; LR was correlated to the presence of a "tail" pattern ($p=0.037$) and to high Gd-enhancement of the tumor ($p=0.041$).

CONCLUSIONS

Surgical treatment and prognosis of patients affected by primary MFS of the extremities present peculiarities that differ from other soft tissue sarcomas. The tail sign at MRI may indicate tumour infiltration along the fascial plane and can be associated with worse local recurrence-free survival. The tail sign is not only valuable for suggesting the diagnosis of MFS, but its recognition and describing the full extent is also essential in pre-operative planning. Radiologists should be aware of these MRI findings and inform the surgeon pre-operatively so that they can obtain a sufficient surgical margin to minimize the risk of local tumour recurrence.

68: Results of using mechanical growing endoprostheses in children with bone tumors

by Volodymyr Protsenko, Volodymyr Chorneyi

Introduction

Preservation of the affected limb in tumors of bones and joints is achieved by endoprosthetics - replacement of the affected bone fragment with artificial constructs. In modern onco-orthopedics, endoprosthetics is possible in cases of large joints lesions, bone diaphysis and total bone damage.

Purpose of the study

To show the results of using mechanical "growing" endoprostheses in children with bone tumors

Materials and methods

In the department of onco-orthopedics, 12 surgical interventions were performed in children with bone tumors, aged 9-15 years, in the volume of joint bone resection with subsequent implantation of "growing" modular endoprostheses. Morphologically met: osteogenic sarcoma - 8 cases, giant cell tumor of the bone - 2, chondrosarcoma - 1, Ewing sarcoma - 1. Endoprosthetics of the distal femur was performed in 7 patients, proximal tibia - 4, proximal humerus - 1. "Growing" endoprosthesis V.Link and Inmed (Ukraine) were used followed by a step-by-step correction of limb length, which was achieved by repeated surgery, as a rule, 2 times a year, by mechanical influence on a sliding prosthesis.

Results and its discussion

Recurrence of the tumor after endoprosthetics is not revealed. The functional evaluation was performed on the MSTS scale: 88.4% after resection of the distal femur with replacement of the defect with the knee endoprosthesis, 71.2% after resection of the proximal tibia, 68.8% after endoprosthetics of the shoulder joint.

Conclusion

In children with bone tumors, the use of "growing" modular mechanical endoprostheses is justified, which contributes to the restoration of function and the limb's ability to support.

71: Prevalence and Clinical Features of the Mazabraud's Syndrome; A Multicentre European Survey

by Bas Majoor, Michiel van de Sande, Natasha Appelman-Dijkstra, Andreas Leithner, Paul Jutte, Roberto Vélez, Tamás Perlaky, Eric Staals, Judith Bovée, Neveen Hamdy, Sander Dijkstra

Background

Mazabraud's syndrome is a rare disorder, characterized by the association of fibrous dysplasia (FD) with intramuscular myxomas. Data are scarce on the prevalence, clinical features, natural history and prognosis of this disorder. In this multicentre study of the European Musculo-Skeletal Oncology Society (EMSOS), we evaluated a series of patients from six European Centers.

Methods

All centers affiliated to the EMSOS were invited to include data on all patients with Mazabraud's syndrome who were seen in their centers between 1980 and 2015. Questions addressed included prevalence of Mazabraud's syndrome, type, severity and localization of FD lesions in relation to the myxomas, histopathology of myxomas and GNAS-mutation analysis when available.

Results

Thirty-two patients (22 female) from 6 centres were included in the study. The prevalence of Mazabraud's syndrome was 2.2% in the combined cohort of 1446 patients with FD and the syndrome was diagnosed a mean of 10.1 years after diagnosis of FD. The myxomas were predominantly localized in the upper leg. Excision was performed in 19 patients, recurrence occurred in 6 (32%) and revision surgery was necessary in 5 (26%) after a median of 8.5 years (range 1.9-16.0). High cellularity of a myxoma was associated with recurrence ($p < 0.05$). A GNAS-mutation was identified in 5 of the 6 (83%) myxomas.

Conclusion

This study is the first to provide data on the prevalence of Mazabraud's syndrome. Although outcomes of surgical resection were good, a quarter of the patients required revision surgery despite free resection-margins. High cellularity of myxomas was identified as a risk factor for recurrence. GNAS-mutations were identified in 83%, emphasising the shared origin of FD and myxomas. Our data show that FD patients with disproportionate complaints, irrespective of type, extent or severity, should be investigated for the possible presence of myxomas. Finally, this study represents a fine example of how international collaboration provide unique opportunities for investigating extremely rare entities such as the Mazabraud's syndrome.

73: Mid-Term Results of Osteoarticular Reconstructions of Pediatric Periarticular Bone Sarcomas With Free Fibula Head Flap

by Bulent Erol, Evrim Sirin, Osman Mert Topkar, Said Erkam Baykan, Ozer Ozturk, Cihangir Tetik

Abstract ID: 73

Objectives: To investigate mid-term radiological and functional outcomes of biological reconstructions after resection of pediatric periarticular bone sarcomas.

Study Design: Retrospective case series

Methods: Twenty-five children [average age 12 (6-18) years] with primary bone sarcomas [osteosarcoma (13), Ewing's sarcoma (11) and chondrosarcoma (1)] of the proximal humerus (17), distal radius (4) and proximal femur (4) underwent wide surgical resection and osteoarticular reconstruction with free fibula head flap with proximal articular surface (Figure 1A-C; Figure 2A-C). Fibular flap was combined with recycled autograft processed by extracorporeal irradiation in all proximal femoral reconstructions. The average follow-up was 46 (28-95) months.

Results: The union and hypertrophy of fibular flap were observed in 24 (96%) patients at 12 months; fibular flap continued to thicken till the end of 24 months. Fibular flap and recycled bone osteointegration rate in proximal femoral reconstructions was 100% at 24 months (Figure 1D; Figure 2D). Even though some remodeling of the fibular head was observed, morphologic and dimensional discrepancy between the fibular head and glenoid persisted in all 17 children with proximal humeral reconstruction. In four patients with distal radial reconstruction, articular surface of the fibular epiphysis had an initial anatomic match with the carpal bones, and gradually developed a more concave surface. The fibular head slightly remodeled in four proximal femoral reconstructions. Average final follow-up Musculoskeletal Tumor Society (MSTS) scores for lower and upper extremity reconstructions were 82% (76-90%) and 84% (72-92%), respectively. Three (12%) complications, including delayed union (1), implant failure (1) and wound problem (1) required re-operation. Donor site complications [six (24%); transient nerve palsy (5), wound problem (1)] were managed conservatively. The disease relapsed in 3 (12%) patients in terms of distant metastasis. Defect size and fibular flap length did not correlate with radiological parameters and MSTS scores ($p > 0.05$).

Conclusions: In this series, massive periarticular bone defects were reconstructed with free fibular head flap, and permanent stability and gradually increasing radiological and functional results were obtained. These results strongly supported the effectiveness of biological reconstructions in the management of periarticular bone sarcomas in children.

74: Pelvic ring reconstruction with a double-barreled free vascularized fibula graft after resection of pediatric pelvic bone sarcomas

by Bulent Erol, Evrim Sirin, Osman Mert Topkar, Tolga Onay, Said Erkam Baykan, Cihangir Tetik

Abstract ID: 74

Objectives: We aimed to analyze the outcome of pelvic ring reconstruction using a double-barreled free vascularized fibula graft (VFG) combined with internal fixation after limb-salvage internal hemipelvectomy in children.

Study Design: Retrospective case series

Methods: Eleven children [mean age 14 (11-19) years] underwent pelvic ring reconstruction using a free VFG combined with internal fixation after internal hemipelvectomy. The

diagnoses were Ewing's sarcoma (8), conventional osteosarcoma (2) and chondrosarcoma (1). Internal hemipelvectomy included type I (7) and type I+IV (4) resections; the fibular graft was placed in an intercalary double-barreled fashion and stability of the remaining pelvis and spinal column was provided by single or double columns of transpedicular screws and spinal rods (Figure 1A-E; Figure 2A-E). The average follow-up was 32 (18-75) months.

Results: Ten patients in this series were alive at the time of study [no evidence of disease (NED) = 7 ; alive with disease (AWD) = 3]. One patient was died of disease (DOD) at two years follow-up. The union and hypertrophy of VFG were observed in all patients at 12 months; fibular graft continued to thicken till the end of 24 months (Figure 1F; Figure 2F). Average final follow-up Musculoskeletal Tumor Society (MSTS) score was 80% (60-95%). A persistent mild to moderate limping was observed throughout follow-up in eight (72.7%) children. There was a slight limb length discrepancy (< 2 cm) in three (27.2%) and mild spinal asymmetry in two (18%) patients. There were two complications [deep infection (1), wound problem (1)] requiring re-operation. Except for one transient nerve palsy, no donor site complication was observed.

Conclusion: This reconstruction method can achieve a high rate of bone union and provide good functional outcome following resection of pediatric pelvic bone sarcomas localized in iliac wing with or without sacrum involvement. Even though the complication rate is high, conservative measures are possible to manage majority of these problems.

78: Revision rate of reconstructions in operated diaphyseal metastases

by Gilber Kask, Jyrki Nieminen, Vincent van Iterson, Toni-Karri Pakarinen, Maire Ratasvuori, Minna Laitinen

Abstract ID: 78

Objective

Skeletal metastases are the most common conditions encountered by oncologist orthopaedics. Lesions of sufficient size can weaken the bone and may need surgery. Indications for surgery vary from pain to actual pathologic fracture. Surgical treatment options are intramedullary nail fixation, open reduction and internal fixation with plates and screws and endoprosthetic reconstruction.

The aim of this study is to investigate the revision rate of reconstructions in surgically treated diaphyseal skeletal metastases.

Study design

Single institution retrospective study.

Methods

The patients, identified from a prospectively maintained database, are been diagnosed and surgically treated with diaphyseal skeletal metastases between 2003 and 2015 at Tampere University Hospital in Finland. Details of the patients' characteristics, clinical, surgical and oncological outcomes were analysed.

Results

This study included 103 patients with mean follow-up of 11 months (range 0-77 months). Sixty-three (61.2%) were females. Mean age at the surgery was 69 (range 38-94) years. Tumour location was humerus, femur and tibia, in 77 (74.8%), 23 (22.3%) and 3 (2.9%) patients, respectively. The most common primary tumour was breast cancer, in thirty-seven (35.9%) patients. Twenty-five (24.3%) patients were treated with intramedullary nailing, 71 (68.9%) with nailing and cementation, 7 (6.8%) with other technique. The implant survival was 81.8% at 1-year and 32.7% at 2-years for intramedullary nailing, 95.0% at 1-year and at 2-years for intramedullary nailing and cementation and 100% at 1- and at 2-years for endoprosthesis replacement. Complications occurred in 12 (11.7%) patients of which 7 (6.8%) required revision surgery.

Conclusions: Conclusions and relevance for EMSOS

Based on this study, nailing with cement augmentation has smaller revision rate of reconstructions in operated diaphyseal metastases and seems to have advantages over conventional nailing. The goal in stabilizing these lesions is to allow the patient to regain mobility and maintain a good functionality and high quality of life.

81: Revitalization and accelerated structural allograft union in femoral intercalary reconstructions with a vascularized periosteal flap. A preclinical study.

by Irene Gallardo, Roberto Velez, Matias de Albert, Alba López-Fernández, Sergi Barrera-Ochoa, Matias Vicente

Abstract ID: 81

Objectives: With advances in early diagnosis, chemotherapy, and accurate preoperative imaging, many tumors involving the metadiaphyseal region of long bones can be treated with epiphyseal preservation. Reconstruction with a massive bone allograft, despite its common use, is not exempt from biological and biomechanical complications. Although reported clinical series show that vascularized fibular or periosteal flaps seems to be helpful there are no comparative studies or histological evidence on the effect of an additional vascularized grafts on a devitalized structural bone graft. The objective is to evaluate the effect of a vascularized periosteal flap (VPF) on the revitalization and osteointegration of a massive bone femoral reconstruction in a rat model.

Study Design: Preclinical study comparing the addition of a VPF to an allograft intercalary reconstruction in a rat femur.

Methods: Sixty-four rats were allocated to two equal groups. Within the control group, critical size defects were performed on their femurs and reconstructed with cryopreserved structural bone allograft. In the experimental group, a vascularized periosteal flap from medial femoral condyle was associated with the allograft. After 4, 6 and 10 weeks, animals were euthanized and the femurs were harvested for analysis using histology (light and confocal microscopy and backscattered electron imaging), micro CT and biomechanical evaluation, analysing the osteogenic and revitalizing properties of vascularised periosteal flap.

Results: A significant increase in osteointegration in the experimental group femurs was observed, achieving 10-times the 10-week control group values. In contrast to the control group, extensive bone neoformation in the allograft surface was observed in the experimental group. In the biomechanical testing, despite not achieving equal results to the non-operated contralateral femur, experimental group femurs showed a torsion resistance pattern similar to them, suggesting the allograft was osteointegrated and adopting similar features to host bone. The confocal microscopy analysis showed a lineal and structured bone apposition related to periosteal flap, synchronic with a perivascular bone apposition. Finally, both scanning electron microscopy and histology showed an intramembranous ossification produced by the vascularized periosteal graft, also showing obvious signs of revitalization of the initial allograft in the experimental group.

Conclusions: The vascularized periosteal graft technique promotes and accelerates osteointegration and revitalization of a structural bone allograft through intramembranous ossification, achieving histological and biomechanical features similar to host bone in a preclinical rat model. Therefore, it should be considered as a complementary technique in structural bone allograft reconstructions in order to decrease the biomechanical complication rates in the clinical practice.

87: Are postoperative infections associated with the survival of osteosarcoma patients? Results of a multicenter study

By Christine Schwering, Maya Niethard, Georg Gosheger, Maria Smolle, Frank Traub, Simon Adam, Hans Roland Dürr, Jendrik Harges, Per-Ulf Tunn, Andreas Leithner, Dimosthenis Andreou

Abstract ID: 87

Objective: To examine the prognostic influence of the development of deep infection in the first year (D11) following wide resection and endoprosthetic reconstruction in osteosarcoma patients.

Study design: Retrospective, multicenter.

Methods: We analyzed the data of 447 patients with a newly diagnosed, high-grade osteosarcoma of the extremities, which underwent multi-agent chemotherapy and limb-

sparing surgery followed by endoprosthetic replacement between 1989 and 2016 in 5 centers in Germany and Austria and achieved a complete surgical remission of all detectable tumor foci. Survival curves were calculated with the Kaplan-Meier method and compared with the log-rank test.

Results: 49 patients developed a DI1. After a mean follow-up of 8.8 years for surviving patients, local recurrence (LR), event-free survival (EFS) and overall survival (OS) probability amounted to 5%, 67% and 78%, respectively. Pathological fractures and a poor response to neoadjuvant chemotherapy were associated with a higher LR ($p=0.035$; $p<0.001$) and a poorer EFS ($p=0.002$; $p<0.001$) and OS ($p<0.001$; $p<0.001$), while primary metastases were only associated with a poorer EFS ($p<0.001$) and OS ($p<0.001$).

No patient with a DI1 developed a LR. On the other hand, DI1 had no influence on EFS ($p=0.395$) or OS ($p=0.116$) in our entire cohort. A subgroup analysis showed that patients with a poor response to neoadjuvant chemotherapy and a DI1 had a significantly higher OS ($p=0.027$) compared to patients without a DI1, while there was no association between DI1 and OS in patients with a good response to neoadjuvant chemotherapy ($p=0.925$).

Conclusions: Although this establishes no causality, our results confirm the observations of previous studies, that osteosarcoma patients with a DI1 do not develop local recurrences after wide resections. Contrary to the results of these previous, smaller studies, DI1 was only associated with an improved OS in patients with a poor response to neoadjuvant chemotherapy.

99: Risk factors in Tenosynovial Giant Cell Tumours, evaluated in 17 international sarcoma centers

by Monique Mastboom, Floortje Verspoor, Anja Rueten-budde, Hans Gelderblom, Silvia Stacchiotti, Primo Daolio, Eric Staals, Marta Fiocco, Andreas Leithner, Alessandro Gronchi, Stefano Ferrari, Piero Picci, Harzem Özger, Robert Maki, Sander Dijkstra, Michele Boffano, Elisabeth Goldenitsch, Domenico Campanacci, Pierluigi Cuomo, Paul Jutte, Gerard Schaap, Anthony Griffin, X. Niu, Yang Sun, Emanuela Palmerini, Bart Schreuder, Michiel van de Sande

Abstract ID: 99

Objective

Tenosynovial Giant Cell Tumour (TGCT), previously Pigmented Villonodular Synovitis (PVNS), is a rare, locally aggressive neoplasm. Two types are distinguished: localized- and diffuse- TGCT. A multicenter-pooled database of individual patient data is essential to evaluate risk factors for recurrent disease.

Study design

Individual patient data from 17 sarcoma centers are the base of this international multicenter retrospective cohort study with histologically proven TGCT of large joints, between 1990-2016.

Methods

Out of 1156 collected cases, 875(522 female, median age at operation 36(range 6-89)years) are included with complete information. Median follow-up is 47.2(95%CI 43.0-52.2)months. 329 of 534 affected knees are diffuse-type, 72% primarily treated with open resection; 196 localized-type, 82% primarily treated with open resection.

Results

Total number of first recurrence is 381(44%). Number of recurrences in the knee, are for diffuse-type 222(58%) and localized-type 30(8%). Mean time from primary surgery to operation for local recurrence is 36.2(95%CI 32.9-39.5) months. At final follow-up 630(72%) patients show no evidence of disease (173 alive with disease, 8 death of other disease, 64 lost). 5-year recurrence free survival of all TGCT-patients is 51%(95%CI 47-55), in diffuse- type 41%(95%CI36-46); localized-type 75%(95%CI 68-82).

In univariate analyses, recurrences occurred significantly more frequent in diffuse-TGCT($p < 0.001$), male patients($p = 0.04$), the knee($p = 0.01$), arthroscopic-resection($p < 0.001$) and in recurrent patients($p < 0.001$). A significant higher risk($p < 0.01$) for recurrence in multivariate analyses was calculated in diffuse-type HR2.75(95%CI1.66-4.55), arthroscopic resection HR2.86(95%CI1.56-5.26) and recurrent patients HR2.42(95%CI1.46-4.03).

Conclusions

Risk factors of first local recurrence in TGCT are diffuse-type after arthroscopic resection and after previous tumour-surgeries.

Relevance for EMSOS

Identification of risk factors for recurrent disease is necessary to define eligible patients for (new) systemic and (neo)adjuvant treatment possibilities in TGCT.

100: Neither CSF1 translocation nor CSF1 over-expression predict clinical outcome and recurrence in Tenosynovial Giant Cell Tumours

by Monique Mastboom, Daisy Hoek, Judith Bovee, Karoly Szuhai, Michiel van de Sande

Abstract ID: 100

Objective

Clinically, localized- and diffuse-Tenosynovial Giant Cell Tumours (TGCT) are two different entities. However, histopathologically they seem identical. Colony Stimulating Factor1 (CSF1) are thought to be the driver mechanisms resulting in an admixture of neoplastic and reactive cells, coined as landscape effect. We aimed to correlate CSF1 expression patterns with TGCT tumour characteristics (localized-/diffuse-type) and clinical outcome (recurrence).

Study design

Cohort study

Methods

9 Localized and 16 diffuse therapy naïve knee TGCT patients >2 year follow-up, median age 44(IQR 26-61)years, 56% female and four additional TGCT look alike patients as negative controls (synovitis of unknown cause) were included. Haematoxylin-Eosin(HE) slides were used to establish histological diagnosis and for slide selection. Using digital correlative microscopy, CSF1 mRNA In Situ Hybridization and CSF1 split-apart Fluorescence In Situ Hybridization(FISH) probes and HE patterns were evaluated on selected slides. Samples containing >2/100 nuclei with a CSF1 split were considered positive. Results were correlated with TGCT-type and recurrence (2/9 localized- and 9/16 diffuse-TGCT), after median follow-up of 51(IQR 40-60)months.

Results

Irrespective of TGCT subtype, all cases showed CSF1 upregulation and in 76% CSF1-gene rearrangement was detected. Of the negative control cases, 50% also showed CSF1 overexpression, but without the typical CSF1 gene rearrangement. No correlation between CSF1 expression and rearrangement with clinical subtype and recurrence was detected. In all TGCT cases, a diffuse and infiltrating CSF1 pattern presented, in contrast to a linear CSF1 pattern in negative control cases.

Conclusions

Analysis of CSF1 expression pattern using mRNA ISH and locus specific CSF1 FISH could not clarify the difference in clinical presentation nor predict recurrence in TGCT.

Relevance for EMSOS

Although molecular differences between both TGCT types were not found, the combination of CSF1 mRNA ISH and CSF1 split-apart FISH might be used as an auxiliary diagnostic tool in unusual cases.

106: Multimodal neoadjuvant therapy including irradiation and locoregional hyperthermia for locally advanced soft tissue sarcoma

by Franziska Eckert, Lore Helene Braun, Michaela Unsöld, Ulf Lamprecht, Frank Paulsen, Barbara Hermes, Bence Sipos, Daniel Zips, Frank Traub

Abstract ID: 106

Objective: To evaluate radiologic and pathologic response and clinical outcome after multimodal neoadjuvant treatment including radiotherapy (RT) and locoregional hyperthermia (HT) in patients with high risk soft tissue sarcomas (STS).

Study Design: 30 patients of a prospective data collection at a tertiary cancer center with a specialized sarcoma center were treated with neoadjuvant RT and HT for high risk STS from

2012 to 2017. RT was administered to a median dose of 50.4 Gy, HT twice weekly at >40°C for 60 min. 25 patients received concurrent chemotherapy with Ifosfamide. 2 patients did not undergo surgery due to distant metastases after neoadjuvant treatment.

Methods: In addition to clinical characteristics and outcome, we performed volumetric analysis of tumor volume and vital tumor volume (without necrotic subvolume) in weeks 1, 3 and 5 of treatment for 13 patients undergoing MR-guided HT. For 10 patients MR based thermometry of a separately contoured volume of interest was analysed for CEM43 (HT time equivalent to treatment at 43°C), which was correlated with clinical features.

Results: Radiologic and pathologic responses were reached by 13 and 18 patients, respectively. 1.5-year disease-free survival (DFS) was 79%, responding patients had a trend to better DFS. A decrease in vital tumor volume during the second half of neoadjuvant treatment in imaging analysis predicted for pathologic response. High CEM43 was associated with large tumor size and seemed to predict pathologic response.

Conclusions: Multimodal neoadjuvant treatment of high risk STS leads to a significant patient subgroup achieving radiologic and pathologic responses, which were associated with better DFS. Efficient hyperthermia was possible in large tumors and seemed to predict pathological response and thus might influence patient outcome.

107: Lower Limb Lengthening with Intra-medullary Nail for Hipometry secondary to Sarcoma Resection. Preliminary Experience at the Rizzoli Institute

by Laura Campanacci

Abstract ID: 107

Purposes- Resection in the lower extremity of children frequently leads to limb discrepancy. Expandable prostheses require repeated surgeries and induce progressive loss of bone stock. Biological reconstructions may preserve the bone stock but leave unsolved the issue of growth. We report preliminary results with a lengthening nail in patients with femoral shortening due to previous reconstruction for bone tumors during childhood.

Methods- PRECICE® (NuVasive) is a magnetic nail for lengthening of femur and tibia. Lengthening procedures are self-performed. Since 2014 the nail was implanted in 17 cases, in 8 after resection for a bone tumor: 3 distal femur; 1 proximal femur; 1 pelvis; 1 rotationplasty, who were 4 to 14 years old when first operated (average 7 years), and presented a LLD of 43 mm (35 to 52 mm) at skeletal maturity.

In one girl (6 years, osteosarcoma) the nail stabilized an hemiarticular composite device; the tumor affected the proximal two thirds of the tibia, and we used this original reconstruction trying to allow a late lengthening of the tibia sparing the distal femur and the tibial bone stock.

Results- No major complications during lengthening were observed. The consolidation index was 1.7 (0.75-1.62) months/cm. Complete consolidation was obtained in all cases. Post-operative complications were: nail running back of 1 cm in one case; a fracture of previous reconstruction after the healing of lengthened bone in 2.

Conclusions- LLD is a frequent complication of surgery for bone tumors in children, who need repeated surgeries. The Precice lengthening nail length up to 8 cm, with non-invasive procedures, and is a promising aid to recover lower limb discrepancy after biological reconstructions in children with bone tumors. However, lengthening after oncologic resection treats very particular and selected cases: planning must consider the previous surgery and devices, which are frequently allografts.

109: Myxoid Liposarcoma: Treatment Outcomes from chemo- and radiation therapy

by Varun Chowdhry, MD, Saveli Goldberg, PhD, Thomas F. DeLaney, MD, Gregory M. Cote, MD, PhD, Ivan Chebib, MD, Jason Kim, BS

Abstract ID: 109

Objective: The purpose of this study was to review clinical and pathological information for patients treated for MLS at our institution to better understand the risks and benefits of pre-operative therapy, and to understand patterns of failure.

Study Design/Methods: A database of sarcomas was queried for patients who were treated for MLS at our institution between 1992-2013. Demographic, clinical, radiographic, pathologic, and treatment outcomes were captured.

Results: 85 patients with myxoid liposarcoma were identified. Median age of patients in this series was 41.8 years (range, 18-88 years). Median follow-up was 87.9 months. Median pre-operative radiation therapy dose was 50 Gy. Response to pre-operative therapy was determined by evaluation of necrosis rates, which is inversely associated with residual, histologically intact tumor. The mean and median histologic response rate to treatment for patients who received pre-operative radiation therapy was 70%. Five-year disease-free survival, distant metastasis-free survival, local recurrence free survival, and overall survival were: 78.6% (95%CI: 67.8-86.1), 84.7%(95%CI: 74.5-91.0), 95.6%(95%CI: 86.9-98.6), and 87.5%(95%CI: 77.2-93.3) respectively. On univariate analysis, there was a trend towards higher necrosis rates in patients who received concurrent chemotherapy, 84.7% (95%CI: 75.9-93.4), 69.5%(95%CI: 55.1-83.8), $p=0.061$. On multivariate analysis, the use of chemotherapy was significantly associated with increased rates of necrosis. Tumor size was the only parameter that was a predictor for disease free survival and overall survival on multivariate analysis. Tumor Size ≥ 10 cm and tumor grade ≥ 2 cm was associated with inferior overall survival.

Conclusions: Myxoid liposarcomas exhibit a high degree of sensitivity to chemotherapy and radiation therapy with high necrosis rates. Tumor size appears to be greatest predictor of long term disease control and survival. The addition of concurrent chemotherapy significantly increases necrosis rates. Further investigation is needed to determine whether chemotherapy improves survival, surgical outcomes, or local control, and in which patients can treatment be de-escalated.

111: Does the Modality of Radiation Therapy Used to Treat Liposarcomas of the Extremities Impact the Outcome?

by Andrew Park, MD, Jonathan Baker, BS, Karen De Amorim Bernstein, MD

Abstract ID: 111

Objective: The purpose of this study is to compare clinical outcomes and complication rates among IMRT, 3D-CRT and older radiation techniques like 2D-CRT in patients with liposarcomas of the extremities. Secondly, we compared outcomes for radiation therapy delivered at a tertiary referral center compared to community hospital based facilities.

Study Design/Methods:

Patients older than 18 years of age, treated between 1990 and 2015, and with histological confirmation of any type of liposarcoma of the extremities were included. Those with well-differentiated low-grade liposarcoma were excluded. Demographic data, clinical presentation, histology, grade, size, location, timing of treatment, radiation technique, complications, and local control rates were collected.

Results:

A total of 126 patients were identified. Of these, 61 (48%) were females. Median age was 49.5 years (range: 18-87). The most prevalent histology was myxoid liposarcoma (54%), and 94% of all tumors were located in the lower extremity. One hundred and eleven patients presented for initial treatment at our institution (88%). Of these, only two (1.6%) had metastatic disease at presentation. Fifteen patients (12%) were seen after intralesional resection or recurrence after an oncologic resection at an outside hospital. Seventy four patients (59%) received preoperative radiation only, 6 (4.8%) received postoperative radiation only, and 29 (23%) received pre- and postoperative radiation. Seventy one patients (64%) received radiation at a tertiary referral center.

Conclusion:

We were unable to demonstrate any statistically significant differences in outcomes based on the modality of radiation therapy used. While the infection rate was lower in patients treated at a tertiary care facility, this finding was not statistically significant. Further investigation is warranted to further elucidate the role that treatment at a tertiary referral center may play in the outcomes of liposarcomas of the extremities treated with radiation therapy.

113: Management of recurrent desmoid fibromatosis of the upper extremity

by Erik T. Newman, MD | Kevin A. Raskin, MD | Marco L. Ferrone, MD | Thomas F. DeLaney, MD | Francis J. Hornicek, MD, PhD | Joseph H. Schwab, MD | Karen De Amorim Bernstein, MD | Santiago A. Lozano-Calderón, MD, PhD

Abstract ID: 113

Objective: Desmoid fibromatosis of the upper extremity is a challenging clinical entity, because wide surgical resection often proves difficult and recurrence rates are high. We sought to assess the impact of radiation therapy and/or additional surgery on local control.

Study Design/Methods: Patients treated for upper extremity and axillary desmoid tumors since 1991 at our institution, which is comprised of two major academic teaching hospitals, were identified and retrospectively reviewed. The Fisher's exact test was used to compare the rates of re-recurrence and presence of residual / recurrent disease at final follow-up across treatment groups.

Results: We identified 32 patients; follow-up of approximately 1 year or greater was available for 28. Treatment included surgery alone, surgery plus radiation, radiation alone, and observation or medical management only. Among patients treated with surgery plus radiation, the average radiation dose was 53 Gy, as compared with 56 Gy among patients in the radiation only group. In patients who were treated for recurrence, re-recurrence occurred at a statistically-similar rate among all 3 treatment groups. At median final follow-up of 5 years (range, 0.8-24 years), rates of residual/recurrent disease differed significantly across groups, and were lowest in the surgery plus radiation group, among those for whom initial treatment of recurrence consisted of surgery plus radiation, surgery alone, or radiation alone ($p = 0.01$).

Conclusions: In this series of 28 patients, re-recurrence rates were high regardless of treatment. However, there were significant differences between groups with respect to disease status at median 5 year follow-up. This data demonstrates that in the treatment of recurrent upper extremity desmoids, high rates of local control can be achieved with a combination of surgery and radiation, though multiple resections may be required. However, the functional and oncologic benefit of achieving disease-free status and the potential role for medical management remain unclear.

118: Improved local control with pre-operative and proton beam radiotherapy regimes for central Ewing's sarcoma

by Johnathan R Lex | Scott Evans | Michael Parry | Jonathan Stevenson | Lee Jeys

Abstract ID: 118

Introduction

Current treatment for Ewing's sarcoma is multimodal, including systemic chemotherapy and local control with surgery and adjuvant radiotherapy. Traditional photon beam radiotherapy alone has proven to be acceptable in achieving local control[1]. Ewing's sarcomas arising within the axial skeleton have been associated with an overall worse prognosis[2]. Oncological outcomes for pre-operative radiotherapy and proton beam radiotherapy for central Ewing's sarcomas at our institution were reviewed.

Patients and Methods

37 patients with central Ewing's sarcoma who underwent surgical intervention between 1999 and 2016 were identified (30 pelvic, 4 spine, 3 thoracic). All patients underwent staging and received chemotherapy (primarily the VIDE regime) according to international guidelines. Radiation was used pre-operatively in 19 patients and post-operatively in 18 patients. Within this same cohort, 28 patients underwent traditional photon radiotherapy and 9 patients received proton beam radiotherapy, 7 received it pre-operatively and 2 received it post-operatively. Pre-and post-operative radiation doses were in accordance with Euro-ewing 99 and 2012 protocols.

Results

Mean ages were 19.8 and 17.1 and mean follow-up was 6.4 and 1.9 years in the post-operative and pre-operative radiotherapy groups, respectively. Good necrosis results (>90% necrosis) were seen in 7/18 of the post-operative patients and 18/19 of the pre-operative patients. There were significantly lower rates of local recurrence and metastasis with patients who received pre-operative compared to post-operative radiotherapy but no significant difference in overall survival (chi-squared test, $p=0.04$, $p=0.03$ and $p=0.42$ respectively). Patients who received proton beam radiotherapy had significantly lower local recurrence and overall survival rates but no significant difference in the rate of metastasis (chi-squared test, $p=0.05$, $p=0.03$ and $p=0.29$).

Conclusions

These early, mid-term results suggest that pre-operative radiotherapy and novel proton beam radiotherapy, in combination with an internationally recognised chemotherapy regime, may offer improved local control compared to post-operative and traditional photon beam radiotherapy for central Ewing's sarcoma, respectively.

122: Functional And Oncologic Outcomes Of Different Variants Of Intramedullary Nailing For Patients With Metastatic Lesion Of The Proximal Femur

by Ilkin Mikailov

Abstract ID: 122

Objectives

To perform the retrospective analysis of the results of different variants of intramedullary nailing in patients with risk of pathological fracture against the background of the metastatic lesions of the proximal femur.

Design & Methods

The study group consisted of 64 patients with the threat of a pathological fracture of the proximal femur on the background of metastasis of breast cancer, operated from 2010 to 2016,

Subgroup I - 24 patients, standard minimally invasive intramedullary osteosynthesis and puncture reconstruction of the defect with bone cement was performed.

Subgroup II - 22 patients, intramedullary osteosynthesis and puncture reconstruction of the defect with bone cement was performed after radiofrequency ablation of the metastatic focus.

Subgroup III - 18 observations. In this subgroup, we made extensive access to the proximal femur, oval osteotomy of the femur in the projection of the tumor center with radiofrequency ablation, curettage with bone spoons and high-speed burs, followed by intramedullary osteosynthesis and reconstruction of the femoral bone defect with bone cement.

The age of patients ranged from 32 to 65 years, the average age was 48.9.

In the early postoperative period, the level of pain syndrome was assessed using VAS, 1 and 6 weeks after the operation.

The final evaluation of the effectiveness of the treatment was performed 18 months after the operative treatment

The oncological result was evaluated from the point of view of stabilization of the local tumor process.

Evaluation of the functionality was performed using the MSTS scale, at 6 weeks and 18 months after the operation.

Results

Assessment of pain with the help of VAS in the early postoperative period (7 days after the operation) showed that in all three subgroups patients marked a significant reduction in the level of pain syndrome.

In X-ray and CT control, 10 (41.6%) cases of local progression were detected in the first subgroup, 4 (16.6%) patients underwent revision surgery, 40% of all relapses of this subgroup. In the second subgroup, against a background of prolonged growth of a metastatic focus accompanied by a cut-out syndrome, two patients (9%) underwent revisions, local relapse occurred in 8 cases (36.4%).

In the third subgroup, local progression was identified in 3 cases, but revision was performed in one case because of a fracture of the nail.

No cases of infectious complications were detected.

The hip joint function, assessed on the MSTS scale, did not have any significant differences in the early postoperative period, however, at the control follow-up stage, after 18 months in the third subgroup, we received the best remote functional result of 83.7% on the MSTS scale.

Conclusions

A retrospective analysis of the medium-term results of the use of prophylactic fixation in conjunction with radiofrequency ablation, open curettage and cementation in the treatment of metastatic lesions of the proximal femur showed that this technique, already at early postoperative periods, provides relief of pain syndrome and a good function of the operated limb with minimal risks of infectious complications.

124: High rate of infra-clinic metastatic spreading detected by whole-body magnetic resonance imaging (B-MRI) after treatment of myxoid liposarcoma (MLPS)

by Francois Gouin | Arthur Renault | Louis-Romée Lenail | Axelle Bertrand-Vasseur | Loic Bouilleau | Ramy Samargandi | Vincent Crenn | Philippe Rosset

Abstract ID: 124

Background. Myxoid liposarcoma of extremities and trunk is a frequent soft tissue sarcoma which has tendency to metastasized to unusual sites. Usual workup tools (computer tomography CT) and Fluorodeoxy-D-glucose positron emission tomography (FDG-PET) have a low sensibility to detect distant metastasis in this condition. Body-MRI have been reported to have a high sensibility (> 80%) and negative predictive value (>95%) for detection of bone and soft tissue metastasis of MLPS. We therefore report the results of a continuous serie of patients followed after surgical resection of a MLPS.

Patient and methods. 51 patients from to 2 reference soft tissue tumor centers have been followed-up respectively from 2006 and 2011. 4 patients were excluded because of the absence of regular MRI (claustrophobia). Mean age was 47.5 y.o [21-69]. MLPS were histologically confirmed by second lecture in our national network with molecular biological diagnosis in 43 of 47 patients. According to FNLCC grading, there were 23 grade 1, 14 grade 2, 3 grade 3 and 7 unknown. All the tumors were located under the fascia, in the lower limb except two on the trunk. Mean size was 110 mm.+ 46. B-MRI included the full spine, upper limbs and lower limbs until knees with contrast gadolinium in most cases.

Results. All the patients had the first B-MRI before or within the 6 post-operative months except 4 (respectively 10, 14, 17 and 34 months after the resection). 10 patients presented a distant infra-clinical metastasis (except one) at the longest follow-up (mean 45 + 30 months); only 1 patient presented a soft tissue metastasis at the diagnosis, 3 within the first year and all before the 43th post-resection month. Metastasis were located in soft tissue metastasis for 2 patients, 6 bone metastasis and 2 bone and soft tissue metastasis. Finally the 5 years

metastasis free survival was 0.69 [0.54-0.88]. None of the metastasis were unique one year after the diagnosis. 5 patients presented a local recurrence (17 yo 34 month after primary resection) : for 2 patients the local recurrence was followed by a distant metastasis and once it was diagnosed at the same time than the metastasis. 5 year local free survival was 0.83 [0.70-0.98]. 5 years overall survival and disease free survival were respectively 0.93 + 0.06 and 0.63 [0.47-0.83].

Distant metastasis wasn't correlated to tumor grade or size.

Conclusion. After surgical , B-MRI is able to detect infra-clinical distant metastasis. Bone and soft-tissue location are the most usual sites. Most of these metastasis occurred early after initial treatment justifying early staging of the tumor. Oligo or unique metastatic pattern have never been observed in our serie. The impact of early diagnosis and treatment of metastatic spreading in MLPS have to be assessed.

130: Silver ion levels in megaprotheses for re-infections following tumour resection or failed joint arthroplasty

by Joerg Friesenbichler | Werner Maurer-Ertl | Mathias Glehr | Elisabeth Smolle | Marko Bergovec | Walter Goessler | Andreas Leithner

Abstract ID: 130

Objective:

Silver-coatings have been introduced to reduce infection rates at megaprosthetic reconstructions. The aim of the current series was to report levels of silver ions in case of re-infection following implantation of a silver-coated device for periprosthetic joint infection (PJI).

Methods:

Between 2004 and 2014, 37 patients underwent limb salvage surgery using silver-coated MUTARS megaprotheses. Ten patients received the prosthesis following resection of a malignancy and 25 implants were used for revision for PJI as prophylaxis against re- infection or in case of poor soft tissue coverage. In two further cases a proximal femoral replacement was necessary for revision THA.

Blood was taken routinely and silver concentrations were determined using inductively coupled plasma mass spectrometry.

Results:

During the follow-up nine patients died and six patients were lost to follow-up. Twenty-two patients were available for determination of serum silver concentrations; most of them appeared routinely and some every once in a while.

After a mean follow-up of 45 months (range, 2-123), 9 patients had a re-infection of the silver-coated implant (=24%). In six cases a limb salvage procedure was possible and in three cases an amputation had to be done. The most germs for infection were Staph. epidermidis (n=4), Enterococcus faecalis (n=3) and Staph. aureus (n=2).

At time of re-infection the mean serum silver concentration was 62.4µg/kg (range: 1.9-132.0). At the latest determination before re-infection the mean concentration was 30.6µg/kg (range: 0.5-50.9) and decreased to 38.9µg/kg (range: 1.6-103.0) at an average of 11 months following revision.

Conclusion:

There were no systemic side effects of silver confirming the low toxicity potential. Silver coatings are not the definitive solution for PJI in megaprosthesis reconstructions, but as shown in the literature, it can be an additional weapon for patients who are at higher risk because of previous septic complications or local or systemic compromising conditions.

135: Complications and reoperations after surgery for 647 patients with spine metastatic disease.

by Nuno Rui Paulino Pereira

Abstract ID: 135

Objectives: To identify factors associated with (1) complications within 30 days and (2) reoperations after surgery for spine metastatic disease, and (3) to assess the effect of complications and reoperations on survival.

Study Design: Retrospective study

Methods: We included 647 patients who had surgery for spine metastatic disease between 2002 and 2014 at one of two affiliated tertiary care centers. Our primary outcomes were complications within 30 days after surgery and unplanned reoperations, our secondary outcome was survival.

Results: A 30-day complication occurred in 205 patients (32%). Lower albumin levels (odds ratio [OR]: 0.69, 95% confidence interval [CI]: 0.49 – 0.96, p=0.021), additional comorbidities (OR: 1.42, 95% CI: 1.00 – 2.01, p=0.048), pathologic fracture (OR: 1.41, 95% CI: 0.97 – 2.05, p=0.031), 3 or more spine levels operated upon (OR: 1.64, 95% CI: 1.02 – 2.64, p=0.027), and posterior/anterior combined surgery (OR: 2.44, 95% CI: 1.06 – 5.60, p=0.036) were associated with 30-day complications. Unplanned reoperations were performed in 115 patients (18%); prior radiotherapy to the spinal tumor (OR: 1.56, 95% CI: 1.07 – 2.29, p=0.021) was associated with receiving a reoperation. 30-days complications were associated with worse survival (HR 1.40, 95% CI: 1.17 – 1.68; p<0.001 [Figure 1]), whereas reoperations were not (HR 0.80, 95% CI: 0.64 – 1.00; p=0.054).

Conclusions: It is relevant for the physician to know what patients with spine metastatic disease deserve extra preoperative attention to lower the risk for postoperative morbidity – and potentially prolonging survival. A pre-operative plastic surgery consultation for soft tissue coverage should be considered when operating three or more spine levels and when a patient had prior radiotherapy. Aggressive nutritional supplementation could normalize hypoalbuminemia. Furthermore, surgeons should mind the increase in complications in patients presenting with pathologic fracture, undergoing a combined approach, and with any additional preoperative comorbidities.

138: A comparison of different reconstruction techniques after intercalary bone resection in bone tumour patients: A single center experience

by Wiebke Guder | Geror Gosheger | Markus Nottrott | Joanna Bohle | Jendrik Harges

Abstract ID: 138

Objective:

Vascularized fibula transplants, autografts as well as the use of modular endoprosthesis are commonly used to bridge intercalary bone defects after tumor resection. The indication for the type of reconstruction is based on parameters such as age, soft tissue coverage, treatment intention, prognosis and the surgeon's preference. Comparing the different types of reconstruction used in our center based on the analysis of the failure mode, influencing parameters and the long term functional, oncological outcome we try to improve the decision making and being able to get a more accurate recommendation for the individual patient treatment.

Patients and Methods:

A review of our prospective database (1990 to 2016) identified 168 patients that were treated with an intercalary bone resection in the upper or lower extremity for bone tumor treatment. Reconstruction was performed either by biological reconstruction (allograft, autograft, combination) or using a modular tumorprotheses. Patient demographics, surgical and oncological treatment details, management strategies and outcomes were analysed.

Results:

Treatment was caused by primary malignant bone tumours (n=144), soft tissue sarcoma (n=17) and bone metastases of carcinoma (n=7). 31 tumours were located at the upper 137 in the lower extremity. Reconstruction type was fibula only (n=45), allograft only (n=29), combined use of fibula /allograft (n=57), tumour endoprotheses (n=30) and bone transport (n=7). Average FU was 106 months. The highest failure rate was observed after allograft (38%) and combined fibula/allograft (38%) reconstruction. Fibula reconstructions were successful in 84%. Non-union (range 4-21%), infection (range 8-17%) and local recurrence (range 2-3%) were the most common reason for failure after biological reconstruction. For endoprotheses the main failure mode was aseptic stem loosening which occurred in 13,3 %. Failure of the

primary reconstruction due to complications led to final amputation in 15% (25/166) of all patients.

Conclusion:

Biological reconstructions using a vascularized fibula autograft offer the best chances of biological restoration and good overall outcome. Besides, tumour endoprosthesis reconstruction allow early full weight bearing and provide immediate primary stability. Though, high rates of aseptic stem loosening impair the overall satisfying results.

140: Incidence, outcomes and prognostic factors during 25 years of treatment of chondrosarcomas

by Veroniek M van Praag | Anja J Rueten-Budde | Vincent Ho | P D Sander Dijkstra | Marta Fiocco | Michiel AJ van de Sande

Abstract ID: 140

Objective. The purpose of this study was to determine the incidence, overall survival (OS) and prognostic factors for OS of CS patients, as well as investigate the efficacy of curettage.

Study design. We analyzed data of 2186 patients diagnosed with chondrosarcomas between '89-'13 from the Netherlands Cancer Registry. **Methods.** The effect of risk factors on OS was assessed with a multivariate Cox regression. Median Follow-up was determined with reversed Kaplan-Meier. OS was estimated using Kaplan-Meier method.

Results. The relative incidence of CS was 2.88 per million citizens between '89-'96, 4.15 between '96-'04 and 8.78 between '05-'13. Most of the increase in incidence came from atypical cartilaginous tumours/grade I chondrosarcoma (ACT/CS I)(fig.1). The 3-, 5- and 10-years survival were, respectively, 96%, 93% and 88% for ACT/CS I, 82%, 74% and 62% for grade II CS and 38%, 31% and 26% for grade III CS. Prognostic factors significantly associated with OS were age, histological grade, year of diagnosis, tumour location and size.

Conclusions. The incidence of CS, and especially ACT/CS I, has increased over time, which could be driven by both an ageing population and increased diagnostic imaging (fig.2). With the increased number of diagnosed ACT/CS I, the number of preventative curettages of this tumour has also increased. Despite the supposed preventative character of this treatment, the incidence of high-grade CS did not decrease.

142: Dynamic prediction for patients with high-grade extremity soft tissue sarcoma

by Anja J Rueten-Budde | Veroniek M van Praag

Abstract ID: 142

Objective. Increasing interest lies in the personalised prediction of disease progression for soft tissue sarcoma patients. Currently, available prediction models are limited to predictions from time of diagnosis or surgery. However, updated patient information during follow-up may change a patient's prognosis, which is not accounted for in these models.

The concept of dynamic prediction allows to include updated information as well as model time-varying covariate effects to make the prediction of overall survival at different times during follow-up. This information can be used to provide better-individualised treatment options that depend on the dynamic assessment of a patient's prognosis.

Study design. Information from 2232 patients with high-grade extremity soft tissue sarcoma who underwent surgery at 14 specialised sarcoma centres, was used to develop a dynamic prediction model with primary endpoint overall survival.

Methods. To estimate a patient's probability of surviving an additional 5 years from a particular prediction time point a proportional landmark supermodel was used. Landmark models are able to make predictions from a particular time, by using all (updated) information of patients still alive and in follow-up at that time.

Results. Surgical margin and tumour histology have a time-varying effect on overall survival. The effect of margin is strongest shortly after surgery and fades slightly over time. Local recurrence and distant metastasis during follow-up have a strong effect on overall survival and must be accounted for to make updated predictions. See two examples in figure 1.

Conclusions and relevance. The presence of time-varying effects for some prognostic factors as well as the effect of the time-dependent variables local recurrence and distant metastasis on survival suggest the inadequacy of baseline models for predictions during follow-up. To the best of authors' knowledge, this is the first dynamic prediction model in this field. The model will be made freely available through the PERSARCa-fter surgery mobile application.

143: Prognostic factors for survival, local recurrence and distant metastasis in high-grade chondrosarcomas

by Veroniek M van Praag | Dominique Molenaar | Paul Jutte | Gerard R Schaap | Ingrid C van der Geest

Abstract ID: 143

Objective. This study aims to identify prognostic factors for survival, local recurrence (LR), and distant metastasis (DM) in patients with high-grade chondrosarcomas (CS).

Study design. A retrospective cohort study of 185 patients with high-grade CS, treated at two principal centres in the Netherlands.

Methods. Grade, tumour location, pathological fractures, soft tissue extension, tumour size, surgical margins, long bone location, LR and DM were assessed as possible prognostic factors. Kaplan-Meier and Cox-regression were used to identify statistical significance.

Results. The mean DSS for grade II, III and IV were 18.3 years (95%CI 16.38-20.2) 9.75 years (95%CI 6.4-13.07), and 7.3 years (95%CI 4.15-10.5) respectively. The development rates of LR per grade were 33,9%, 52,4%, and 25%, with grade ($p=0.007$ HZ 1.1 and 2.96) and surgical margins ($p=0.001$, HZ 2.6) associated with the development of LR. The development rates of DM per grade were 16,5%, 38,1%, and 54,5%. Soft tissue extension ($p=0.034$) and tumour size ($p=0.029$) only in univariate and grade ($p=0.003$, HZ 1.3 and 2.8) was of significant influence on the development of DM. Grade ($p=0.005$: HZ 5.2, 95%CI 1.65-16.39) and LR ($p<0.0001$ HZ 14.08, 95%CI 6.17-32.25) were associated with disease- specific survival (DSS) in multivariate analysis. Soft tissue extension ($p=0.027$), tumour size ($p=0.039$), surgical margins ($p=0.041$) and DM ($p<0.0001$) were only in univariate analysis of significant influence.

Conclusions. Prognostic factors for DSS were soft tissue extension, tumour size, surgical margins and the development of LR and DM. The development of pathological fractures was not significantly associated with worse DSS. Surgical margins were of significant influence on the development of LR and soft tissue extension and tumour size on the development of DM.

152: Systemic Treatment of Aggressive Fibromatosis

by Diedkov Anatolii | Kukushkina Maria | Korovin Sergiy | Diedkov Sergiy

Abstract ID: 152

Background: Several pharmacological agents have been associated with clinical benefit in patients with aggressive fibromatosis (AF) but question about type of systemic therapy and their duration is still discussed.

Objective: To evaluate the efficacy of systemic treatment in patients with AF.

Methods: 38 patients with AF were included in study (14 (36.8 %) patients had primary and 24 (63.2 %) recurrent tumor; median age 33.0; 12 (31.6 %) male, 26 (68.4 %) female; location on the trunk 17 (44.7 %), upper limbs 5 (13.2 %), lower limbs 11 (28.9 %), intraabdominal 5 (13.2 %); 18 patients were treated with chemotherapy and hormonal therapy (methotrexate, vinblastine, tamoxifen) - 1st group, 6 with hormonal therapy - 2nd group, 8 with chemotherapy - 3rd group, 6 with anti-inflammatory drugs - 4th group.

Results: In 1st group partial response (PR) was observed in 1 (5.6 %), stable disease (SD) in 10 (55.6 %), disease progression (PD) in 7 (38.9 %) patients; median time to first response (FR) was $3\pm 0,7$ months, median duration of response (DR) 6 months, median time on treatment (TT) 6 months. In 2nd group SD was in 6 (100 %); median time to FR was $3\pm 0,4$ months, median DR 8 months, median TT 6.5 months. In 3rd group SD was observed in 8 (100 %)patients; median time to FR was $3.3\pm 0,4$ months, median DR 9 months, median TT 5 months. In 4th

group PR was in 1 (16.7 %), SD observed in 4 (66.6 %), PD in 1 (16.7 %) patients; median time to FR was 3±0,3 months, median DR 9.5 months, median TT 8 months.

Conclusions: Regardless of treatment SD was the most frequent in all groups and was achieved after 3 months of therapy. Disease control was durable during therapy and out of treatment.

159: Clinical relevance of sentinel lymph node biopsy in clear cell sarcoma (CCS) and epitheloid sarcoma (ES)

by Carmen Tiedke | Maya Niethard | Mathias Werner | Henrike Boldt | Per-Ulf Tunn

Abstract ID: 159

Objective:

CCS and ES are rare (<1% of STS) and associated with an increased rate of LNmetastasis. A SN biopsy can be performed in pretherapeutic staging. Aim of this prospective study is to evaluate the clinical relevance of a SNbiopsy in these tumor entities.

Methods:

A SN biopsy was performed in 13 patients with CCS (m: w = 5: 8) and in 7 with ES (m: w = 5: 2), treated between 1990-2017 without clinical evidence nor sign for LN-and distant metastases. Median age at time of diagnosis with CCS was 42 years (20-65 years), with ES 44 (26-65 years). CCS was more located in the lower extremity (n = 8), ES in the upper extremity (n = 5). Except for one patient with CCS all patients got an unplanned primary tumor resection in an external clinic. Median follow-up time was 67 months (7-150) for CCS / 40 months (9-94) for ES. Median survival of the patients who died of CCS was 11 months (6-121).

Results:

In each patient at least one SN is identified. Median size of SN was 25 mm (CCS) and 18 mm (ES). 5 of 13 (38.5%) with CCS, had a positive SN. 5 of 13 are without disease, 6 DOD (4 with positive SN). 5 of 13 were amputated after earlier R1 resection. Positive SN was accompanied by poor prognosis. 6 of 7 with ES had a negative SN. 1 patient developed regional lymph node metastases after negative SN biopsy after 15 months. Here a LN dissection was performed. 1 patient with false negative SN biopsy died from generalized metastasis. Summary: SN biopsy has a high prognostic value in CCS. Further studies should investigate whether an early detection and treatment of these metastases improves the prognosis. It has no clinical relevance in ES.

161: Prognostic significance of timing of pulmonary metastasis occurrence on the outcome of osteosarcoma patients

Abstract ID: 161

Background. Complete metastasectomy is the best predictor of survival in osteosarcoma patients with pulmonary metastases. Controversy existed in the literature about the prognosis of the timing of occurrence of lung metastasis.

Patients and methods. Data were obtained retrospectively on all consecutive metastatic osteosarcoma patients from 2008 to 2016 in author's hospital. These patients were categorized into 3 groups: group 1, patients with lung metastases at the initial presentation; group 2, lung metastases identified during treatment; group 3, lung metastases identified after completion of the treatment for the primary osteosarcoma. follow-up data were obtained through Jun 2017

Results. During the study period, we had 371 patients with osteosarcoma. Among those patients, 170 patient had suspected lung metastasis (85 initially, 32 during treatment and 53 after completion of treatment). Of the 170 patients with suspected pulmonary metastasis, 99 patients had surgery. Out Of the 99 patients who had metastasectomy, 88 patients were positive for malignancy (G1n=37, G2n=18 and G3 n=33). The median age was 13years. The mean follow-up duration was 39 months (range 8 to 99 months). 138 thoracotomies were done ,Wedge resection n=127 ,lobectomy n=11 .The 5 –year OS and EFS were 38.1% a 25% respectively. The 5-year OS were 46.1% for group 1, 8 %for group 2, 48.8 %for group 3 (p <0.001) . The 5-year CEFS were 26.1% for group 1, 6.5 %for group 2, 27 % for group 3 ,(p< 0.001) . Patients who developed metastasis during chemotherapy had a significantly poorer survival than the other groups. However, there was no survival difference (OS and CEFS)between group 1 and group 3(p= 0.265and 0.135).**Conclusion.**Timing of occurrence of osteosarcoma lung metastasis is an important prognostic factor among patients who had metastasectomy. Patients who had metastasis during treatment had the worst survival rate.

162: Outcome After Endoprosthetic Reconstruction of Proximal Femoral Tumors: A Systematic Review

by Stein J Janssen | David WG Langerhuizen | Joseph H Schwab | Jos AM Bramer

Abstract ID: 162

Objective: We assessed the outcome after proximal femur resection followed by endoprosthetic reconstruction of proximal femoral tumors to better inform our patients and improve surgical decision making. Specifically, we assessed revision rate, reason for revision, limb salvage rate, implant longevity, and functional outcome. Results for modular prostheses (MP) and allograft-prosthetic composites (APC) were reported separately.

Study design: A Systematic Review

Methods: A literature search was performed January 2018, using the Pubmed, Embase, and Cochrane database yielding 4,014 publications. We included 38 studies describing 40 treatment arms: 30 studies reported on 1,602 MP's (41% male, mean age:26-68 years, 36% malignant, 4% benign, 60% metastasis), 10 studies reported on 216 APC's (45% male, mean age:29-51 years, 76% malignant, 19% benign, 5% metastasis).

Results: Overall revision rate was 11% (0-69%) for MP and 24% (0-50%) for APC. Revision rate for soft-tissue failure was 1.3% for MP, and 0% for APC. Revision rate for aseptic loosening was 2.9% for MP, and 2.3% for APC. Revision rate for structural failure was 2.3% for MP, and 13% for APC. Revision rate for infection was 2.2% for MP, and 6.5% for APC. Revision rate for tumor progression was 1.8% for MP, and 1.9% for APC. Amputation rate was 2.7% for MP (32% for infection, 64% for recurrence, and 4.5% for instability) and 1.4% for APC (33% for infection, and 67% for recurrence). Five and ten year revision free implant survival ranged from 63-100% and 55-86% for MP and from 84-100% and 81-86% for APC. The average MSTS score ranged from 58-94% for MP, and from 58-93% for APC.

Conclusions: Revision rates for proximal femoral reconstructions after tumor resection are high. Failure modes differ between modular prostheses and allograft-prosthetic composites. Reported complication rates and functional outcome helps surgeons inform their patients and aids surgical decision making.

164: Clinical significance of MET, TWIT, APC and TOP2 gene status as a diagnostic and prognostic signature in pediatric osteosarcomas (OS)

by ENTZ-WERLE Natacha | TRIPP Aurélien | LITZLER Marie | WEINGERTNER Noelle | GASPAR Nathalie | BRUGIERES Laurence | PIPERNO- NEUMANN Sophie | MAREC Perrine | DONTENWILL Monique

Abstract ID: 164

The survival of pediatric OS is stable worldwide since two decades. The management of those cancers is really lacking new approaches to classify closely the patients and adapt thereafter the treatments. The objectives of our allelotyping and qPCR (quantitative PCR) developments was to determine the impact of the tumor molecular profile in the initial biopsy, in the tumor resection after neoadjuvant chemotherapy and their molecular correlations with survival and the tumor histological response after treatment. The qPCR panel based on genes of bone dedifferentiation and cell proliferation was used in the large tumor cohort of the French national protocols treated pediatric osteosarcomas OS94 (115 patients) and demonstrated a significant prognostic impact of 4 genes MET, TWIST, APC and TOP2. We applied retrospectively in the cohort of OS2006 (100 patients) the same molecular assessment comprising the targeting of those 4 genes with 2 techniques evaluating the rearrangement by

allelotyping (specific microsatellite analyses) and the copy number of those genes by qPCR (a SYBR Green I dye method using the Light Cycler 480 technology). With these methods, we are able to determine frequent rearrangements in the regions containing these 4 genes and a statistically significant correlation between the presence of a deletion or an amplification and a worst outcome. Combining the 4 genes, the signature was significantly predicting the outcome of the patients diagnosed for an OS. Those genes were also analyzed in the primitive tumor after the neoadjuvant chemotherapy comparatively to the initial biopsy and showed a correlation between the residual presence of gene abnormalities and risk relapse. This molecular signature seems to be clearly associated with patient outcome and was able to provide evidence that this approach is a powerful tool to be used now prospectively in the next protocols.

165: The Clinical Outcome of Dedifferentiated Low-grade Osteosarcoma Based on Molecular Pathological Confirmation: A Retrospective Cohort Study in Single Institution.

by Shunichi Toki | Eisuke Kobatashi | Akihiko Yoshida | Shintaro Iwata | Akira Kawai

Abstract ID: 165

Objective: Low-grade osteosarcomas occasionally progress to high-grade osteosarcomas, which is called “dedifferentiation.” However, the criteria of diagnosis, optimal treatment and prognosis of “dedifferentiated” low-grade osteosarcoma (DLOS) are unclear. The objective of this study is to decide the criteria, clarify the clinical outcome and analyze relationships of clinicopathological characteristics and oncological outcome in DLOS.

Study design: Retrospective cohort study.

Methods: Thirteen patients with DLOS, the criteria of which were concurrence of low- grade and high-grade component in the lesion, and positive immunohistochemistry of MDM2 and CDK4, and 51 patients with conventional osteosarcoma (COS) age-matched to DLOS cohort between 1991 and 2016 were retrospectively reviewed. Comparison of baseline and clinical outcomes between both groups was carried out by statistical analysis.

Results: Five-year overall survival rate in DLOS and COS was 85.7%, 77.1% ($P=0.728$), and 5-year progression-free survival rate was 57.7%, 44.9% ($P=0.368$), respectively. The median ratio of dedifferentiated component, in comparison to the whole tumor, was 65% (ranged, 5-95%). Adjuvant chemotherapy was mostly according to regimens for high-grade osteosarcoma. The histological evaluation of 9 surgical specimens revealed that the responses to chemotherapy were grade 1 ($n=7$), grade 2 ($n=1$) and grade 3 ($n=1$). There were 1 instance

of local recurrence and 5 cases of distant metastasis. The disease statuses at the final observation were CDF (n=8), NED (n=2), AWD (n=1), and DOD (n=2) with the median follow-up period of 50 months.

Conclusions: Novel 13 DLOSs were diagnosed in this study by clinicopathologically fixed standards. Instead of poor response to chemotherapy, clinical outcome of DLOS was relatively good clinical outcomes similarly to COS. We should consider the accumulation of a greater number of DLOS cases according to current criteria and assess whether the treatment strategy for COS is adequate for DLOS.

168: Substance response testing of primary human high-grade osteosarcoma cell lines cultivated in a chick chorio-allantoic membrane (CAM) model: a proof of principle.

by Wiebke K. Guder | Gregor Hauschild | Georg Gosheger | Jendrik Harges | Markus Nottrott | Arne Streitbürger

Abstract ID: 168

Response to chemotherapy is an important factor in successful treatment of osteosarcoma patients and an increased knowledge on drug sensitivity might affect future treatment protocols. Therefore, it's the objective of this preclinical experimental study to propose a drug response-testing model of primary high-grade osteosarcoma cell lines cultivated on the chick chorioallantoic membrane.

In five patients who underwent incisional biopsy and were diagnosed with high-grade osteosarcoma, spare biopsy tissue was transferred into a non-immortalized primary cell culture. Incubation was performed at 37°C and 5% CO₂. Fertilized eggs were incubated at 37.5-38° C at a humidity of 70-80%. On day 3 of egg development (ED), eggs were opened under laminar airflow. On day 10 ED, cells from primary cell cultures were harvested and suspended at a concentration of 10⁶ cells/100µl in extracellular matrix (ECM) gel. 100µl ECM gel was applied per egg (n=20). On day 16 ED, either 25µl of 20µmol/l doxorubicin (treatment group; n=4) or 25µl of culture medium (control group; n=6) were applied to the eggs. On day 17 ED, the CAM membranes were covered in a formaldehyde solution for 30 minutes. Then, the area of interest (tumor growth) was excised from the CAM and processed for histological examination.

Transfer of a biopsy aliquot into a non-immortalized primary cell culture was successful in all specimens. Egg survival at days 3, 10 and 17 was 86.3%, 54.5% and 37.5%. After inoculating the eggs with tumor cells on day 10, 50% of eggs died before application of doxorubicin on day 16. After application of doxorubicin, all eggs survived until the experiment was terminated 24 hours later. Histological examination found a response to doxorubicin in all four specimens.

The CAM model as proposed in this study shows promise as a preclinical alternative to animal experiments to answer questions arising in musculoskeletal tumors.

172: Exploring ex-vivo functional interplay between tumor cells and immune system in chordoma

by Federica Torricelli | Benedetta Donati | Alessia Ciarrocchi | Andreas Leithner | Bernadette Liegl-Atzwanger | Tobias Madl | Beate Rinner

Abstract ID: 172

Objective: The interaction of tumor cells with the surrounding microenvironment including tumor associated fibroblasts and immune cells is a major research area. However, limited attention has been focused upon interactions between cancer cells and normal cells. Recently we succeeded in the establishment of a clival chordoma cell line named MUG-CC1 and a spontaneously established non-tumorigenic lymphoplastoid cell line MUG-CC1-LCL originating from the same chordoma patient. The aim of this study was to figure out the influence of non-tumorigenic cells on chordoma cells.

Study design: MUG-CC1 and non-tumorigenic lymphoblastoid cells were co-cultured in different conditions, proliferation assays, detection of supernatant in terms of metabolic profile as well as RNA-Sequencing were done.

Methods: To this end we performed RNA sequencing gene expression profile analysis and in vitro experiments to assess proliferation, migration and growth behavior. We also performed metabolic analysis of metabolic profile by NMR technology. The experimental was set up in triplicates with cultivation of MUG-CC1 and MUG-CC1-LCL alone and co-cultivation of both cell types. Lysate and supernatant of each cultivation condition was investigated. We also explored by RNA-Seq changes in the gene expression profile of MUG-CC1 and MUG-CC1-LCL upon co-culture. Exposure to autologous immune cells induced profound changes in the gene expression profile of MUG-CC1.

Results: A total of 811 were deregulated in MUG-CC1 upon co-culture with MUG-CC1-LCL of which the vast majority were up-regulated. Ingenuity Pathway Analysis (IPA) showed that exposure of MUG-CC1 to MUG-CC1-LCL induced a strong activation of immune-related and inflammation related pathways. In particular activation of Interferon γ (Z-score= 8.118, p-value= 8.34e-29) and NF κ B (Z-score= 6.037, p-value= 1.25e-16) signaling seemed to be crucial in this interplay.

Conclusion: The interaction of chordoma cells with immune cells was clearly demonstrated and can be used in further consequence as innovative therapy options.

179: Tumors of the proximal femur – Comparing results after resection and either standard or tumor endoprosthetic reconstruction

by Martin Lueg | Alexander Klein | Andrea Baur-Melnyk | Thomas Knösel | Volkmar Jansson | Hans Roland Dürr

Abstract ID: 179

Objective

The aim of this study was to evaluate function, complications and endurance of two types of prostheses (standard vs. tumor) implanted due to a primary or secondary tumor of the proximal femur. The hypothesis was that patients with standard prostheses benefit more in terms of functionality, lesser complications and durability than those with tumor prostheses.

Methods

110 patients who underwent endoprosthetic reconstruction between 1980 to 2008 were included; 62 tumor endoprostheses and 48 standard replacements. The average age at the first surgery for the 51 men and 59 women was 62.7 years (16-91). The follow-up period averaged 2.6 years (7 days to 16.8 years).

Results

In 81 patients MSTS Score and the TESS data could be collected. MSTS was on average 13.8 points (median 13). TESS mean was 75.3 points, median 74.5 points. The MSTS for standard prostheses averaged 14.3 points with a median of 13, and in tumor prostheses 13.4 points with a median of 13. For the TESS, the average was 73.4 and 76.8 points, respectively. The median was 72 and 77 points. Overall dislocations were reported in 12 patients (it also came to recurrent dislocations) in 9 patients with tumor prostheses (14.5%) and 3 patients with standard prostheses (6.3%). 7 cases of infection were seen (5.6%). Of all infections, 4 occurred in the tumor prostheses (5.6%) the standard prostheses showed an infection rate of 5.8%. Aseptic loosening occurred in 2 tumor prostheses (2.8%), affecting 1.6% of all patients. Aseptic loosening in the standard prostheses was not been reported.

Conclusions

Good functional results, successful pain reduction, as well as a prosthesis endurance which in most cases exceeded patients' lifetimes were seen in both groups. The hypothesis of a worse outcome after reconstruction with tumor prostheses could not be confirmed.

185: Denosumab in Bisphosphonate- Refractory Fibrous Dysplasia

by Bas Majoor

Fibrous dysplasia (FD) is a rare bone dysplasia due to an activating mutation of theGNAS- gene. Several case studies report on the effectiveness of denosumab, a monoclonal antibody to RANKL. We present a first case series on denosumab treatment in FD.

All patients with FD who were treated with denosumab at the Outpatient Clinic of the LUMC between 2013 and 2017, with a minimal follow-up of 9 months, were included. Patients were treated with denosumab subcutaneous injections of 60mg 3-6 monthly on the basis of high bone turnover with associated complaints of pain. Twelve patients (10 female) were treated with denosumab with a median follow-up of 14.5 months (range 13-29). One patient had monostotic craniofacial FD, 6 had polyostotic FD and 5 had McCune-Albright syndrome. Median Skeletal-Burden-Score was 20.8 (0.3-64.7). All patients were previously treated with bisphosphonates, predominantly with olpadronate, with a mean cumulative dose of 2650mg (± 1964 SD), which led to normalisation of bone turnover in 5 patients (45%).

Patients with a 3-monthly scheme had significantly better improvements in bone turnover markers (BTM) compared to patients on a 6-monthly scheme regarding ALP ($p=0.007$) and P1NP ($p=0.025$) but not for CTX. In 8 patients BTM normalized, 5 of whom had not reached normalisation of BTM after long-term treatment with bisphosphonates. Denosumab was well tolerated and no side effects were reported.

The results of this study show that denosumab may provide a well-tolerated alternative in patients failing bisphosphonate therapy. Three-monthly dosage schemes with 60mg appear to have a promising effect on bone turnover markers and pain. Our data provide sufficient information for the design of a controlled study of the efficacy and tolerability of denosumab in severely affected patients.

193: Long term outcomes of iliosacral resection for primary bone tumours with no reconstruction

by Sanjay Gupta

Aims

Iliac wing (Type I) or iliosacral (type I/IV) pelvic resections for primary bone tumours create a large segmental pelvic ring defect. When no reconstruction is performed, the residual ilium collapses back onto the remaining sacrum over time thereby creating an iliosacral pseudarthrosis. The goal of this study was to evaluate the long term oncologic outcomes, complications and functional outcomes associated with these pelvic resections without bony reconstruction.

Methods

Thirty-three patients who required a type I or type I/IV pelvic resection for with resultant pelvic ring discontinuity and no osseous reconstruction between 1989 and 2015 were identified from our prospectively collected database. Local recurrence-free, disease-free and overall survival were assessed using the Kaplan-Meier method. Patient function was assessed using the MSTs and TESS scoring systems.

Results

The 22 men and 11 women had a mean age of 35 years (15-85) and mean follow-up was 159 months. The diagnoses included 17 chondrosarcomas, 4 giant cell tumours, 4 Ewing's sarcomas, 3 osteosarcomas and 5 other bone sarcomas. Four patients presented with metastatic disease. 5-year local recurrence-free survival was 100%, 5-year metastasis-free survival was 85.2% and overall survival was 81%. Eighteen patients (54.5%) experienced complications: 13 wound healing complications/infections, 3 fractures, 1 pulmonary embolism and 1 hip dislocation. Most complications occurred early following surgery. The mean functional scores were 21.1 for MSTs 87, 67.3 for MSTs 93 and 76.2 for TESS.

Conclusion

Patients requiring type I or type I/IV pelvic resections can anticipate very good oncologic outcomes. Complications were generally acute in nature and easily manageable. These patients achieved good functional outcomes without the need for reconstruction of the osseous iliosacral defect.

195: Infected pelvic endoprostheses: not your average prosthetic joint infection

by Michaël P.A. Bus | Philip T.J. Sanders | Robert J.P. van der Wal | Michiel A.J. van de Sande | Jos A.M. Bramer | Gerard R. Schaap | Mark G.J. de Boer | Henk Scheper | P.D. Sander Dijkstra

Abstract ID: 195

Objective

Deep infection is the main complication and cause for failure of pelvic endoprostheses. Chemoprophylaxis and effective treatment of infected implants in part depends on the epidemiology of the causative micro-organisms. We aimed to gain further insight in this challenging clinical problem by assessing the micro-organisms that caused deep infections of pelvic endoprostheses.

Study design/methods

From a total of 67 patients who underwent endoprosthetic reconstruction for a pelvic tumor, we retrospectively identified 17 patients (7 males, 41%) with a deep surgical site infection. Eleven patients (65%) had a LUMiC, six (35%) a pedestal cup endoprosthesis. Median age was 63 years (20-72). Fourteen patients (82%) were treated for a primary bone tumor (including 11 chondrosarcomas), three (18%) for metastatic carcinoma. Four patients (24%) received (neo)adjuvant chemotherapy, four (24%) had (neo)adjuvant radiotherapy. All patients received prophylactic cephalosporins for 1-5 days. We recorded the micro-organisms that

were isolated from periprosthetic purulence or tissue biopsies during the first debridement for infection. Minimum follow-up was one year.

Results

Infections were diagnosed at a median of 28 days (12 days-3 months). Thirteen infections (76%) were multi-microbial. In total, 41 micro-organisms were isolated: 27 (66%) Gram-negatives, and 22 (54%) were part of intestinal flora. Predominant micro-organisms were *Enterobacter cloacae* (n=6,32%), *Enterococcus faecalis* (n=5,29%), *E.coli* (n=5,29%) and *Proteus mirabilis* (n=4,24%). Eight infections (47%) were successfully eradicated with a DAIR procedure, seven (41%) eventually necessitated implant removal (five pedestal cups and two LUMiCs), and two (12%) were treated with suppressive antibiotics at final follow-up.

Conclusions

Deep infections of pelvic endoprostheses are predominantly polymicrobial, caused by Gram-negative micro-organisms and normal intestinal flora. These profiles differ from those isolated from prosthetic joint infections of conventional arthroplasty procedures. This may indicate a different pathogenesis, for example bacterial translocation through the intestinal wall. Our results suggest that infection prophylaxis and empiric treatment may need to be changed.

196: Is there still a Role for A1 Rotationplasty (A1R) in Children with Distal Femur Sarcomas?

by Marco Manfrini | Laura Campanacci | Marco Colangeli | Eric Staals | Davide Donati

Abstract ID: 196

Thirty years ago A1R represented a solution in immature patients with malignant sarcomas of the femur, previously candidates to amputation. Then reconstructions became feasible also in children, but scanty data are available about pros and cons in younger patients. To improve counselling and future reconstructive options, we analyzed indications to A1R in a consecutive series of children with distal femur bone sarcomas.

In 1987–2017, 173 children below age 11, with distal femur high-grade sarcomas, had surgery at Istituto Rizzoli. Indications included 5 amputations, 36 A1Rs (median age 7), 13 knee-arthrodeses, 75 megaprotheses (41 expandable, median age 8), 11 Osteoarticular allografts and 33 intercalary reconstructions. Trend of indications was compared and A1R parameters (age <6, tumor volume, knee and vascular involvement) were evaluated according to current perception.

In first decade 23 A1Rs represented 36% of surgeries but only 9 children would maintain rotationplasty indication nowadays. In second decade 10 A1Rs were 25% of surgeries with 7 confirmed indications. In the recent decade 3 A1Rs represent only 5% indications, always in toddlers below 5.

Concerns exist around durability of small stems and infection risk with iterative surgeries. That's why, until 2000, A1R was suggested in any distal femur sarcoma, younger than 10, while megaprotheses were performed mainly in prepuberal cases. Then expandable devices changed the landscape and in 2008-2017, only 3 children (below age 6) had a rotationplasty versus 35 prostheses (median age 9). The limit of expandable devices in toddlers is related to the minimum prosthetic length, to get at least 5 cm expansion. In small children, if we must resect the distal femur avoiding total femur resection, A1R still represents the first choice. Then it is alternative to hip disarticulation also in older children and adults, in expanded tumors involving the whole thigh, the knee joint, and the main vessels.

198: Outcomes of biological versus non-biological reconstruction for diaphyseal humeral tumours

by Feiran Wu | Jonathan Stevenson | Lee Jeys | Michael Parry

Abstract ID: 198

Objective

Diaphyseal tumours of the humerus are uncommon and it may be possible to achieve adequate resection margins without sacrificing the adjacent articular cartilage. This study aims to compare the surgical and functional outcomes of mid-humeral resections treated with fibula autografts versus endoprosthetic replacements.

Study Design

Eighteen patients were identified retrospectively using our institutional database.

Methods

Between 1996 and 2013, thirteen males and five females with a mean age of 40 years (range 7-74) underwent en-bloc resection of the humeral diaphysis with preservation of the adjoining joints. The indications for surgery were a primary bone malignancy in ten patients, a metastatic lesion in seven, and fibrous dysplasia in one. Eleven patients underwent reconstruction using a custom-made endoprosthetic diaphyseal replacement, and seven patients underwent biological reconstruction using a fibula autograft.

Results

Overall survival without reoperation was 22% at a mean follow-up of 24 months. In the biological reconstructions, six required re-operation (86%) with adjuvant bone-grafting, although overall risk of secondary reconstructive surgery was low, with only one patient (14%) requiring revision to a proximal humeral endoprosthetic replacement. In the non- biological reconstructions, seven required surgical revision (64%), with aseptic loosening (4/7) the most common reason for failure.

There were no wound complications, periprosthetic infections, or amputations in either group. Overall survival was 92% at a mean follow-up of 82 months. The mean TESS was 82% for biological reconstructions and 67% for endoprosthetic reconstructions ($p=0.3$).

Conclusions

Although both techniques demonstrate similar risk of re-operation, autograft reconstruction has a significantly lower secondary reconstruction rate and should be considered in the treatment of suitable patients with diaphyseal humeral tumours. Care should be taken in the method of reconstruction taking into consideration the underlying pathology, patient characteristics, the need for adjuvant therapies and the oncological prognosis.

199: Introducing fluorescence guided surgery into orthopedic oncology: a systematic review of candidate targets for Ewing sarcoma

by S.E. Bosma | P.B.A.A. van Driel | A.L. Vahrmeijer | C.F.M. Sier | P.C.W. Hogendoorn | P.D.S. Dijkstra

Abstract ID: 199

Objective - Ewing sarcoma (ES), an aggressive bone and soft-tissue tumour, is treated with chemotherapy, surgery and/or radiotherapy. Research shows that achieving wide surgical margins is of paramount importance for survival. Despite developments in imaging techniques, intra-operative distinction between healthy and tumorous tissue remains challenging, especially after chemotherapy and at complex anatomical locations. Near infrared (NIR) fluorescence guided surgery (FGS) is a promising technique to adequately determine tumor boundaries intra-operatively, potentially improving complete resection and therefore survival. Here, the first steps are made to introduce NIR-FGS in ES by providing an overview of potentially suitable ES-specific targets for NIR fluorescence guided surgery.

Study design - Systematic review

Methods - The literature search was conducted based on two highly important characteristics: Presence and accessibility of the biomarker on the cell membrane of ES cells and up-regulation compared to adjacent normal tissue. Studies were eligible for inclusion if they met the following criteria: 1) Report of cell surface expression in primary tumour; 2) Expression evaluated by flowcytometry, western blot or immunohistochemistry; 3) Positive expression in 50% or more of the ES samples. Eligible biomarkers were evaluated with a predefined scoring system based on five domains: I) Sample size; II) Expression pattern; III) Upregulation, using the recently published ES surfaceome database (Town, 2016); IV) Percentage positive cells; V) Previously imaged. Biomarkers that score 7/10 or higher are considered potentially suitable for targeted imaging in ES.

Results - Using the scoring system we identified CD99, LINGO1, C-kit, NOTCH receptor, CXCR4, NPY receptor Y1, claudin1, occludin and IGF-1R as most promising ES-specific biomarkers for NIR-FGS.

Conclusion - This study involves the first steps to implement the NIR-FGS technique to advance orthopaedic oncologic surgery. Immunohistochemical and cell line-based validation of the potential biomarkers will be performed to elucidate the most optimal candidate.

200: Sacroiliac joint reconstruction following resection of malignant bone tumors

By Massimiliano De Paolis | Federica Mariotti | Riccardo Zucchini | Matteo Romantini | Tommaso Frisoni | Eric L Staals | Davide M Donati

Abstract ID: 200

Introduction: Primary malignant bone tumors involving sacroiliac joint are difficult to treat. Several reconstructive options have been reported, all associated with a high complication rates.

Objective: The purpose of this study was to assess the functional outcome and complication rate using different reconstruction methods after tumor resection in a single Institute.

Materials and methods: We retrospectively reviewed 20 patients, between 1992 and 2015. In all cases the pelvic ring was interrupted. There were 12 men and 8 women. Ages ranged from 9 to 56 years. Three types of reconstruction were performed: cement and screws in one case, custom made prosthesis in one, and bone auto/allograft in 18 cases. Average follow-up was 10.57 years. MSTS score was used to evaluate functional results with minimum follow-up of 2 years. Surgery-related complications, infection and mechanical failures, were determined at the final follow-up.

Results: Resection margins were wide in 18 cases, marginal in 2, and contaminated in one. The 5 and 10-year survival rate was 80%. Local recurrences occurred in 3 cases, 2 of these were treated with external hemipelvectomy. Deep infection occurred in 5 cases and mechanical failure in 2 cases of bone graft reconstructions. No major complications were reported in reconstruction with prosthesis and cement. All cases with infection needed further surgery. Only one case of mechanical failure required surgery.

Excluding patients with neurological damage due to tumor resection, in 12 graft reconstructions the average MSTS score was 73%, 80% in custom-made prosthesis reconstruction, 67% in cement reconstruction. MSTS score was 45% in cases involving neurological sacrifice.

Conclusions: Reconstruction with bone graft is an acceptable method of reconstruction, because of its lower rate of mechanical complications and satisfactory functional outcome. Infection remains a frequent complication. Reconstruction with custom-made prosthesis seems to be promising surgical technique.

203: Timing of pre-operative radiotherapy in soft tissue sarcomas

by Annalisa Cortesi | Giulia Ghigi | Antonino Romeo | Andrea Galuppi | Giuseppe Bianchi | Marco Gambarotti | Alberto Righi | Fabrizio Romani | Alessio Giuseppe Morganti | Silvia Cammelli

Abstract ID: 203

Objectives

To investigate a possible correlation between timing of radiation therapy (RT), and outcome in patients treated for soft tissue sarcoma (STS).

Study design

Medical patients charts presenting primary or recurrent localized STS of extremities treated with neoadjuvant RT, limb-sparing surgery +/- chemotherapy (CHT) were retrospectively analysed.

Methods

Sixty-one patients (median age 52 years), affected by primary (88.5%) or recurrent (11.5%), G1 (8.2%), G2 (6.6%) or G3(85.2%) grade STS (according to FNCLCC classification), were treated with pre-operative RT, surgery, +/- CHT. Patients received a dose of 4400-5000cGy to the target, delivered in 22-25 daily fractions. Only one patient received a dose of 4480 cGy/28 twice a day. Treatment was delivered with multiple photons beams technique. The study evaluated the impact of RT duration (range: 18-64 days, median: 35 days, with delays due to both clinical or technical reasons) and the time interval between end of RT and surgery (range 10-52 days, median 29 days).

Results

Median follow-up was 60.8 months (range 12-116). Two patients had local relapse after surgery and 5-year local control (LC) was 95.8%. Fifteen patients developed metastases with 72.9% 5-year MFS and 71.6% 5-year DFS. Six out of the 61 patients died, with 90.8% 5- year OS. No statistically significant correlation was found between RT duration and the interval between end of RT and surgery in terms of patients outcomes.

Conclusions

The management of non-metastatic STS involves the use of potentially curative surgery associated with RT to improve LC rates. In this series no correlations were found between RT duration and timing of surgery and LC rates, possibility to perform limb-sparing surgery, and patients outcomes.

205: Prediction of Recurrence after Curettage following Curopsy in Aneurysmal Bone Cyst

Objective

While curettage has been regarded as the mainstay of current management of aneurysmal bone cysts, curopsey is a recently described percutaneous technique that has gained interest due to its limited invasiveness and favorable rates of local control. If curopsey fails, detailed curettage is generally the second choice. The objective of this study was to evaluate pre-curettage predictive factors for recurrence after curettage following curopsey in aneurysmal bone cyst.

Study design

We retrospectively reviewed the medical records of the patients who underwent curopsey once among those registered with a diagnosis of primary aneurysmal bone cyst in the oncology database between January 1999 and June 2016.

Methods

Potential risk factors for recurrence, including age, gender, the extent of the lesion, Campanacci grade, and the rate of increase in main length and ballooning of the lesion, were analyzed by logistic regression.

Results

Among 239 patients who underwent curopsey, 36 (15.1 %) did not show signs of consolidation after curopsey; there were 20 females and 16 males, with a median age of 12.5 years, and 19 lesions were located in the long tubular bone and seven in the short tubular bone. Recurrence developed in eight patients after additional aggressive curettage. In aneurysmal bone cysts in the tubular bone, multivariate analysis demonstrated that the rate of increase in ballooning of the lesion was a statistically significant predictive factor for recurrence after curettage following curopsey ($p=0.016$).

Conclusions

We believe that it would be better to consider combined treatment or other alternative strategy in aneurysmal bone cysts showing rapid progression of ballooning after curopsey. Further studies on more cases with longer follow-up period should be mandatory.

209: “Pediatric Non-Rhabdomyosarcoma Soft Tissue Sarcoma: heterogeneous group of rare tumors with multidisciplinary approach”

by Giovanni Beltrami | Gabriele Ristori | Angela Tamburini | Anna Rosa Rizzo | Francesco Lazzarini | Filippo Frenos | Guido Scoccianti | Rodolfo Capanna | Domenico Campanacci

Objective

The so-called non-rhabdomyosarcoma soft tissue sarcomas (NRSTS) account a very heterogeneous group of tumors. The rarity of each histotype prevents the performance of clinical trials on a single tumor type, and consequently, NRSTS have to be analyzed as a group.

Study design & Methods

Retrospective analysis of 33 consecutive pediatric-age patients affected by NRSTS seen at our institution in a 15-year period. Patients were treated using a multimodality therapeutic approach, including surgery, chemotherapy, and radiotherapy, based on the European Pediatric Soft Tissue Sarcoma Study Group (EpSSG) protocol. Surgery plays the main role in this protocol: chemotherapy and radiotherapy are variable associated on the basis of the subtype of tumor, yet leaving wide gaps.

Results

Thirty-nine percent of patients received only surgical treatment, 33% patients received chemotherapy associated to surgery, only 3% had radiotherapy and surgery and the residual 24% underwent both chemo- and radiotherapy associated to surgery. The overall survival of our series was 91% at 1 year, 86% at 5 years, 81% at 10 years. The local free recurrence survival was 93% at 1 year, 85% at 5 years and 10 years. The metastasis free survival was 78% at 1 year, 75% at 5 years and 10 years. Limb-salvage surgery was possible in the majority of cases (97%) and overall outcomes are generally good, with only a 15% of patients complaining functional deficit.

Conclusions

The results of the present study underline the primary importance of a multidisciplinary approach in the treatment of pediatric NRSTS.

210: Conventional mega prostheses in pediatric age after bone tumor resection in lower limb: doubtful or long lasting solution?

by Giovanni Beltrami | Anna Rosa Rizzo | Filippo Frenos | Guido Scoccianti | Francesca Totti | Francesco Muratori | Rodolfo Capanna | Domenico Andrea Campanacci

Abstract ID: 210

Objective

After bone tumor resection in adults, conventional mega prostheses are well experienced and effective reconstructive techniques, while, in pediatric age, this employment is debating.

The dial in growing children is mainly due to open physis, plastic and elastic bone and different functional and long-term expectancy than adults.

Objective of our study, is critically review our experience, on the use of mega prostheses in children.

Study design & Methods

From the overall database of 485 megaC prostheses (Waldemar Link, Germany), we have retrospectively reviewed the patients operated between the ages 0-18 in the last 15 years.

They were 52 patients, with average age at surgery of 15 years (18 cases: 11-14; 34 cases: 15-18 years). The diagnosis was bone sarcoma in all but one case; mega prostheses were utilized as primary implant in 48 cases, as salvage procedure of failed bone massive allograft in four cases.

Anatomical site were proximal femur 4, distal femur 37, proximal tibia 6, total femur 3, extrarticular knee 2 cases.

Results

At an average follow up of 72 months (1-184), 12/52 (23%) patients experienced major complications: 3 deep infections, 5 structural failure, 4 scar sloughs or soft tissue failure.

Eleven cases were revised by new prosthetic implant, one was amputated.

Eighteen patients had tumor recurrences (local 2, distant 16), while after growth plate closure, limb length discrepancy, occurred in 14/46 patients (with FU longer than 2 years).

Conclusions

Conventional mega prostheses are theoretically definitive solutions, but for intrinsic characteristic of growing bone, several complications and re-operations has to be considered.

215: "Innovative reconstructions after combined sacro-pelvic resections in treatment of bone sarcoma".

by Daniel Kotrych | Andrzej Bohatyrewicz | Paweł Ziętek

Abstract ID: 215

Objective

Large pelvic defects following tumor resections around sacrum and posterior pelvic column require sophisticated reconstructive solutions such as dedicated customized implants manufactured with 3D technology. The aim of the study is to present the innovative methods of reconstructions in sarcoma patients in whom the sacral and pelvic resections were performed at the same surgical procedure.

Study Design and Methods

Material was composed of 20 selected patients hospitalised at The Department of Orthopaedic Oncology of Pomeranian Medical University of Szczecin, Poland between 2013 and January 2018 due to advanced forms of primary bone tumors. All patients were reconstructed with 3 D custom made implants of the same origin. The surgical procedure in

all cases was combined partial or total sacrectomy with the resection of posterior pelvic column. The reconstruction of the defect was performed by 3D custom made implants covered with deep EPORE® surface (Implantcast). We used gammakamera SPECT/CT GE Hawkeye 4 bone scintigraphy with TcPPm MDP dynamic, planar and tomographic aquisitions to precisely visualise the bone ingrowth into the surface of the implant. The test and clinical evaluation were performed at 12 month after surgery in all patients.

Results

We showed promising short term results regarding both oncological aspects and reconstruction options in patients treated with wide sarco-pelvic resections. Good functional results were achieved as the presented surgical techniques and firm primary stability of the new concepts of implants enabled better healing and osseointegration.

Conclusions

The presented methods show the possibilities of oncologically clear wide sacro-pelvic tumor resections, step by step surgical techniques of nerve roots release have a great impact on functional results. The sacro-pelvic reconstructions are mainly based on innovative implants designs with deep porous layers such as EPORE® can help stimulate osteoblasts migration form the adherent bony area.

220: Long-term Outcomes of surgical treatments for Patients With Synovial Sarcoma: A 25-year Experience

by Recep Selcuk Eyceyurt | Burcin Kececi | Serra Kamer | Dundar Sabah

Abstract ID: 220

Objective:

The objective of this study was to find out the factors that effect the prognosis and outcomes of the patients with synovial sarcoma that we have treated and followed up.

Study Design:

Retrospective cohort study; Level of evidence, 3

Methods:

Between 1991 and 2016, 35 patients who were followed up and treated with synovial sarcoma diagnosed at Ege University Medical Faculty Orthopedics and Traumatology Department retrospectively reviewed. Careful attention has been paid to the detailed examination of the parameters that will affect the survival time of patients in our study. The effects of surgery on local recurrence and duration of survival were investigated in cases of limb salvage surgery. The endpoints analyzed were local recurrence-free survival (LRFS) and overall survival (OS).

Results:

Median age of patients was 29 years (range 7–85 years). All patients received surgery, 8 % received adjuvant radiotherapy, 31 % adjuvant chemotherapy and 57 % adjuvan radiotherapy and chemotherapy. The 5-year OS was 50.4 %. Stage of the tumor was linked to OS as the only independent risk factor. Five patients had local recurrence, and the 5-year LRFS was 84 % Independent predictor factor for LRFS was not found as a result of multivariate analysis.

Conclusion:

Synovial sarcoma is still a disease with a poor prognosis. Stage of the tumor at initial diagnosis is a significant adverse prognostic factor for overall survival.

221: Prognostic factors and clinical outcomes in Undifferentiated pleomorphic sarcoma of the extremities

by Recep Selcuk Eyceyurt | Burcin Kececi | Serra Kamer | Dundar Sabah

Abstract ID: 221

Objective:

the objective of this study was to determine the prognostic factors influencing the survival of patients affected by undifferentiated pleomorphic sarcoma with consideration for the stage, state of the resection margin, size, metastases and local recurrence in a retrospective, single-centre analysis over 25 years.

Study Design:

Retrospective cohort study; Level of evidence, 3

Methods:

We included 94 patients (male/female = 56/38) in this study. We recorded the size, AJCC classification, tumour margins, number of operations, complications, radiation , chemotherapy, survival, recrudescence, metastases and follow-up. Survivorship analysis was performed.

Results:

Of 94 patients, 56 males (59.6%) and 38 females (40.4%) with a median age of 58.5 (range, 20-85 years),16 (17 %) had lung metastasis at the first diagnosis and 78 (83 %) had only a localized tumor. The 5-year overall survival of all the patients was 54.9%. Negative margins were detected in 87 cases (93.5%) after surgical resection. Local recurrence was detected in 12.9 % of cases. The presence of metastases at the first diagnosis and stage are significant

prognostic factors of the survival rates ($p < 0.01$).

Conclusion:

Stage and metastases at the first diagnosis are independently associated with survival. We hope our investigation may facilitate a further prospective study and clinical decision-making in liposarcoma.

224: Rechallenge with temozolomide and irinotecan in advanced ewing sarcoma patients. Experience from a single institution

by Cesari Marilena | Palmerini Emanuela | Abate Massimo Eraldo | Paioli Anna | Setola Elisabetta | Rocca Michele | Salone Mariacristina | Donati Davide Maria | Longhi Alessandra

Abstract ID: 224

Introduction

The combination of Temozolomide and Irinotecan (TEMIRI) has shown activity in Ewing Sarcoma (ES). Thanks to the low toxicity profile it represents one of salvage schedule in metastatic or relapsed patients. We evaluated the role of the TEMIRI rechallenge in patients previously treated with this regimen.

Methods

Patients who had received Temozolomide 100 mg/m²/day and Irinotecan 50 mg/m²/day, days 1- 5 every 21 days, for relapsed ES were retrospectively evaluated.

Results

Fourty-three patients were treated at Rizzoli Institute between april 2011 and may 2017. Five patients (11.6%) of this group experienced second relapse after clinical complete response (CCR) of disease (median time 8 months, range 4- 33 months). All patients were male, median age was 37 years (19- 47), site of second relapse was lung in all cases. Rechallenge with TEMIRI was proposed. One patients experienced a new CCR (6 courses administered), partial response (PR) was seen in 3 patients (5 courses in 2 and 11 in 1 patient), 1 patient had stable disease after 8 courses. Chemotherapy toxicity was mainly gastrointestinal, 3 patients had grade 3 diarrhea and a dose reduction of Irinotecan was performed. No serious adverse events occurred at any time.

Conclusions

Rechallenge with TEMIRI can be an effective treatment strategy in relapsing patients who experienced some response to a previous treatment with this schedule. Toxicity is usually low and manageable.

225: Sacral anchoring of the LUMiC prosthesis after combined peri-acetabular and complete iliac wing resections: poor clinical outcome

by P.T.J. Sanders | M.P.A Bus | M.A.J. van de Sande | F. Gouin | Daniel Kotrych | P.D.S Dijkstra

Abstract ID: 225

Objective

Reconstruction of combined P1/2 resections (periacetabulum and medial ilium) is an extreme challenge. Current reconstructive options consist of transposition of the hip with disappointing functional outcome, and 3D-printed endoprostheses with unknown clinical results. The LUMiC was designed to seat in the ilium. However, in the absence of acceptable alternatives, it has also been used for more extensive resections. We aimed to evaluate our clinical experiences with the LUMiC prosthesis with sacral anchoring.

Methods

We retrospectively reviewed ten patients with LUMiC sacral anchoring performed between 2009-2016. All were combined P1/2 resections. Diagnoses were chondrosarcoma (n=5), osteosarcoma (n=3), and Ewing sarcoma (n=2). Median age at surgery was 43 years (21-59). The LUMiC stem anchored either in the sacral ala (n=6) or in the vertebral body of S1 (n=4). In two patients, a spondylodesis of L5-S1 was performed with LUMiC extension into L5. Attachment tubes were used in nine, dual-mobility cups in five. Median follow up was 4.1 years (0.9-6.2).

Results

Dislocation occurred in four patients. Loosening occurred in three patients, after a median of 28 months: one was managed with revision to a custom-made implant, one with transposition of the hip, and one patient had developed an ossified connection of the proximal femur to the ischium. One periprosthetic fracture occurred during rehabilitation and was treated conservatively. Three acute infections were treated successfully with surgical debridement. At final follow up, seven patients had the primary prosthesis in situ.

Conclusions

Sacral fixation of the LUMiC showed poor clinical results; eight experienced mechanical failure. It appears that the sacrum offers insufficient bone stock and cortical support to allow for adequate fixation. Reconstruction after combined peri-acetabular and complete iliac wing resections remains challenging and none of the treatment options available meets the requirements. Therefore, pursuing new patient-specific options such as 3D printed implants is warranted.

226: Do intercalary allografts provide for a durable reconstruction in the lower extremities after long to very long term follow up?

by P.T.J. Sanders | J.F. Spierings | J.I. Albergo | M.P.A. Bus | L.A. Aponte Tinao | P.D.S. Dijkstra

Abstract ID: 226

Objective

Contradictory clinical results have been reported for intercalary allograft reconstructions in the lower extremity, and there is no definite evidence on risk factors for complications. Moreover, there is a lack of studies with adequate follow-up, and long-term outcomes therefore remain uncertain. We aimed to analyse complications and failures of lower-extremity intercalary allograft reconstructions, with a minimum follow-up of ten years.

Methods

We reviewed 131 patients who underwent intercalary allograft reconstruction between 1980-2006. Predominant diagnoses were osteosarcoma (n=72,55%), Ewing sarcoma (n=22,17%) and chondrosarcoma (n=15,12%). Ninety-two patients (70%) received chemotherapy, one underwent radiation therapy. Tumours were located in the femur (n=89,68%) and tibia (n=42,32%). Allograft fixation was performed using plates in 88 reconstructions (67%), of which 73 had at least one plate that bridged the entire graft. Intramedullary nails were used in 19 patients (15%). Median follow-up was 14 years (95% CI 11-18).

Results

Non-union occurred in 21 patients (16%), 11 of which (11/21,52%) were successfully treated with bone-grafting procedures. Intramedullary nail fixation (HR5.2;95%CI1.7-15.9;p<0.01) and non-bridging plate fixation (HR2.9;95%CI1.1-8.1;p=0.03) were significantly associated with the risk of non-union in time-dependent analyses adjusted for localization, epimetadiaphyseal localization and reconstruction length. Allograft fractures occurred in 25 reconstructions (19%), 11 of which (44%) occurred within 5 years, eight (32%) between five and ten years, and four (16%) after 10 to 22 years. Infection occurred in eight reconstructions (6%), after a median of eight months (4-60), none of them were retained.

Conclusions

Our study shows that mechanical complications not only occur on the short- to midterm, but continue occurring throughout the lifespan of the allograft. Infection was the leading cause for failure in the first years. In the absence of superior alternatives, intercalary allograft reconstruction still represents an acceptable option in selected cases. Given the lower risk of non-union, we strongly advise bridging plate fixation.

229: Retrospective evaluation of silver coated tumour prostheses in complex joint infection with major bone destruction: about 23 cases with 5 years follow up

By Fabrice Fiorenza | Jérôme Druon | Louis-Romée Le Nail | Hélène Durox | Louis Bernard | Christian Mabit | Philippe Rosset

Abstract ID: 229

Introduction: Complex joint infections around the hip or the knee often require an aggressive surgical debridement that can sometimes lead to major bone loss. Bone reconstruction can be difficult in such cases and the use of a silver coated tumour prosthesis is an interesting option.

Materials and Methods: It is a retrospective study. Patients were included in 2 university teaching hospital (CHU of Tours and CHU of Limoges) over a period of about 9 years.

Results: Our series included 23 patients with complex infected prostheses: there were 15[®] men and 8 women. Mean age was 65.3 (29-82). There were 18 Mutarsprostheses (ImplantCast, Germany) and 5 Stanmore[®] prostheses (SIW, UK). Mean follow-up was 62 months (10 -138). On average each patient had 1.9 germ (1-10). 55% of the germs were Staphylococcus spp (Staphylococcus aureus: 27,5 %, coagulase negative Staphylococcus: 27,5%). On average each patient had 5.3 operations (3-10) before the final silver coated prosthesis was implanted. Each case was discussed with a multidisciplinary team and treatment included systemic antibiotics with a 2 stage revision surgery for 22 patients and 1 stage revision surgery for one patient.

At last follow up, 4 patients were dead and one had a chronic local recurrence of the infection. 4 patients had a chronic fistulisation of the infection. Among these 4 patients, 3 had a total femur. Two patients had acute local recurrence of the infection at 45 and 60 days and were successfully treated with a DAIR procedure with no recurrence of the infection at 36 and 38 months

Conclusion: The overall success rate in controlling infection with this treatment strategy using silver coated implants and systemic antibiotics was 78 % (18/23) at 62 months in this short series. The authors recommend the use of silver coated implants in complex joint infection with major bone destruction.

231: Cemented versus Uncemented Endoprostheses: A Meta-Analysis of Outcomes Following Tumor Resection at the Knee

by Joseph Ippolito | Andrew Carbone | Valdis Lelkes | Alexander Willis | Francis Patterson | Kathleen Beebe | Joseph Benevenia

Objective:

Outcomes of endoprosthetic reconstruction following tumor resection are frequently published but limited by small sample sizes and variability in cementation method and implant design. The primary objective of this study was to perform a meta-analysis of aseptic loosening rates and long-term implant survival in patients with cemented or uncemented endoprostheses at the knee following tumor resection.

Methods:

Major inclusion criteria were specification of prosthetic design and whether cemented or uncemented fixation of prosthetic stems was used. Major exclusion criteria were studies without minimum follow-up of 2 years or greater than 20% of patients with metastatic bone tumors. After review, 32 studies (3,217 patients) met inclusion criteria: 18/32 studies (2,081) reported on cemented endoprostheses and 17/32 studies (1,136 patients) reported on uncemented endoprostheses at the knee. Significance was set at $p < 0.05$.

Results:

Mean age (26.7 ± 7.1 years) and follow-up (63.1 ± 36.0 months) were statistically comparable between cemented and uncemented groups. Overall, uncemented endoprostheses were significantly more likely than cemented endoprostheses to undergo aseptic loosening and mechanical failure (Figure 1). Compared to cemented endoprostheses, uncemented endoprostheses had significantly lower 5-year and 10-year survival rates (Figure 2). These differences were similar when rotating hinge designs and prostheses at the distal femur were exclusively analyzed. Compared to cemented endoprostheses, uncemented endoprostheses had significantly shorter time to aseptic loosening and mechanical failure (Figure 3).

Conclusions:

Cemented endoprostheses at the knee are associated with lower rates of aseptic loosening and mechanical failure, as well as increased implant survival. These findings are exclusively based upon Level IV evidence. Future prospective large multi-center trials are needed to further elucidate the differences between cemented and uncemented endoprostheses in the bone tumor population.

232: Impact of biopsy sampling errors and quality of surgical margins in treating chondrosarcoma

by Sandro Hodel | Christoph Laux | Jan Farei-Campagna | Tobias Götschi | Beata Bode-Lesniewska | Daniel A. Mueller

Objective:

The purpose was to examine the frequency of CT-guided biopsy sampling errors in chondrosarcomas, as well as the impact of these errors and the achieved surgical margins on the local recurrence free survival (LRFS) and the disease specific survival (DSS).

Study design:

Retrospective cohort study

Methods:

68 consecutive patients treated for chondrosarcoma from 2000 to 2015 were retrospectively reviewed. Biopsy sampling error was present if the histopathology of the resection revealed different histological grade compared to the preoperative biopsy. Surgical margins were classified according to Enneking. Additionally, the distance to the tumor (mm) and the presence of an anatomical barrier (fascia, periosteum) at the closest margin were recorded.

Results:

The primary location was at the extremities in 46 patients and at the axial skeleton in 22 patients. 14 patients underwent planned intralesional curettage. Surgical margins were assessed in the remaining 54 patients and included 21 wide, 25 marginal and 8 intralesional resections. Biopsy sampling errors occurred in 10 patients. In 4 patients the grading was corrected from low- to high-grade, in 3 patients from high-grade to dedifferentiated and in 3 patients from benign to low-grade. 2 out of these 10 patients needed further surgery due to the sampling error. LRFS was 82.2% at 5 years and 76.9% at 10 years. An intact anatomical barrier was associated with the most preferable LRFS at ten years (89%). DSS was 79.2% at 5 years and 75.5% at 10 years. The metric distance of the surgical margin and the presence of a biopsy sampling error did not affect the LRFS and DSS.

Conclusions:

Even though histologic grading in chondrosarcoma is difficult, sampling errors in preoperative biopsy are relatively rare and do not deteriorate outcome. Presence of an anatomical barrier has higher impact on LRFS than metric distance of surgical margins.

235: Clinical Outcome of Navigated vs Non-navigated Reconstruction with Ice-cream Cone Prosthesis for Bone Tumours Involving the Acetabulum

by Tomohiro Fujiwara | Jonathan Stevenson | Louis-Romee Le Nail | Michael Parry | Robert Grimer | Lee Jeys

Abstract ID: 235

Objective: Although accumulating evidence has demonstrated the advantage of computer-assisted navigation for the resection of bone tumours, the evidence supporting acetabular reconstruction has been limited. We aimed to evaluate the efficacy of navigated ice-cream cone reconstruction for patients with bone tumours involving the acetabulum.

Study design: A retrospective case-control study.

Methods: A retrospective case-control study of 35 patients who underwent acetabular resection and reconstruction with an ice-cream cone prosthesis was conducted. Mean age was 55 years and there were 21 males and 14 females. Surgery was performed with and without navigation in 11 and 24 patients, respectively. Oncologic and functional outcomes, as well as complication rates, were statistically evaluated.

Results: The intralesional resection rate for the primary tumours was 9% (n=1) in the navigated group and 17% (n=4) in the non-navigated group. At a mean follow-up of 40 months, local recurrence rate was 11% (n=4); all were identified in the non-navigated group. There was no intra-operative complication related to the navigation, and the rate of major complication, which required at least one surgical intervention, was 9% (n=1) in the navigated group and 42% (n=10) in the non-navigated group. The implant survival rate at five years was 100% in the navigated group and 83% in the non-navigated group; the implant failure was seen in two patients in the non-navigated group (8%). The mean functional results by Musculoskeletal Tumour Society score at latest follow-up was 52% (range, 7-97%); 70% (range, 53-97%) in the navigated group and 45% (range, 7-90%) in the non-navigated group (p = 0.015), the difference of which were attributed to the higher complication rate in the latter group.

Conclusions: The introduction of computer navigation to ice-cream cone reconstruction reduces complications and failure and enables better oncological and functional outcome in patients with a bone tumour involving the acetabulum.

236: Functional and Oncologic Outcome of Limb-sparing Reconstruction for Bone Sarcomas Involving the Acetabulum - Review of 113 Experiences in a Referral Centre of the United Kingdom

by Tomohiro Fujiwara | Manuel Ricardo Medellin | Rhys Clark | Jonathan Stevenson | Michael Parry | Lee Jeys

Abstract ID: 236

Objective: While limb salvage for bone sarcomas involving the acetabulum remains a major surgical challenge for orthopaedic oncologists, there has been no agreement what is an optimal reconstruction after tumour resection. The purpose of this study was to evaluate and compare the overall clinical outcomes according to the surgical procedures over the past 40 years.

Study design: Retrospective

Methods: Between 1971 and 2015, a total of 113 patients underwent pelvic surgery for bone sarcomas involving the acetabulum. Surgical reconstructions were performed with custom-

made prosthesis in 65, ice-cream cone prosthesis in 22, extracorporeal irradiated autograft in 17, and modified Harrington procedure in 9. Functional and oncologic outcomes were statistically evaluated.

Results: The overall 5- and 10-year survival rates of all patients were 63% and 49%, respectively, and a total of 40 patients (35%) developed local recurrence. The incidence rates of the major complication, which required at least one additional surgical intervention, in the reconstruction with custom-made prosthesis, ice-cream cone prosthesis, irradiated autograft, and modified Harrington procedure, were 61%, 27%, 59%, and 55%, and implant survival rates at 10 years were 83%, 86%, 60%, and 56%, respectively. The survival of custom-made prosthesis gradually decreased to 50% at 30 years. The causes of implant failure were deep infection (n=14), local recurrence (n=7), aseptic loosening/graft-host nonunion (n=3), and persistent pain (n=2). The mean functional results by Musculoskeletal Tumour Society System were 51%, 65%, 61%, and 39%, respectively. These scores were significantly lower in patients with major complications (mean, 35%) than those without them (mean, 66%) ($p < 0.001$). The limb salvage rate was 90% with a mean follow-up period of ten years for survivors.

Conclusions: Best functional outcome was achieved by the surgical procedure with the lowest risk of deep infection, which confirmed an ice-cream cone prosthetic reconstruction, supported by antibiotic-laden cement, provided the preferable clinical outcomes.

237: Sexuality, self-worth and resilience 20 years after amputation, rotationplasty and megaprosthesis

by Carmen Trost | Jeannine Huber | Tryphon Kellaridis | Joachim Gubba | Reinhard Windhager | Georg Fraberger | Gerhard M Hobusch

Abstract ID: 237

Objective

Surgeries due to malign bone tumor of the lower extremity change the physical function of the human body. This is a major incision in the sense of self.

Study design

In this retro-perspective, 20 years long term follow-up study a total number of 80 patients were interviewed. The patients underwent three types of surgery: (1) amputation of the thigh (n=21), (2) rotationplasty (n=22) and (3) KMFTR prosthesis (n=37) and they were asked to fill-out 18 questionnaires inter alia three questionnaires regarding (1) sexuality, (2) resilience and (3) self-worth.

Methods

For every questionnaire the factor analysis was performed, to exclude all inconsequential questions. For every questionnaire an index was built. The indices show the relation between the groups and the asked topics.

Results

The overall results show a strong significant relation between self-worth and resilience (0,65). Furthermore, patients picture a moderate significant coherence between self-worth and sexuality (-0,38) and there is also a weak correlation between sexuality and resilience (0,65). Patients with amputation revealed no correlation between sexuality and resilience and between self-worth and sexuality, but there is a strong correlation between resilience and self-worth (0,538). However, the rotation plasty patients represent a strong positive interrelation between self-worth and sexuality (-0,749), but no significant correlation between sexuality and resilience. The cohesion for the KMFTR patients was between self-worth and resilience (0,702) and no significances between sexuality, resilience and self-worth and sexuality.

Conclusion

Patients with amputation and KMFTR prosthesis revealed a correlation between resilience and self-worth. In the group of rotationplasty the self-worth is important to have a good relation to sexuality, which was not significant in the other groups.

239: The Prophylactic Antibiotic Regimens in Tumor Surgery (PARITY) International Randomized Controlled Trial

By Michelle Ghert

Abstract ID: 239

Background:

PARITY is an international multi-center randomized controlled trial in which patients with a bone tumor of the lower extremity undergoing endoprosthetic reconstruction are randomized to one of two study arms: 1 day of post-operative antibiotics, or 5 days of postoperative antibiotics.

Methods:

PARITY patients are randomized by the pharmacy team at each site through an online randomization program (www.randomize.net). The remaining study participants (patients, surgeons, nurses, study personnel) are blinded to treatment allocation. The primary outcome is surgical site infection and outcomes are adjudicated by the PARITY Adjudication Committee through an online secure platform (Global Adjudicator™). Data is monitored for patient safety by an independent Data Safety and Monitoring Committee. Data quality is screened at regular intervals to maintain high standards of data quality.

Results:

A total of 47 clinical sites across 9 countries have opened for enrolment in the PARITY trial. At the time of abstract submission, 356 patients have been randomized across sites in the United States, Canada, Argentina, Brazil, South Africa, Spain, The Netherlands, India and Australia. Sites recently open to enrolment or currently in the active start-up phase represent France, United States, the Netherlands, Spain, Denmark, England and Egypt. The baseline infection

rate for these reconstructive surgeries based on the PARITY pilot data is 15%. Given the recent rapid pace of enrolment for this trial, enrolment is expected to be completed by the end of 2019.

Conclusion:

Infection rates are high in lower extremity bone sarcoma surgery. Peri-operative antibiotics can be extended past the date of surgery, but this intervention may not improve outcomes. With international expansion, including several sites in Europe, the pace of enrolment has accelerated and the study is expected to close for enrolment at 600 patients. However, there is still time for interested EMSOS investigators who are welcome to participate.

243: Virtual clinic referral pathway to a regional musculoskeletal onco-surgical service: Is it cost effective?

by Omer Farhan-Alanie | Stephanie Spence | Helen Findlay | Ashish Mahendra | Sanjay Gupta

Abstract ID: 243

Introduction: Within our tertiary referral sarcoma unit, we routinely screen referrals from local centres through a weekly “virtual clinic” which involves a multi-disciplinary conference of radiologists and surgeons and uses information provided by the patient’s local orthopaedic surgeon to triage referrals. We sought to examine the feasibility of this screening tool in reducing the burden on our service and facilitating investigations.

Methods: A database containing all referrals made to a single sarcoma unit based at Glasgow Royal Infirmary from January 2010 to December 2015 was utilised. All new referrals and follow-up results are discussed at the Musculoskeletal MDT conference to determine if the patient requires a sarcoma unit review.

Results: Our centre serves a geographical area of 40,000km² and a population of 3million. 49.1% of referrals are out-with our local hospital board. Our database contained 3757 discussions for 3179 Patients, giving an average of 1.18 discussions per patient. 53.5% were male. 10.8% had a missing conference outcome. Following discussion at the conference, 19.8% were discharged from the sarcoma unit back to referring clinician, 9.9% required further investigations and imaging, 24.2% required biopsy prior to review and 3.5% were forwarded for discussion at the National Sarcoma meeting prior to reviewing patient. 1.6% were discussed for surgical planning. Only 30.1% required review directly from the conference. Using these results, 2625 clinic appointments were saved over the time period. Based on national statistics, the average cost of an orthopaedic clinical consult within National Health Service is 169.54 GBP. This gives an average saving of 74,174 GBP/annum.

Conclusion: A virtual clinic to triage referrals which utilises local assessment and imaging, and review of this information at a multi-disciplinary conference is a cost-effective method of reducing unnecessary referrals. Given the sometimes significant journey involved in travelling, this also saves the patient inconvenience and expenses.

248: Computer Navigated Surgery in Sacral Tumours

by Catrin Wigley | Jonathan Stevenson | Johnathan Lex | Jose Albergo | Luis Aponte | Lee Jeys

Abstract ID: 248

Computer-aided tumour surgery (CATS) enables three-dimensional pre-operative planning for tumour resection. This novel technology aims to minimise patient bone loss and maximise function, all while safely resecting tumours. We aimed to report patient's sacral nerve function, complications and oncological outcomes following CATS for sacral tumours.

Patients and Methods

22 patients who underwent partial sacrectomy using CATS were identified retrospectively from a prospectively collated oncology databases from two tertiary sarcoma centres (one in the UK and one in Argentina). Both centres used pre-operative CT and MRI imaging for planning and the OrthoMap 3D module (version 2.0, Stryker, Mahwah, NJ, USA). Mean follow-up was 27.1 months (range: 1 to 82 months).

Results

The mean age was 56 years old (range: 17 to 78) and included 11 females and 11 males. 19 patients (86.4%) had primary bone tumours of the sarcoma, two patients (9.1%) had locally invasive disease invading the sacrum and one patient (4.8%) had metastatic disease to the sacrum. Wide margins were achieved in 17 patients (77.3%), four patients had marginal margins and one was intralesional. 10 resections (45.5%) were multiplanar, of which excellent wide margins were achieved in 9 patients, with the one remaining resection having marginal margins. Urinary incontinence was observed in 14 patients (70%) and bowel incontinence observed in seven patients (35%) with an additional two (10%) having stomas. Complications were observed in 9 patients (40.1%) and were primarily wound infections (27.3%) or wound healing problems (9.1%).

Conclusion

Compared to traditional osteotomies, multiplanar resections can be conducted with CATS and still achieve wide tumour margins. Unfortunately, despite the use of navigation, sacral nerve function was frequently compromised, likely attributable to the large tumour size at presentation (mean: 8.9cm). The complication rate related to wound healing was high.

249: Use of Total Body MR Imaging as a Screening Tool in Patients with Multiple Osteochondromas (MO)

by H.J. van der Woude | S.J. Ham | A.L. van der Zwan | M. Flipsen

Abstract ID: 249

Objective:

- To prospectively evaluate the value of multidirectional total body (TB) MRI in adult patients with genetically approved MO
- To assess the prevalence of synchronous intraosseous chondroid lesions in these patients

Study design:

Prospective MRI study in tertiary referral center.

Methods:

Between August 2012 and February 2017 127 TB MR examinations were performed in 127 patients with MO, 58 male, 69 female patients, mean age of 39,9 years (range, 14,4-79,7). 74 patients had an EXT 1 mutation, 29 an EXT 2 mutation, 10 no mutation and 14 patients an unknown profile. A 45 minutes MRI exam was performed (1.5 T Philips Ingenia) in each patient, including 5 coronal levels (skull to ankle) T1 and T2-weighted fat-suppressed (T2FS) images, sagittal T2 weighted images of whole spine and oblique sagittal T1 weighted images through scapular regions. All sites of MO were registered (excluding lower arms), also suspicious osteochondromas (OC) based on presence of cartilage (T2 FS), intraosseous chondroid lesions and secondary findings (bursitis, soft tissue edema) by one experienced MSK radiologist without knowledge of other imaging findings or medical history.

Results:

A total number of 1365 OC sites was found (mean per patient, 10.7, range 0-17). Mean number of OC was 11.7 in EXT 1 and 9.5 in EXT 2 patients. Highest prevalence of OC was found around knees (95% of patients) and ankles (86%). Lowest prevalence was in the spine (7%). Suspicious OC were found in 3 patients. Intraosseous chondroid lesions (either enchondroma or atypical cartilaginous tumor) were detected in 29 patients (23%) (humerus 4, proximal femur 11, pelvis 3, distal femur 10, proximal tibia 1).

Conclusions

TB MRI is a valuable tool for screening adult patients with MO to rule out peripheral chondrosarcoma and to select suspicious OC for additional focus MRI. A remarkable number of synchronous intraosseous chondroid lesions is found in this patient group.

250: Autologous non-vascularized fibula as an internal biological splint in curetted huge benign cystic lesions of the proximal humerus

By Awad Rafalla

Abstract ID: 250

Introduction

The proximal part of the humeral bone in early childhood and teenagers is a common site for benign cystic lesions that frequently reach a big size .

Curettage is a common method of surgical treatment of those lesions which usually results in a big segmental defect.

Stabilization of the resultant weak bone segment could be a real problem to manage.

An autologous nonvascularized full thickness fibular strut graft can be a reasonable means to overcome both the mechanical and the biological defects.

Patients and methods;

Thirty seven patients were included in this study aged 7 to 16 year at presentation . Mean age (10.5 years) . 20 patients (54%) were males. All patients had a huge benign cyst at the proximal end of the humeral bone (25 had aneurismal bone cyst , 10 cases had simple bone cyst and 2 had fibrous dysplasia). Four cases had pathological fracture at presentation.

All cases had thorough surgical curettage through followed by hydrogen peroxide lavage .

The already harvested fibula was used as an intramedullary stabilization tool by direct impaction of the graft.

Minimal internal fixation was needed in five cases where impaction of the graft was not adequate using small fragment cortical screws or k. wire .

Arm sling for four weeks followed by range of motion exercises.

Bone healing started first at the fibular ends which allowed early recovery.

Follow up period ranged from 12 to 60 months (average 30 months).

Two cases had local recurrence (5.5%)

All patients returned to full daily activity .

Conclusion;

The use of autologous non-vascularized full thickness fibular graft could be used as a mechanical stabilizer as long as biological enhancer of cyst healing.

251: Resection Of High-Grade Large Soft Tissue Sarcoma With Adequate Wide Margin Can Lead To Good Local Control Without Adjuvant Radiotherapy

by Toshiyuki Kunisada

INTRODUCTION: Soft tissue sarcoma (STS) has been treated by achieving safe surgical margin rather than by using adjuvant radiotherapy (RT) in our country and 2-cm wide margin can be considered as adequate margin according to Kawaguchi's criteria. We evaluated local recurrence (LR) and prognosis following resection of high-grade large STS using JOA surgical margin concept.

TREATMENT STRATEGY: Surgical resection with at least 2cm-wide margin was attempted whenever possible. Marginal or 1cm-wide margin are acceptable when preserving neurovascular bundles. RT is conducted postoperatively for marginal or R1 margin. Chemotherapy is indicated for patients less than 60 years old with deep seated, high grade and large tumor.

PATIENTS: Inclusion criteria are localized STS in the extremities or trunk, larger than 5cm, FNCLCC grade 2 or 3, limb sparing surgery, primary complete resection at our institution, and minimum 3 years of follow-up. We retrospectively analyzed 69 patients treated between 2007 and 2014.

RESULTS: Median follow-up was 64 months. Median tumor size was 8.7cm. 6 patients underwent postoperative RT due to inadequate surgical margin. 21 (30%) patients received chemotherapy. There were 7 (10%) LR with average 14.5 months after surgery. Average size of tumor developing LR (14.8cm) was statistically larger than that without LR (9.8cm, $p<0.05$). Only 1 of 9 patients developed LR after postoperative RT for inadequate resection. Distant metastasis was shown in 14 patients with average 20 months after surgery. There was no statistical difference of LR-free and overall survival between wide resection alone and inadequate resection with postoperative RT. Chemotherapy did not significantly affect overall survival.

DISCUSSION: In this series of high-grade large STS, resection alone with 2cm-wide margin led to good local control, which is identical to previous reports with surgery plus RT. Adjuvant RT should be given for resection with marginal margin or R1 margin of the resected specimen.

253: Does the modified Glasgow Prognostic Score aid in the management of patients undergoing surgery for a soft tissue sarcoma?

by Stephanie Spence | Sanjay Gupta | Omer Alanie | Jason Ong | Helen Findlay | Ashish Mahendra

Objective

The modified Glasgow Prognostic Score (mGPS) is a validated prognostic indicator in various carcinomas as demonstrated by several meta-analyses.

The mGPS includes pre-operative CRP and albumin values and calculates a score from 0 to 2 that correlates with overall outcome. Scores of 2 are associated with poorer outcomes. To date this correlation has not been proven in the sarcoma patient group.

Our aim was to assess if the mGPS is reliable as a prognostic indicator for patients with soft tissue sarcoma (STS).

Study Design/Methods

All patients with a STS diagnosis presenting during years 2010-2014 were included. We identified patients using our prospectively collected MSK oncology database. We performed a retrospective case note review examining demographics, preoperative blood results and outcomes (no recurrence, local recurrence, metastatic disease and death). 94 patients were included. 56% were female and 53% were over 50 years. 91% of tumours were high grade (Trojani 2/3) and 73% were >5cm. 45 patients had an mGPS score of 0, 16 had a mGPS of 1 and 33 had an mGPS of 2. On univariate analysis, an mGPS of 0 or 2 was statically significant with regards to outcome ($p=0.012$ and $p=0.005$ respectively). We also found a statistically significant association between CRP, albumin, tumour size and neutrophil count to the development of metastasis and death.

Conclusions

We have demonstrated that pre-treatment mGPS is an important factor in predicting oncological outcome. A score of 0 relates to an improved prognosis whilst a score of 2 relates to an increased risk of developing metastases and death. mGPS as a prognostic indicator was not affected by either the tumour size or grade.

We believe that a pre-operative mGPS should be calculated to help predict oncological outcome and in turn influence management. Further work is being undertaken with a larger cohort.

255: Should Complication Trends Dictate Surgical Management in Femoral Metastatic Bone Disease?

by Joseph Ippolito | Valdis Lelkes | Jon Gabor | Alex Nicheporuck | Kathleen Beebe | Francis Patterson | Joseph Benevenia

Abstract ID: 255

Objective:

Surgical treatment decisions in patients with metastatic disease are multifactorial and made on an individual basis. The objective of this study was to report on outcomes, as well as rates and types of failure by treatment methods and anatomic locations in patients with metastatic disease to the femur.

Methods:

Patients treated surgically for metastatic disease to the femur from 2001-2015 were retrospectively reviewed. Patients with reconstruction including the pelvis were excluded.

Lesion locations were identified as follows: (1) Head/neck (2) Intertrochanteric (3) Subtrochanteric (4) Shaft and (5) Distal Femur. Treatment options included osteosynthesis (plate fixation, intramedullary nail) or endoprosthesis (arthroplasty, intercalary endoprosthesis). Complications were grouped by major (requiring revision of implant, amputation, or persistence of infection) and minor (implant and limb was salvaged).

Results:

After review 92 patients (52% female) were identified. Mean age was 62.3 ± 14.0 . Mean follow-up was 21.6 (range, 1-150) months. Most common primary origins of metastases included Breast (29%), Renal (15%), and Lung (14%) (Table 1). Overall complication rate was 16%. Complication rates were comparable among patients with endoprosthesis versus osteosynthesis ($p=0.455$), though distinct complication patterns were associated with different types of reconstruction: Patients who underwent osteosynthesis were at increased risk for structural failure (OR 10.3; $p=0.011$), while those with endoprosthetic reconstruction were at increased risk for wound dehiscence or deep infection (17.6; $p=0.020$). Patients who underwent osteosynthesis were at greater risk for major complications than patients with endoprosthesis (OR 3.9; $p=0.045$). Anatomic region ($p=0.135$), tumor volume ($p=0.077$), and fracture on presentation ($p=0.349$) were not associated with increased risk for complications (Table 2).

Conclusions:

Osteosynthesis was associated with higher rates of major complications and structural failure, while endoprosthetic reconstruction was associated with higher rates of infection and wound dehiscence. Larger multi-institutional studies are warranted to better elucidate risks and benefits of various methods of reconstruction.

261: Are modular porous metal augment the solution for metastatic pelvic bone disease? A sperimental study

by Boffano Michele | Evans Sam | Ratto Nicola | Miola Marta | Vernè Enrica | Piana Raimondo

Abstract ID: 261

OBJECTIVE The stability of the construct of modular Trabecular Metal™ (TM, Zimmer, USA) implants relies on the primary fixation with the bone and on the cementation among the modules. The aim of this project is to study the cementation process between two modules of TM, the mechanical stability of the construct “TM-cement-TM”, and the cement penetration.

STUDY DESIGN Sperimental study

METHODS 24 pairs of TM specimens (40x15x6mm) were cemented together at the smallest side applying a constant pressure. Biomet Plus (high viscosity, group A) and Hi-Fatigue Bone Cement (intermediate viscosity, group B) were used. Both groups were divided into 2 subgroups of 6 pairs according to different polymerization times (T1,T2). The 4-point bending

test was performed to obtain the axial load (N) and the flexural strength (MPa). The whole set of experiments was repeated at the same conditions for 24 pairs (C and D) of thinner specimens (40x15x3mm). A SEM and a photomicroscope were used to observe the specimens to evaluate cement penetration.

RESULTS The best mean values were observed in group A-T1a (725,2N and 40,29MPa), the best peak values were 853N and 47,39MPa (group B-T1b). Microscopic analysis demonstrated that cement penetrates only into the first available pores at the surface.

CONCLUSIONS An efficient cementation could obtain an “unique” implant relying initially on the bone fixation of one module and consequently on the osteointegration process. This study confirmed that the cementation is a reliable technique to connect two pieces of TM. It is better to cement larger surfaces ($p < 0.05$). The difference between polymerization times and cement viscosity were not statistically significant. A stable construct with different modules available off-the-shelves can fill zone I-II pelvic defects and represent a cheaper and quicker solution than a custom-made prostheses. A precise preparation and cementation technique is advisable to obtain reproducible clinical results.

263: Serum Biomarkers: A future perspective for Osteosarcoma

by Dr. Ajay Mahato | Prof. Shah Alam Khan

Abstract ID: 263

Introduction:

Osteosarcoma is the most common primary malignant tumor of bone in children with high metastasis tendency and least available diagnostic tools for early detection and prognostic outcome.

Objective:

This study is to correlate between serum biomarkers, dynamic MRI and histopathology in children (<18 years) with osteosarcoma and help in establishing protocol guidelines in osteosarcoma management vis-a-vis the use of serum biomarkers.

Study design: Prospective/observational Study

Method: 11 biopsy-proven non-metastatic osteosarcoma cases (7 male and 4 female) and 7 healthy volunteers (6 male and 1 female) of same age group were included in the study. 11 serum biomarkers were evaluated thrice; pre-chemotherapy, post-chemotherapy completion, and 6 weeks post-surgery. Dynamic Contrast Enhanced – Magnetic Resonance Imaging (DCE-MRI) to see the change in tumor volume and time intensity curve (TIC) and

histological analysis of necrosis percentage and subtypes were done in pre- and post-chemotherapy phases. Serum biomarkers were correlated with DCE-MRI and histological response.

Result: Serum biomarkers such as IGF-1, IGFBP-3, IGFBP-3/IGF-1, CXCL-4, CXCL-6, Ki67-P, and BAP had shown significant results and were following a pattern in the metastatic and poor responder patients suggesting the potential of prognostic significance. The change in serum levels can be used to plan the treatment protocol for the high-risk patient groups. Changing serum level trends of serum T3 and CD44 seemed of prognostic significance, however, were statistically non-significant. Serum markers such as ANG, TNF-beta, and MT-1 failed to show much significant role in our study suggesting their lower prognostic significance.

Conclusion: With recent advances in molecular biology and technologies, serum biomarkers seemed to have a potential role in early diagnosis and predicting treatment outcome and disease-free survival in combating with osteosarcoma.

265: Chordoma derived Extracellular Vesicles

by Ines Anders | Arjen Yildiz | Bernadette Liegl-Atzwanger | Birgit Lohberger | Andreas Leithner | Beate Rinner

Abstract ID: 265

Objective: Tumor-secreted extracellular vesicles (EVs) are mediators of intercellular communication between tumor cells and stromal cells and play an essential role in tumor growth and metastatic evolution. EVs have the same topology as their parental cells and have been shown to be capable of delivering nucleic acids, proteins, like tetraspanins and growth factors, to recipient cells. Chordoma are slowly growing malignancies which can be located all over the spine and belong to bone tumors. The exact molecular pathogenesis is yet to be elucidated. Due to the location, the usual treatment of resection and radiation is often insufficient and leads to tumour recurrence. EVs might be new biomarkers and novel therapeutic targets for chordoma progression, particularly for predicting and preventing future metastatic development.

Study design: Various chordoma cell lines were cultured under normal and under stimulation at different oxygen conditions. Additionally the effect of stimulation/inhibition of co-cultivating chordoma cell lines together with a lymphoblastoid B- cell line from the same patient will be investigated. Moreover the characterisation of biomolecules being transported will be targeted, thus aiming to reveal a possible new target for therapy

Methods: To rapidly size and phenotype cellular vesicles we used nanoparticle tracking analysis by NanoSight NS300 (Malven Instruments). A combination of markers and

fluorophores ensures the exclusion of membrane fragments or vesicles originating from cell culture media supplements and was detected by flow cytometry CytoFLEX (Beckman Coulter). Results: We were able to clearly demonstrate the existence of EVs. To our knowledge communication via EVs and chordoma cells has not been investigated so far. The data gained to this point indicates that chordoma cells produce extracellular vesicles for cellular communication.

Conclusion: We hypothesize that EVs are released by chordoma cells, play a major role in tumor progression and might be a new option for targeted therapy.

270: Intercalary allograft reconstruction after femoral tumor resection : long-term results and benefits of adding a vascularized autograft

by Quinette Yonis | Crenn Vincent | Missenard Gilles | Viard Brice | Briand Sylvain | Anract Philippe | Mascard Eric | Gouin François

Abstract ID: 270

Intercalary allografts femoral reconstructions after diaphysial carcinologic resection aim to a functional recovery of the limb by joint preservation. Complications are usual, led by infection, non-union and fracture. Adding a vascularized fibular autograft could decrease complication rate. Is the outcome of an intercalary allograft reconstruction improved by adding a vascularized fibula?

We retrospectively reviewed 51 intercalary reconstructions. 34 were ALLO and 17 were ALLO-FIB.

The primary outcome was allograft survival and the secondary outcomes were the complication rate (surgical revision, infection, non-union, fracture), bipolar consolidation delay and functional outcome measured using MSTS score.

Allografts survival at five years was 95.2%, 91.6% at ten and 81.4% at twenty, without significant difference between the two techniques (At five years, ALLO-FIB survival was 100% and ALLO was 92.3%; At ten, ALLO-FIB was 87.5% and ALLO was 92.3%). There were no significant difference in revision rate (global rate: 1.45 ; ALLO-FIB: 1.29; ALLO: 1.53) and complication rate (global: 80.4%; ALLO-FIB: 70.6%; ALLO: 85.3%). Bipolar consolidation rate was 84.3%, 100% for ALLO-FIB and 76.5% for ALLO with a mean delay of 19.5 months, significantly shorter in ALLO-FIB (14 months vs 25, $p=0.02$). MSTS score was 27.4/30, significantly better in ALLO (28.14 vs 26.2, $p=0.04$).

Intercalary allografts survival is not significantly improved by adding a vascularized fibula. Our study shows good functional results and an acceptable survival but numerous revisions due

to several complications. Adding a fibular vascularized autograft significantly decrease the consolidation delay, allowing an earlier full weight-bearing, but also lead to a decrease of the MSTs score, maybe due to the presence of a second surgical site.

274: Resection of groin soft tissue sarcoma: analysis of complications predictive factors

by Louis-Romee Le Nail | Audrey Patoue | Sophie Chapet | Guillaume Janoray | Loic Bouilleau | Philippe Rosset | Aurelie Bourdais-Sallot

Abstract ID: 274

Introduction: Soft tissue sarcomas are rare malignant tumors that require standardized management in referral centers. Surgical management of groin tumors is difficult because of frequent local complications. The main objective of our study was to identify predictive factors of major local complications of surgical management of primary inguinal soft tissue sarcoma. Secondary objectives were to identify predictive factors of delayed adjuvant radiotherapy and to define an optimal surgical therapeutic attitude in order to enable adjuvant treatment to be carried out as quickly as possible.

Material and methods: This is a retrospective monocentric study that includes all patients referred to Tours University Hospital, between January 1995 and December 2016, for resection of a primary soft tissue sarcomas located in the groin region. Major complications should require surgical revision or invasive procedure or prolonged dressings (infection, wound disunion, hematoma, seroma and lymphorrhea).

Results: Over the 55 patients included, 13 had major complications (24%): 10 patients required revision surgery (18,2%), 2 patients required repeated aspirations and 1 patient needed prolonged dressings. Two pedicled rescue flaps were performed. Patients with major complications were more often tobacco smokers ($p = 0.012$) and bone was more often exposed during surgery ($p = 0.024$). As a consequence, of the 39 (71%) patients who required an adjuvant radiotherapy, 5 patients (12.8%) had a delayed radiotherapy and 3 patients (7.7%) did not have any at all.

Conclusion: In our study, predictive factors such as smoking, bone exposure during tumor excision were associated with major complication occurrence (e.g postoperative local infection, scar disunion and lymphorrhea) following resection of soft tissue sarcoma of the proximal adductor compartment. We thus recommend flap coverage after tumor resection in case of predictive factors of complication.

277: Core needle aspiration biopsy – a novel highly effective technique for sampling musculoskeletal lesions

by Mandip Chandravadan Shah, Chetan Anchan

Abstract ID: 277

Introduction:

Needle biopsy for suspected musculoskeletal neoplasms has many advantages over open biopsy. However its effectiveness in form of yield and accuracy has been debated. We report a novel but simple needle biopsy technique – Core Needle Aspiration Biopsy (CNAB) which is highly effective.

Method:

From 2010 to 2017, 931 patients underwent CNAB. A Jamshidi needle, A 20 cc syringe, and a bowl with saline were heparinised with 5000 IU of un-fractionated heparin. Through a stab incision, Jamshidi needle was inserted into the lesion. The syringe was then attached to it. Maintaining a negative pressure, the needle was moved back and forth to reach all the areas of the lesion. The aspirate was emptied in the heparinised saline. Procedure is repeated twice. The saline is then filtered. The sediment material contains the tissue for histopathology.

Results:

Of 695 bone and 236 soft tissue lesions, 167 required CT scan guidance and 122 needed image intensifier. 203 required general anaesthesia. 887 specimens were representative samples (Yield = 95.3%). An average of 3.4 paraffin blocks could be prepared (range 1 – 9). A musculoskeletal pathologist could differentiate malignant and benign in 97% (bone 99.7%, soft tissue 94%) cases and make a specific diagnosis in 94% (98% bone, 90% soft tissue) of adequate biopsies. Diagnosis remained unchanged after treatment in 860/887 patients (accuracy = 97.9%). Cystic and fibrous lesions were most difficult for adequate yield. 1 patient had deep infection. Any artifact due to the use of heparin wasn't observed. Average procedure cost was 5000 Indian Rupees (80 US\$).

Conclusions:

CNAB is a safe, easy and cost effective procedure with high yield and accuracy. Presence of heparin does not allow clot formation eliminating entanglement of representative tissue within clots. Definitive therapy can be started early without patient having to undergo a major surgical procedure for diagnosis.

279: Radical Intralesional Curettage for large campanaci III GCT with systemic Zoledronate therapy – Have we hit the Bull’s eye?

by Mandip Chandravadan Shah, Chetan Anchan

Abstract ID: 279

Introduction: High local recurrence rates have been reported after Intralesional surgery for large Campanaci grade III giant cell tumors. Resection is considered safer option but leads to disability and long term issues. We analysed oncological safety of very extensive intralesional curettage for campanacci III Giant cell tumors (GCT) of appendicular skeleton.

Methods: Between 2010 and 2015, in 47 patients (28 males, 21 females, median age 27 years) underwent radical intra-lesional curettage for campanaci III GCTs by a single surgeon. Entire soft tissue mass was excised enbloc with the cortical window. Variety of scoops, high speed burr, Electro-cauterization of all the walls with spray mode and phenol – alcohol irrigation was used in all cases. Postoperatively all received 6 injections of Zoledronate 4 mg at monthly interval. Suitable reconstruction was done. Oncological outcome and functional results were analyzed. Data of all 47 patients is available.

Results: Most common site involved was the distal femur (n=24). There were 17 recurrent and 30 virgin cases. 7 patients had intra-articular pathological fractures at presentation. Reconstruction was done using only cement in 32, only bone graft in 5 and both in 10 cases. Implants had to be used in 35 patients for better stabilization. Mean follow was 58 months (Range - 36 to 90 months). There were 3 recurrences (6.3%). No infections were noted. 1 patient had to undergo total knee joint replacement for severe arthritis. Functional scores were excellent in 34, good in 6, fair in 4 and poor in 3 patients (1 lower femur, 2 proximal humerus).

Conclusions: Combination of radical surgery (enbloc removal of soft tissue mass, high speed burr, phenol – alcohol irrigation, electrocautery) and zoledronate seems to consistently give excellent local control even in campanaci III GCTs. We strongly recommend this treatment for select Campanaci III and all other GCTs.

280: Limb salvage for very large tumors - Are we justified?

by Mandip Chandravadan Shah, Chetan Anchan

Purpose: While limb salvage is the norm for small or medium size tumors, there is still no clarity in literature on the large tumors. In this paper we have analysed retrospectively 126 very large tumors where limb salvage was attempted and tried to find out the safety, function and disease control rates.

Methods: Between 2010 and 2016 , 126 patients with very large tumors underwent limb salvage surgery. The judgment of “very large” was made on 3 objectives. (1) Tumor size of >12cm in at least two dimensions &/or (2) tumor diameter \geq 2/3rd of the limb diameter on axial MRI &/or (3) marrow extent of the tumor \geq 1/2 of the bone length on coronal or sagittal MRI. An analysis was done as to the surgical morbidity, disease and functional status.

Results: complications In 126 patients (92 malignant, 34 benign), included 1 perioperative mortality, 2 infections (1.5%), 3 major skin necrosis and 5 nerve palsies. 13 repeat surgeries were needed for dealing with complications. 3 patients had to be amputated later. Resection margins were adequate in 110 and inadequate in 16 patients. At a mean follow up of 48 months, Local recurrence (LR) developed in 9 patients (7.1%). Distant metastasis developed in 46 patients. All 34 benign tumor and 13 low grade sarcoma patients are disease free. Of 92 malignant tumor patients, 39 have died of disease, 7 are alive with disease and 46 (50%) are disease free. Functional scores were good /excellent 116 patients.

Conclusions: For very large benign tumors or low grade sarcomas the disease control rate of almost 100% justifies all attempts at extremity preservation. For high grade sarcomas, where it is possible to get technically tumor free margins and with good adjuvant treatment, results for limb salvage may be similar to an amputation.

281: Van Ness Rotationplasty for nonsalvageable tumors around the knee - a study of 20 cases

by Mandip Chandravadan Shah, Chetan Anchan

INTRODUCTION: we looked at Van Ness rotationplasty as an option to Amputation in otherwise non-salvageable limbs and evaluated their surgical morbidity, oncological and functional outcomes.

PATIENTS AND METHODS: Between May 2010 and May 2016, 20 such "not amenable to conventional salvage" patients underwent Van – Ness rotationplasty. Indications were fungated large tumor, long segment involvement in kids, ill performed open biopsy, post radiation relapsed and infected failed megaprosthesis. There were 15 males and 5 females with a mean age of 12 years at time of surgery (range 5-25 years). Histology was osteosarcoma (12 patients), Giant cell tumor (3 cases), Ewing’s sarcoma (4), chondrosarcoma (1) and liomyosarcoma (1). Location was lower femur (14) and upper tibia

in 6. Implants used were LCP, DHS, DCS and bipolar prosthesis. Mean follow up period was 40 months (range 24 -83 months).

RESULTS: 3 patients developed vascular compromise within 24 hours of surgery necessitating re-exploration. 2 recovered while 1 ended up in amputation. There was no infection or non – union. Convincing union was seen after average 2.5 months (range 1 – 9 months). Overall average MSTS score for whole series was 21 /30 (range: 18 – 26). MSTS scores were better for distal femoral resections (avg 23; range 19 – 25) and with children. At last follow up, all 3 GCT patients and 12/ 17 primary sarcoma patients were alive without any disease. 5 patients have died due to systemic spread to lungs, bones and brain of their disease. No patients developed local tumor recurrence.

CONCLUSION: Very low surgical complications and excellent oncological safety even in otherwise nonsalvageable situations makes Rotationplasty a reliable option which should be offered to such patients. Children are the best candidates. Video assisted counseling of the patient and family is mandatory before undertaking this procedure.

282: Do we really need to do a bony reconstruction after internal hemipelvectomy?

by Mandip Chandravadan Shah, Chetan Anchan, Mukul Trivedi

Abstract ID: 282

Aims: After acetabular resection for sarcomas, achieving a bony femoro -pelvic fusion is very difficult and prosthetic reconstructions has very high complication rates. We reconstructed the defects with a simple polypropelene mesh between femoral head and remaining part of pelvis thereby aiming at a pseudo-arthrosis and analyzed its functional outcome.

METHODS: 24 patients having bone tumors of the pelvis underwent acetabular resections and femoro-pelvic pseudoarthrosis. Commonest Histology was chondrosarcoma (13). According to Enneking’s classification, type II (1), type I+II (5) , type II+III (14), type I+II+IV (2) ,type I+II+III (2) resections were carried out. A 30 x 30 cm polypropelene mesh was tied to the remains of capsule around the head and was then turned on itself to make a strong braided rope like structure. It was passed through remaining ilium/ ischium/ sacrum and was tied to itself in proper rotation with heavy ethibond suture. Functional limb results were reported according to MSTS functional scores.

RESULTS: 20/24 patients attained independent ambulation. Mean time to full weight bearing was 4.7 months (3-9 months). There were 2 flap necrosis, 2 infections, 1 nerve injury and 1 vascular injury. Local recurrence occurred in 3 (13%) and Systemic metastasis developed in 10 patients (47% of malignant tumors). At last follow up 14 are alive without any signs of disease. Average MSTS score was 22 (range 13–27). Best MSTS scores were with type II or II+III IH where ilium was left to support the femur while worst was with type I+II+III resection patient. Patients with higher BMI have poorer functional outcome with meshplasty.

CONCLUSION: Mesh-pseudoarthrosis is a very simple reconstruction option which has an excellent functional outcome. It reduces surgical time and eliminates uncertainties pertaining to fusion / joint replacement. This should be strongly recommended as a method of reconstruction to patients undergoing acetabular resections.

283: Translocation of ipsilateral fibula for reconstruction of tibial defects after tumor excision

by Mandip Chandravadan Shah, Chetan Anchan

Abstract ID: 283

Aims:

Tibialization of fibula (TOF) is a well documented modality for reconstruction of long tibial defects. We analysed surgical morbidity and functional outcome of this procedure.

Method:

Between 2010 and 2016, 24 patients underwent tibial diaphyseal or distal epimetaphyseal resections. Ipsilateral fibula was osteotomized at a suitable level and translocated medially keeping all its muscular attachments intact, to bridge the defect. All patients required plate fixation for stabilization (from upper tibia to lower tibia in diaphyseal resections and from tibia to talus for lower tibial resections). Surgical complications, time to union and weight bearing, additional procedures and oncological outcome were noted.

Results:

Commonest Histology was Osteosarcoma in 14. Resection was diaphyseal in 10 and lower tibia in 14 patients. Average length of defect was 12.5 cm. Additional avascular fibula strut was used in 7 cases. Average time to radiological union was 10.5 months in single fibula and 6 months in double fibulae group. Non union leading to implant failure occurred in 3 cases (2 distal tibia, 1 diaphyseal). Delayed union (>9 months) was noted in 11 cases. Average time to full weight bearing was 12 months in single and 9 months in double fibulae group. Complications included superficial skin necrosis (n = 8), common peroneal nerve palsy (n = 3), Sudeck's osteodystrophy (n = 2) and significant malpositioning (n = 3). At mean follow up of 50 months 6 /14 osteosarcoma and both Ewing's sarcoma patients have died due to metastasis. 1 osteosarcoma patient had local recurrence. Rest are mobile and functional.

Conclusions:

TOF is a very useful option for reconstruction of lower tibial and select diaphyseal defects. Addition of another avascular strut of fibula enhances the union allowing early weight bearing. Delayed union is quite frequent with this surgery. Once united, this procedure gives excellent function to the patient.

286: Single-photon emission computed tomography scan as a novel supplement for differentiating enchondroma and low-grade chondrosarcoma

by Min Wook Joo | Woo Hee Choi | Seonhwa Jeong

Abstract ID: 286

Objective

As management and prognosis are different, it is important to distinguish between enchondroma and low-grade chondrosarcoma. Although various clinical and radiological clues have been proposed, it is not easy to distinguish both diagnoses, which is difficult to even by pathological examinations. The objective of this study was to evaluate the efficacy of single-photon emission computed tomography (SPECT) scan in differentiating the chondroid tumors in the long bone.

Study design

Among patients who were pathologically diagnosed as enchondroma or low-grade chondrosarcoma of the long bone from July 2015 to November 2017, we retrospectively reviewed the medical records on cases of which radiological impression and histological diagnosis were identical.

Methods

Maximum standard uptake value (SUVmax), mean standard uptake value (SUVmean), and tumor volume were measured from SPECT scan images, and we statistically analyzed the differences in the values between enchondromas and low-grade chondrosarcomas.

Results

There were 18 females and 10 males. Median ages of 14 patients with enchondromas and the rest of patients with low-grade chondrosarcoma were 48 and 51 years. Median main lengths were 3.2 cm in enchondroma and 6.15 cm in low-grade chondrosarcoma. Median follow-up period was 12 months. Median SUVmax, SUVmean, and tumor volume were 12.34, 5.06, and 11.12 in enchondroma and 20.59, 8.16, and 14.14 in low-grade chondrosarcoma. Mann-Whitney U test demonstrated that differences in SUVmax, and SUVmean between enchondromas and low-grade chondrosarcomas were significant ($p < 0.001$, and $p = 0.024$). The areas under ROC curves for SUVmax and SUVmean were 0.88 ($p = 0.001$) and 0.75 ($p = 0.024$). Using a cut-off value of SUVmax of 16.6, the sensitivity and specificity were 85.7% and 100%. With a cut-off value of SUVmean of 6.7, The sensitivity and specificity were 78.6% and 71.4%.

Conclusions

While it is still challenging to distinguish enchondroma and low-grade chondrosarcoma in the long bone, SPECT scan might facilitate differentiation of the diagnoses.

287: Translocation of ulna and wrist arthrodesis after enbloc resection of lower radius for Giant cell tumor

by Mandip Chandravadan Shah, Chetan Anchan

Abstract ID: 287

AIMS: Arthrodesis of wrist is a documented and popular method for reconstruction after complete resection of lower radius Giant cell tumors. We have analyzed functional outcome of wrist fusion done with translocation of segment of ulna to bridge the defect.

PATIENTS AND METHODS: Between 2010 and 2016, 43 patients having campanaci III GCTs (23 primary, 20 recurrent) of lower radius were candidate for enbloc resection , ulnar translocation and wrist fusion. There were 15 males and 28 females with a mean age of 29 years at time of surgery (range 22-54 years). After resection, ulna was osteotomised and translocated in the defect with all its muscle attachments intact, thus making it a vascularised graft. The wrist was fused with a long 3.5 locking plate from MC II / III to radius in midprone position and 15 degrees of dorsiflexion. Mean follow up period was 50 months (range 24 -90 months). Bony union was assessed radiographically on regular basis. Functional limb results were reported according to MSTs scores.

RESULTS: The mean length of bony gap bridged was 5.5 cm (range of 4 - 8 cm). Mean union time at ulnocarpal area was of 2.5 months (range 2-5 months) and 4 months (2 – 9 months) at radioulnar area. Average MSTs scoring was 24 (range 21 – 28). All but 1 patient has (who developed radio – ulnar synostosis) excellent range of prono – supination. No patient had local recurrence. No patient had surgical site infection. One patient underwent removal of implant at 4 years after surgery for impending skin breakdown.

CONCLUSION: Translocation of ulna and wrist arthrodesis is a useful, simple, inexpensive and predictable reconstructive option. It is readily acceptable to the patient due to preservation of pronosupination, cosmesis, durability and low rate of complications.

290: Role of bisphosphonates in the management of giant cell tumor of bone: a randomized, comparative, clinical radiological and histopathological study

by Siddharth Dubey | Shishir Rastogi | Shah Alam khan

Abstract ID: 290

Objective: To analyse clinical and radiological effects of bisphosphonates in patients with Giant cell tumor of bone and to correlate them with ultrastructural changes and apoptosis of tumor cells using Transmission Electron Microscopy.

Study design: Randomised clinical trial

Method: 30 patients were enrolled in the study conducted from April 2014 to December 2014. Patients were randomised in two equal groups. Group A was given Zoledronic acid 5 mg slow IV infusion over 15 min. Three doses were given at 1-month interval. Group B was not given any form of neo adjuvant therapy. Primary outcome was to analyse if any difference in Apoptotic index as calculated using transmission electron microscopy. Secondary outcomes were change in VAS score, mineralization of the lesion and change in tumor volume.

Result: Mean apoptotic index in bisphosphonate group and control group was 41.46 ± 12.74 and 6.06 ± 2.60 , P value < 0.001 (using Mann-Whitney U Test). Mean VAS score before and after bisphosphonate therapy was 5.33 ± 1.77 and 1.8 ± 0.6 , p value = 0.001 (using Wilcoxon Signed Ranks test). Mean tumor volume before and after bisphosphonate therapy was 89.42 ± 34.84 and 89.70 ± 38.11 , p = 0.706 (using Wilcoxon Signed Ranks test).

Conclusion: Bisphosphonates induce apoptosis in GCT tumor cells, which may lead to decreased recurrence after surgery. They also alleviate pain and stabilize tumor volume which may be useful in managing inoperable GCT.

293: The Long-term results of Non-invasive extendable Endoprostheses in the treatment of paediatric lower limb bone tumours in paediatric patients

by Christian Gray Stephens

Abstract ID: 293

Introduction

Limb salvage surgery is now the treatment of choice for the management of bone sarcomas affecting the limbs. Extendable Endoprostheses are useful in lower limb reconstruction in skeletally immature patients where the growth plate is involved. As compared to previous invasive growing prostheses, the current non-invasive growers can be lengthened without the need for surgery therefore avoiding the anaesthetic and risks associated with multiple surgical procedures.

Method

Long term follow up of 94 patients, who have had non-invasive growing massive Endoprostheses in the lower limb, is presented.

Survival analysis was performed by cause: to increase growing potential, failed growing mechanism, aseptic loosening, fracture, and arthrosis.

Functional outcome score including the Toronto extremity salvage score and the musculoskeletal tumour scoring system was used.

Hydroxyapatite collar osseointegration was assessed.

Results

Histopathological diagnosis included osteosarcoma (72), Ewing's sarcoma (19), and one case each of aneurysmal bone cyst, chondrosarcoma and metastatic retinoblastoma.

Of the 94 patients, 25 have died. Mean survival from diagnosis was 12.75 months (range 0 to 174 months)

76% of endoprotheses had been revised at 8 years (Number at risk = 8 at 8 years). Removing 'reaching maximum lengthening capacity' as a criterion reduced this to 46% revision rate at 8 years.

Detailed functional outcomes are presented and demonstrate good to excellent postoperative function in the majority of patients.

The presence of osseointegration at the collar bone interface reduces the risk of loosening and prolongs survival of prosthesis.

14 further operations were required for recurrence and metastasis.

Conclusion

The use of non-invasive extendable endoprotheses in the treatment of paediatric bone tumours of the lower limb allows multiple repeated atraumatic lengthening without the need for surgery and anesthesia, thus reducing the morbidity associated with multiple operations. Functional results are excellent. Osseointegration is crucial for long term survivorship. Improving implant longevity requires more work going forward.

296: Sensitivity of osteosarcoma cell models against FGF receptor inhibition

by Dominik Ensle | Walter Berger | Lisa Gabler | Reinhard Windhager | Bernd Kubista

Abstract ID: 296

Topic

Osteosarcoma is the most common malignant bone tumor in children and young adolescents with a five-year survival rate of about 80%. Unfortunately, micro-metastases frequently exist at diagnosis making surgical cure difficult. Despite numerous (pre)clinical trials of novel

targeted anticancer compounds, survival and recurrence rates have not improved during the last decades.

Objective

Here we tested human osteosarcoma cell models for sensitivity against inhibitors of fibroblast growth factor receptors (FGFR) and dissected underlying signaling mechanisms.

Study design and methods

Three small-molecule FGFR inhibitors were tested. Two are clinically approved – ponatinib and nintedanib – while AZD4547 is in preclinical development. Trabectedin, a natural compound approved for treatment of soft tissues sarcoma, was tested in combination with FGFR inhibition. The impact on cell survival and clone-forming capacity was compared to activity of the MAPK and PI3K/AKT proliferation and survival pathways. Additionally, subcellular localization of FGFR1 in osteosarcoma cells was tracked by immunofluorescence staining.

Results

Survival analyses revealed IC50 values of 0.5-1 μ M for ponatinib, 2.8-7 μ M for nintedanib, 6-10 μ M for AZD4547 and 0.5-1.5nM for trabectedin as single treatments. Interestingly, SAOS-2 was the most sensitive cell line against all tested drugs, while MG63 and U2OS were comparably resistant. FGFR inhibition caused reduction of ERK phosphorylation (as marker of MAPK pathway activity) in parallel to dephosphorylation of FGFR indicating presence of an autocrine signal loop. FGFR levels at the cell membrane increased after FGFR inhibition, indicating reduced RTK degradation. In case of AZD4547, this effect was weak for FGFR4 as compared to FGFR1, reflecting the lower activity of this TKI in case of FGFR4. The FGFR inhibitor nintedanib in combination with trabectedin showed synergistic anti-osteosarcoma effects.

Conclusions

This in vitro study suggests that the inhibition of FGFR alone or in combination with Trabectedin is a promising targeted treatment strategy for osteosarcoma.

301: The biological significance of tumour growth during preoperative radiation for extremity soft tissue sarcoma

by Christian Isaac | John Kavanagh | Anthony Griffin | Colleen Dickie | Peter Ferguson | Peter Chung | Charles Catton | David Shultz | Rakesh Mohankumar | Brian O'Sullivan | Jay Wunder

Abstract ID: 301

Objective: To investigate whether local tumor response to preoperative radiotherapy (RT) has prognostic significance for local or systemic disease control.

Study Design: Retrospective review

Methods: Pre & post-RT MRI were available for 309 patients treated for extremity STS from 2001-2012. Preoperative RT was delivered over 5 weeks (50Gy); most received image-guided intensity modulated RT (IMRT). Tumor volume on pre-RT and post-RT MRI was measured to evaluate tumor response, as was percentage change in T2-weighted signal (177 paired scans available). Using RECIST criteria, tumor response to RT was categorized as growth, shrinkage, or no change if tumor volume increased by $\geq 20\%$, decreased by $\geq 30\%$, or demonstrated $< 20\%$ change. Local recurrence-free, metastasis-free, and overall survival were estimated by Kaplan Meier and compared with the log rank test.

Results: Of 309 patients examined, 106 tumors shrank, 106 grew, 97 were unchanged. A majority of myxoid liposarcomas shrank; a high proportion of MFH/UPS/myxofibrosarcoma grew. There was no difference in local recurrence-free survival based on tumor to preoperative RT (5-year LR-free survival 98.0%, 94.0% and 98.9% for shrinkers, growers and unchanged, respectively, $p=0.06$). However, tumors which grew during preoperative RT had significantly worse metastasis-free survival (5-year metastasis-free survival 73.8%, 52.1% and 78.5% respectively, $p<0.001$) and overall survival (5-year overall survival 81.8%, 54.7% and 79.5%, respectively, $p<0.001$). For cases where the T2 signal increased, metastasis-free survival was also poorer (unchanged 66.0%, decreased 73.5%, increased 46.2%, $p=0.04$). On multivariate analysis, tumour growth, higher grade, and greater tumour diameter pre-radiotherapy retained significance for metastasis-free survival.

Conclusions: Extremity STS that increased in volume on preoperative RT had worse metastasis-free and overall survival, likely attributable to unfavourable tumor biology. There was no difference in local recurrence risk, likely due to treatment re-planning for those that grew, reinforcing the importance of a multidisciplinary treatment approach to patients with sarcoma.

305: Use of Indocyanine Green-SPY angiography for soft-tissue survival post sarcoma resection and Flap reconstruction

by Sophie Mottard

Abstract ID: 305

Objective:

Vascular evaluation of surgical beds after sarcoma resection and evaluation of flap reconstruction to avoid wound complications

Study design:

Indocyanine Green-Spy angiography was performed during large sarcoma resections. Images were studied and surgical strategy was modified before wound closure (with ou without flaps). A prospective data base allowed us to evaluate complications before and after adoption of this technique.

Methods:

SPY angiography was performed in patients large STS resections and large deep tumors that required soft tissue reconstruction to avoid large dead spaces. Hemipelvectomies were included in the last group. Images were studied live during surgery at 2 points in time, immediately after tumor resection and at the very end of surgery when flap reconstruction was complete. Skin vascularity was reviewed surrounding the surgical bed and additional skin resection was performed as required.

Results:

Patients who sustained SPY angiography to allow skin flap modification presented decreased wound complication. Sluggish vascularity was re-resected aggressively and Flap modification according to spy results allowed for resection of areas with insufficient blood flow.

Conclusions:

Indocyanine Green-SPY angiography is a useful new imaging technique that has promising indications in sarcoma resection. Decrease in wound complications was observed when this technique was applied during extensive resections, and reconstructions. A Prospective study is underway.

312: Evaluation of 3014 Bone and Soft Tissue Tumor with Multidisciplinary Approach in Black Sea Region, Turkey

by Sina COŞKUN | Nevzat DABAK | Hasan GÖÇER | Ferhat SAY

Abstract ID: 312

Objective: Multidisciplinary approach plays an important role in the management of bone and soft tissue sarcomas. Due to this cooperation, treatment modalities are arranged more optimally, patient survival is positively affected and unnecessary examination and over treatment costs are avoided. The aim of this study is to share the demographic data of a musculoskeletal tumor center and to emphasize the importance of the multidisciplinary approach in bone and soft tissue sarcomas.

Study design: Retrospective

Methods: Between 2004 and 2017, the database of patients enrolled in a multidisciplinary bone and soft tissue tumor council at a university hospital was retrospectively scanned and transferred to a computer environment.

Results: A total of 3014 patients were included in the study. After the patients with lacking data were removed, 2585 patients constituted the subject of study. 472 patients were evaluated multiple times in multidisciplinary tumor council. 718 primary bone tumors, 603 primary soft tissue tumors, 387 metastasis and 405 non-tumoral cases were identified in the evaluation of the 2113 patients. The definitive diagnosis of 203 patients was different from their initial diagnosis. Among these differences, there were 27 patients whose diagnosis

changed from a benign diagnosis to a malignant diagnosis, and 42 patients whose diagnosis changed from a malignant diagnosis to a benign diagnosis.

Conclusion: In this study, we have determined the epidemiologic distribution of cases evaluated in the multidisciplinary bone and soft tissue tumor council in the Central Black Sea Region. We can share that multidisciplinary approach in treatment of bone and soft tissue tumors has a positive effect on survival especially in the patient group whose final diagnosis is different from the preliminary diagnosis. With a multidisciplinary approach, unnecessary treatment costs are avoided and the survival rate of the patients were positively affected.

315: Peroneal Nerve Palsy Following Surgical Treatment of Tumors in the Knee Area- Incidence and Risk Factors

by Ana Oljaca | Magdalena Maria Gilg | Lorenz Trausnitz | Christine Linda Wibmer | Marko Bergovec | prof. Andreas Leither

Abstract ID: 315

Peroneal nerve palsy (PNP) is a possible complication of surgical treatment of tumors in the knee area. So far, only post-total knee arthroplasty (TKA) PNP risk factors have been presented. We investigated the overall incidence and risk factors for PNP in bone tumor patients who have undergone resection in the knee area.

We reviewed our prospectively maintained tumor database dating from 2006 to 2016 and have singled out 56 patients with a wide resection of the distal femur and/or proximal tibia and implantation of a tumor endoprosthesis. 10 out of 56 patients developed postoperative PNP. Clinical records were further analyzed in search of known risk factors for PNP (diabetes, type of analgesia, tourniquet, BMI, hematoma, constrictive dressing, tumour specific factors: neoadjuvant polychemo- and radiotherapy, limb lengthening procedures).

In our dataset, the overall incidence of PNP was 17.9%. Six patients developed PNP after wide resection with endoprosthetic replacement, four after revision procedures (one lengthening procedure, two mechanical complications, one infection). Eight patients experienced partial, and two a complete loss of nerve function. Six of the palsies were temporary and four were permanent. The mean duration of PNP was 22.2 months (range 4.2-72.7).

All of the patients had at least two of the known PNP risk factors, one patient had three, and six patients had more than four risk factors. 8/10 patients underwent polychemotherapy and one had undergone additional radiotherapy.

The incidence of PNP in our dataset (17.9 %) is higher than the reported rates following TKA (0 to 9,5%), which could be attributed to the administration of polychemo- and/or radiotherapy. In regard to children, minimally-invasive lengthening must be undertaken with caution to avoid nerve damage. The determination of potential risk factors and their prevention can reduce the risk of PNP following bone tumor surgery.

318: Long term results of allograft + vascularized fibula graft in primary tibial tumors intercalary resection

by Campanacci Domenico Andrea | Totti Francesca | Muratori Francesco | Ippolito Massimiliano | Bartolini Saverio | Beltrami Giovanni | Capanna Rodolfo

Abstract ID: 318

Introduction

Biologic reconstruction with bone grafts is commonly used after intercalary resections of primary tumors of the tibia. The aim of this study was to analyze complications and failure rate in patients affected by primary tibial sarcoma treated with intercalary reconstruction using massive bone allograft and vascularized fibular graft.

Patients and Methods

Forty patients (mean age 18, 5-60; M/F: 24/16) were retrospectively reviewed. The diagnosis included osteosarcoma (21), Ewing's sarcoma (10), adamantinoma (5), soft tissue sarcoma (4). Average resection length was 15,4 cm (range 10-26). In 12 patients an intra- epiphyseal resection was performed. Twenty-nine patients received chemotherapy, no patients received radiotherapy.

Results

At a mean follow up of 96 months (range 5-255), 32 patients (80%) were continuously disease free. Five patients (12,5%) had a local recurrence (excision 1, amputation 3, no treatment 1). A fracture was observed in 12 patients (30%) (spontaneous healing 5, surgical revision 7). Non-union occurred in 6 (15%) patients, treated with surgical revision in all cases. In 2 cases (5%) a deep infection was observed; 1 case was treated successfully with surgical debridement and 1 case required an amputation. Early wound dehiscence in 6 (15%) patients, treated successfully with surgical revision with (5) or without (1) flap coverage. Average MSTS functional score was 27 (range 18-30). Revision free survival of the implant was 58% at 5 and 50% at 10 years. Implant failure rate considering removal of reconstruction or amputation for any reason was 12,5%. Overall survival of the reconstruction was 89% at 5, and 84,5% at 10 years. Limb salvage survival was 89% at 5 yrs, 10 years.

Conclusion

Intercalary reconstruction with VFG plus allograft was successfull in primary tibial tumor resection. In spite of the high proportion of complications, the biological reconstruction

showed an excellent long-term failure-free survival rate, allowing to salvage the limb in almost 90% of cases.

319: Endoprostheses in children with bone sarcomas. Experience of East-European Sarcoma Group.

by Dzampaev A.Z | Nisichenko D.V. | Hestanov D.B. | Aliev M.D.

Abstract ID: 319

Objective: to analyze the results of endoprostheses of large joints and bones in children with bone sarcomas and possible complications after applying megaloprostheses in one center N.N. Blokhin.

Study design: for 30 years more than 664 operations have been performed, 474 children (2000-2016) were subjected to analysis, who underwent 423 primary operations and 51 reimplantations.

Materials: The analysis of complications was carried out according to the scale of Henderson 2010 and 2014. Time of survival of endoprostheses was analyzed, the overall survival of patients was assessed depending on the histological variant of the tumor and the stage of the process.

Results: Patients with stage I-II occurred in 52%, from II-IV stage - 42% of cases, with local relapses - 6%. The type No1 of complications occurred in 37 cases (12.7%), Type 2 (aseptic loosening) in 25 cases (8.6%), Type 3 in 9 cases (3.1%). Infectious complications (Type 4) occurred in 35 cases (12%). Local recurrence - 5.5% of cases (16 patients). The average follow-up - 39 months (max. -159). Three-year survival - 70.8% for modular prostheses and 74.6% for sliding prostheses. The 5-year period, 70.8% and 54.6% for modular and sliding prosthesis, 10-year interval - 52.3% and 18.9%, respectively. The overall survival of patients with osteosarcoma II stage was 74.7% (5 years), 70.9% (10 years); with the IV stage - 49.1% (5 years). The overall survival of patients with Ewing Sarcoma with stage II is 68.1% (5 years); With the IV stage- 24.2% (5 years).

Conclusions: endoprosthetics remains the gold standard in treatment of bone sarcomas. Infectious complications and aseptic loosening of the implants remain at a high level - 12% and 8.6%. The survival time of the prosthesis depends on the technique of the operation, the design of the prosthesis, the method of fixing the stems, the planned length of the prosthesis enlargement.

321: Ewing sarcoma of the pelvis: oncologic results after multimodal treatment

by Muratori Francesco | Totti Francesca | Botti Alessandra | Scoccianti Guido | Beltrami Giovanni | Capanna Rodolfo | Campanacci Domenico Andrea

Abstract ID: 321

Introduction

Multimodal treatment of Ewing sarcoma include chemotherapy followed by surgery and/or radiationtherapy. Around the pelvis, indications to local treatment are still debated, regarding the choice to perform surgery or radiationtherapy (RT) and timing in case of association. A consecutive series of 21 patients affected by Ewing Sarcoma of the pelvis were retrospectively reviewed with the aim to assess local and systemic control and correlation with multimodal treatment.

Patients and Methods

Between 2000-2016, 21 localized pelvic Ewing Sarcoma were treated in our Institution (mean age 19, range 9-43; M/F: 12/9). As local treatment, 3 patients received RT without surgery and 18 patients underwent pelvic resection (7 without RT, 7 preoperative RT, 4 postoperative RT). Margins were wide in 16 and marginal in 2 cases. In 5 cases no reconstruction was performed while in 12 cases allograft-prosthesis composite and in 1 case ischiofemoral arthrodesis was used after resection.

Results

The mean followup was 36 months (range 3-156). Seven patients (33%) were continuously disease free at follow up. Eleven patients (53%) died for disease progression after a mean of 15,7 months (range 3-32). Three patients (14%) had no evidence of disease after treatment of lung metastases. Postoperative complications observed were: 2 hip dislocations, 1 superficial infection and 5 deep infections (6/18; 33%). Two patients (5%) had local recurrence and 57% of patients developed metastases. Overall survival was 44.4% at 5 years.

Conclusion

In spite of advanced multimodal treatment, pelvic Ewing sarcoma remains a challenge in orthopaedic oncology with high risk of systemic progression and low overall survival. Pelvic reconstruction and perioperative RT increase the risk of postoperative complications.

322: En block spondilectomies for malignant neoplasms in children: review of 18 cases

by Alessandro Luzzati

Abstract ID: 322

Introduction: In children, we meet the difficulties of choosing the length of the instrumentation , the small size of the pedicles and vertebral bodies and the fragile hemodynamic balance.

Materials and methods.: Over the past 12 years we have performed 18 total spondilectomy single or multilevel (one to five vertebrae in en block excision), 6 cervical , 4 thoracic and 8 lumbar , with a resection of a minimum of 2.8 to a maximum of 12 cm. The age of our patients was between 4 and 16 years old with a mean follow-up of 26 months.

Histologies were: 6 osteosarcomas , 4 Ewing's sarcoma , 3 malignant high grade schwannomas , 1 leiomyosarcoma , 1 high grade rhabdoid tumor, 1 giant cell tumor (aggressive), 1 chordoma, 1 osteoblastoma osteosarcoma-like.

Results: We systematically performed a 360 ° circumferential reconstruction , connecting the anterior arthrodesis with the posterior fixation. The final stability over the time has been systematically carried out by an anterior interbody fusion between the adjacent vertebrae to the resection.

We preferred short strumentations, to save spine for future growth.

We had a distal junctional kyphosis due to breakage of the instrumentation , an distal junctional kyphoscoliosis due to failure of the arthrodesis , two neurological worsening (one completely healed , one with only partial recovery) , 4 local recurrences (9 , 12, 34 and 39 months) with systemic progression of the disease.

Conclusion: The high complication rate in our series is explained by the complexity of this type of surgery in children.

Summary: Based on our results we can say that even in pediatric patients with vertebral primary aggressive tumors it is possible to perform correct oncological resections with a final positive outcome higher than 70%

325: Sacral Chordoma: A Clinical Review Of 101 Cases With 30-Year Experience In A Single Institution

by Olivier van Wulfften Palthe

Abstract ID: 325

Objectives: 1) What are the overall survival, local relapse free survival, and distant relapse free survival rates and 2) prognostic factors for patients presenting with a primary tumor. 3) What

are the overall survival, local relapse free survival, and distant relapse free survival rates and 4) prognostic factors for patients presenting with a first local relapse? And finally 5) are there any differences in overall survival, local relapse free survival, and distant relapse free survival rates between patients presenting with a primary tumor and patients presenting with a first local relapse?

Results: We analyzed 73 primary and 28 first time recurrent sacral chordomas. Overall survival at 5 and 10 years for the primary tumors was 79% and 59%, respectively. Local relapse free survival at 5 years was 86%. For primary tumors, not receiving radiation was an independent predictor for worse local relapse free survival (HR: 0.20; 95%CI: 0.0043-0.90; p = 0.004) and increased tumor size was an independent predictor for both worse overall survival (HR: 1.68; 95%CI: 1.38-2.42; P = 0.004) and worse distant relapse free survival (HR: 2.25; 95%CI: 1.47-3.44; P < 0.001). For recurrent tumors the 5- and 10- year overall survival was 65% and 40%, respectively. Local relapse free survival at 5 years was 79% for recurrent tumors. On bivariate analysis increased tumor size was a significant predictor for worse survival (LR median: 338ml IQR: 218-503ml; no LR median: 26ml IQR: 9-71ml). A trend was seen towards better distant relapse survival for tumors presenting as a primary tumor (HR: 0.51; 95%CI: 0.25-1.06; P = 0.072).

Conclusion: Using a combination of surgical resection and adjuvant radiotherapy allowed us to obtain a good overall survival, local relapse free survival, and distant relapse free survival in patients presenting with either a primary tumor or with a first time local recurrent tumor.

326: Quality of Life and Functional Outcome after Proximal Femur Resection and Reconstruction for Tumors

by Polyxeni J. Papagelopoulou | Leonidas Dimopoulos | Panayiotis D. Megaloikonomos | Thekla Antoniadou | Vasileios G Igoumenou | Christos Vottis | Evanthia Mitsiokapa | Andreas F. Mavrogenis | Olga D. Savvidou | Panayiotis J. Papagelopoulos

Abstract ID: 326

Objective: The assessment of quality of life and functional outcome after limb salvage surgery of the proximal femur for musculoskeletal tumors.

Study design: Prospective observational study.

Methods: Thirty-five patients (11 women, 24 men) with a mean age of 47 years (range, 18-75 years) who underwent proximal femoral endoprosthetic reconstruction after tumor resection

were enrolled in this study. Their quality of life and functional outcome were prospectively assessed using different scores, which they completed at the last follow-up. Quality of Life was assessed using the Quality of Life of Cancer Survivors (QoL-CS) score, whereas the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Oxford Hip Score (OHS), and University of California Los Angeles (UCLA) activity score were used for the evaluation of patients' functional outcome. Statistical analysis was performed in order to find associations between quality of life and functional outcome scores. Mean follow-up was 3.5 years (range, 2-7 years).

Results: The mean overall QoL-CS was recorded to be 5.2 ± 0.8 points, while the mean score of the physical subscale was 6.9 ± 1.6 , of the psychological 4.7 ± 0.9 , of the social 4.1 ± 1.4 , and of the spiritual well-being 5 ± 1.5 points. Mean WOMAC, OHS, and UCLA scores were 56.2 ± 16.1 , 53.3 ± 19.7 , and 3.1 ± 1.5 , respectively. A positive strong correlation was found between QoL-CS and WOMAC ($r=0.73$, $p<0.05$), whereas moderate correlation between QoL-CS and OHS ($r=0.45$, $p<0.05$), and UCLA ($r=0.61$, $p<0.05$).

Conclusions: Even though functional expectations are limited after extended proximal femoral reconstruction, the quality of life of these patients seems to be acceptable. However, the functional outcome of these patients seems to define their quality of life, including the social and psychological outcome.

328: Does Radiotherapy after Surgery Affect Outcomes in Ewing's Sarcoma of the Pelvis?

by Ashish Gulia | Ajay Puri | Vineet John | Siddhartha Laskar | Tushar Vora | Nehal Khanna

Abstract ID: 328

Objective: The impact of postoperative radiotherapy (PORT) on outcomes has been a matter of debate after adequate resection in Ewing's sarcoma of the pelvis. We evaluated our cases after surgical excision in pelvic Ewing's sarcoma and assessed local control and overall survival (OS) with respect to PORT and chemotherapy-induced percentage necrosis.

Study Design: Retrospective study

MATERIALS AND METHODS: Forty four surgically operated patients (June 2002-November 2014) of localized Ewing's sarcoma were retrospectively reviewed. There were 31 males and 13 females. Age ranged from 2 to 53 years. All patients received institutional chemotherapy protocol. No patient received preoperative radiotherapy. Specimen was analyzed for margins and chemotherapy-induced percentage necrosis. PORT was offered to patients on case-by-case basis. Presence of a large preoperative soft-tissue component, margin evaluation, and percentage necrosis were factors considered. At time of the last followup, 29 patients were

alive, 11 died, and 4 were lost to followup. Survivors had a minimum followup of 2 years (range: 31-118 months, mean = 69 months).

RESULTS: One of twenty (5%) patients with PORT had a local recurrence as against 2 of 24 (8%) without PORT. OS of all patients was 76% at 5 years. Twelve patients with <90% necrosis had OS of 56% and 32 with >90% necrosis had OS of 83% (P = 0.040). OS of patients with PORT was 74%, without PORT was 78% (P = 0.629).

CONCLUSIONS: The decision to offer PORT after surgical excision in pelvic Ewing's sarcoma is multifactorial; the absence of PORT in selected cases is not detrimental to local control. Poor responders to chemotherapy had poorer survival while PORT did not impact on outcomes.

330: Pathologic Fractures As Prognostic Factor For Survival, And Distant Metastases In Osteosarcoma Of The Extremities

by Olivier van Wulfften Palthe

Abstract ID: 330

Objective: 1) What is the prognostic value of a pathologic fracture on survival, local recurrence, and metastasis in patients with osteosarcoma? 2) What variables are associated with a poor clinical outcome in patients who sustained a pathologic fracture in the setting of osteosarcoma?

Methods: The population consisted of 316 patients with osteosarcoma of the extremities (60 fractures and 256 no fracture). All patients were treated in the standard fashion with adjuvant and neoadjuvant chemotherapy and surgery. All patients had an Enneking stage IIB or III tumor. Patients were excluded if (1) they underwent oncologic resection of the osteosarcoma at an outside institution or (2) they were diagnosed with an extraskeletal osteosarcoma or (3) they had less than one year of clinical follow up and no oncologic outcome (local recurrence, metastasis or death).

Results: The survival rate at ten years was 45% in the group that had a pathologic fracture and 72% in the group that did not have a pathologic fracture ($p < 0.001$). Metastasis-free survival rate at ten years was 44% in the pathologic fracture group and 69% in the group without a pathologic fracture ($p < 0.001$). At ten years, 83% did not experience a local recurrence in the pathologic fracture group and 86% in the group without pathologic fracture ($p = 0.632$). The presence of a pathologic fracture ($p = 0.021$) and an Enneking stage III ($p < 0.001$), among other factors, were independent risk factors for worse overall survival. With

regard to the development of distant metastases, the presence of a pathologic fracture ($p = 0.025$) and a bigger tumor size ($p = 0.001$) were independent predictors for the development of distant metastases.

Conclusion: This study suggests that the presence of a pathologic fracture is predictive for worse survival and distant metastases but not higher local recurrence.

334: Infective complications in pelvic allograft reconstruction

by Campanacci Domenico Andrea | Totti Francesca | Giannini Niccolò | Mondanelli Nicola | Muratori Francesco | Matera Davide | Scoccianti Guido | Beltrami Giovanni | Capanna Rodolfo

Abstract ID: 334

Introduction

After pelvic bone tumor resection, infection represent the most frequent complication with both allograft and prosthetic reconstructions. In the present study, we retrospectively reviewed infective complications in allograft reconstruction after pelvic tumor resection, with the aim to assess risk factors, treatment modalities and final outcome.

Patients and Methods

Between 1999-2016, 58 patients were treated with pelvic massive allograft reconstruction (mean age 42, 9-70; M/F: 36/22). Diagnosis included 4 benign, 49 primary and 5 secondary malignancies. In 50 cases reconstruction involved the acetabulum. Ten patients received radiationtherapy and 28 chemotherapy.

Results

Mean follow-up was 42 (2-182) months. Infective complications were observed in 14 (24%) patients at an average of 10 months (0-69), 11 were deep and 3 superficial. Deep infections required surgical revision in all cases. In seven patients surgical debridement was performed, with infection healing in 3 cases and persistent in 4. Four infections healed after allograft removal. No amputation was performed due to infective complication. Infection occurred in 1/9 (11%) type-II, 13/41 (32%) more extensive periacetabular resections ($p=0,14$); 5/10 patients (50%) who received radiationtherapy developed infection ($p=0,04$); 11/45 (25%) of infection were in patients operated for high-grade primary malignant tumors ($p=0,47$). Infection-free survival was 75% at 5 years, 68% at 10 years.

Conclusions

Infection was the primary cause of failure in pelvic allograft reconstructions. However, infective complication had no impact on limb salvage (no amputation was performed due to infection) and in most of the cases allograft retaining was possible (allograft removal for infection in 7% of cases). In 42% of cases infection healed after surgical debridement and in 29% after allograft removal. Infection was persistent at follow up in 29% of cases. Radiation therapy was an important risk factor. Periacetabular resection in primary high-grade malignant tumors showed a tendency to a higher risk of infective complications.

335: What is the significance of equivocal lung nodules identified on staging scans for osteosarcoma? A EURAMOS-1 Sub-Study

by Jeremy Whelan | Paul O'Donnell | William Ramsden | Henk-Jan van der Woude | Gordana Jovic | Fiona Ingleby | Mark Bernstein | Stefan Bielack | Neyssa Marina | Sigbjorn Smeland | Matthew R Sydes

Abstract ID: 335

Objective: To understand the predictive value of computed tomography (CT) of the thorax described as 'equivocal' for pulmonary metastases when staging osteosarcoma. To determine the imaging characteristics more likely to be associated with definite metastatic disease among those with equivocal staging CT.

Study design: Secondary analysis of data from large international randomised study, EURAMOS-1.

Methods: Staging CT of the thorax determined by investigators as equivocal for lung metastases from a subset of patients registered in EURAMOS-1, were categorized by three radiologists using quantitative and qualitative scales to be more or less likely to represent metastatic disease. Associations with outcomes including results of thoracotomy, when conducted, and survival were sought by linear regression analysis. Survival was determined for those with equivocal staging and a further 1058 trial registrants recruited by European Study Groups staged as either no, equivocal or definite metastatic disease.

Results: Staging CT examinations of 50 patients were examined. Fourteen patients were considered either not or "low risk" to be metastatic, 35/50 patients were considered "high risk". Ten patients underwent thoracotomy, of which 9 were from the "high risk" group. Neither quantitative nor qualitative categorization of CT findings identified sub-groups with differing survival. Event-free survival and overall survival for the group with equivocal staging lies between those with either no or definite evidence of lung metastases.

Conclusions: Osteosarcoma patients with thoracic CT suspicious for lung metastases have an intermediate survival between those staged as having definite metastases and those with localized disease. We could not identify imaging features on CT classed as 'equivocal' which refined this group further. Clinicians should continue to interpret osteosarcoma staging scans

with caution. Stratification of patients with 'equivocal' scans should be considered in future clinical trials and the indications and value of thoracotomy in this setting deserves further evaluation.

336: Extensor Mechanism Repair after Tumor Resection and Reconstruction of the Proximal Tibia. Clinical Outcome of 25 Patients

by Panayiotis D. Megaloikonomos | Thekla Antoniadou | Leonidas Dimopoulos | Vasileios D. Igoumenou | Vasileios A. Kontogeorgakos | Olga D. Savvidou | Andreas F. Mavrogenis | Panayiotis J. Papagelopoulos

Abstract ID: 336

Objective: The aim of this study was to assess the clinical outcome after tumor resection and endoprosthesis reconstruction of the proximal tibia, comparing the different techniques of extensor mechanism reattachment.

Study Design: Retrospective case series.

Methods: We reviewed 25 patients (mean age, 55 years; range, 42-81 years) that underwent proximal tibia endoprosthesis reconstruction after bone tumor resection. In 12 patients, reattachment of the patellar tendon was achieved with a trevira, and in 6 with a graft jacket. In 7 patients, patellar tendon was reattached to the hydroxyapatite-coated surface of the endoprosthesis after augmentation with autologous bone graft. Coverage with medial gastrocnemius muscle flap was conducted in all instances. Supplementary muscle flaps were necessary in 9 patients. Functional outcome was assessed with the MSTS score. At final follow-up, knee range of motion and related complications were also recorded. Mean follow-up was 3.8 years (range, 2-7 years).

Results: Two patients experienced periprosthetic infection, and treated with surgical debridement and long-term suppression antibiotics. No association was found between reattachment method and infection rate. Patients of the trevira group demonstrated the best clinical outcome, with mean MSTS score 81% and a mean extension lag of 10°. The patients of the graft jacket group presented 76% MSTS score and 21° mean extension lag. Autologous graft augmentation to hydroxyapatite reattachment showed inferior outcomes with similar MSTS score (73%) but worse extension lag (mean, 35°).

Conclusions: Favorable clinical outcome and low complication rates are expected with endoprosthesis reconstruction of the proximal tibia after bone tumor resection. Patellar tendon reattachment may be better to be augmented with a trevira, as the use of graft jacket and the hydroxyapatite reattachment enhanced with bone grafts showed inferior functional results.

337: Correction of leg length discrepancy after biological reconstructions following tumor resection in children

by Zdenek Matejovsky, jr. | Jan Lesensky

Abstract ID: 337

The leg length discrepancy (LLD) remains a problem in a growing child. In contrary to growing endoprotheses, biological reconstructions have not been discussed so much. It is not clear as to what length discrepancy in which bone should be corrected through what procedure. The timing of such surgeries is also not clear.

We retrospectively evaluated 5 patients after biological reconstructions following tumor resection of tibia or femur that were gradually corrected for their LLD and followed until adulthood. Different types of corrections, anatomical locations, intervals between and numbers of surgeries and age of patients were compared with the final functional outcomes, complication rates and gait patterns.

Two girls and three boys with a high grade osteosarcoma had a biological reconstruction (3 allografts, 1 vascularized fibula, 1 combined graft) of the femur (2) or tibia (3) at the age of 5-12 years. The LLD was gradually corrected with a shoe correction until 3cm when an epiphyseodesis was indicated. Further LLD was compensated with prosthetic devices until adulthood when final surgery was performed. In between, surgeries for delayed graft incorporation, infection (1) or axis correction (1), were done. One prolongation and 4 abbreviation osteotomies were performed. Tibial abbreviation osteotomy was complicated with a compartment syndrome. All patients have normal or close to normal gait, are fully weight bearing and one has a limited ROM in the knee.

In LLD, especially the abbreviation of the tibia should not be considered a major problem even in young children and can be corrected with epiphyseodesis when it reaches 3 cm. Abbreviation of the tibia can be a risky surgery and prolongation can be an option. Discrepancy in the femur occurs faster and larger differences can be corrected by an intertrochanteric graft exchange. The final gait pattern does not alter from normal if LLD doesn't exceed 3cm during growth.

343: Diagnosing Malignant Peripheral Nerve Sheath Tumors Using PET/CT, MRI, and Clinical Findings

by Cara A Cipriano

Objective: Distinguishing benign from malignant peripheral nerve sheath tumors (MPNST) is challenging, with no gold standard prior to resection. Clinical symptoms (pain, tumor enlargement, nerve symptoms) and MRI features (necrosis) are often considered, but their diagnostic value has not been defined in the literature. F-FDG PET/CT parameters (maximum standard uptake value (SUVmax) and tumor-to-liver (T/L) ratio) are increasingly used, but studies report a wide range of cutoff values indicating malignancy, and the value of these tests remains uncertain. The purpose of this study is to define the utility of clinical, MRI, and PET/CT findings for distinguishing between neurofibromas and MPNSTs in patients with NF1.

Study Design: Retrospective cross-sectional.

Methods: Eighteen NF1 patients who underwent MRI and PET/CT evaluation of potential MPNST were included. Medical records were reviewed for patient age, gender, clinical symptoms (increasing pain, rapid enlargement, and nerve symptoms), necrosis on MRI, SUVmax and T/L ratio on PET/CT scan, and final histologic diagnosis. Receiver operating characteristic curves were constructed to determine the optimal diagnostic threshold for SUVmax and T/L ratio, and the areas under the curves (AUCs) were calculated. The sensitivity, specificity, positive predictive values, and negative predictive value for each diagnostic parameter were then determined.

Results: The optimal PET/CT thresholds for diagnosing MPNST were SUVmax 5 and T/L ratio 3, both with fair, comparable diagnostic value (AUCs 0.85 and 0.86, respectively). Sensitivity, specificity, positive predictive values, and negative predictive values indicated that PET/CT findings were more accurate for diagnosis than clinical features; however, necrosis on MRI had 100% specificity and positive predictive value, while pain had 0% specificity and negative predictive value. (Table 1)

Conclusions: SUVmax > 5 and T/L ratio > 3 are fair tests for MPNST; pain and necrosis on MRI also appear to be diagnostically helpful. Larger studies are needed to further define the interactive roles of these predictors.

344: Assessment Of Primitive Malignant Bone Tumors: Are We Heading To The Future Of Musculoskeletal Tumors Imaging with Ultra High Field MRI?

by MATTEI Jean-Camille | FOURE Alexandre | Arthur VAROQUAUX | Alexandre ROCHWERGER | SALAS Sébastien | GUISS Sandrine | BENDAHAN David | Christophe CHAGNAUD

Background: Planning sarcoma resection on the basis of a preoperative MRI with expert radiologists optimizes the opportunities to spare noble structures. However, per operative conditions may vary from MR observations, resulting in compromising safe removal or

creating unscheduled technical difficulties. With classical MRI resolution and routinely performed sequences, uncertainties remain regarding tumoral surrounding (inflammatory reaction or tumor?) thereby resulting in frequent unnecessary sacrifice of healthy tissue.

Purpose: evaluate in a preliminary study the feasibility and the new potential offered by ultra-high field MRI (7T) in the pre-operative assessment of malignant bone tumor.

Material and Methods: A patient suffering from distal femur chondrosarcoma was imaged using CT, conventional 1.5 T MRI and 7-T MRI in our research facility. Conventional T1, T2W and diffusion-tensor imaging were performed. As a preliminary approach, tumor expert radiologists compared image quality, diffusion coefficients and zones of interest (soft tissue involvement, edema analysis, tumor limits) between both MRI and CT-scan.

Results: Cortical layers and bone marrow spatial resolution was largely superior to conventional MRI and was equivalent to what can be observed on a CT-scan. Distal limits of the tumor were clearly visible at 7T compared to blurry signal at 1.5 T. Tumor and edema could be clearly distinguished at 7T but not at 1.5 T. Interestingly, 7T diffusion coefficient was significantly superior in the tumor compared to the surrounding edema, thereby allowing a clear distinction between tumoral tissue and inflammatory reaction.

Conclusions: Considering the spatial resolution of MR images obtained at 7T, ultra-high field MRI of musculo-skeletal tumors seems very promising. Thanks to the enhanced signal to noise ratio, tumor can be more accurately delimited and distinguished from edema. One can reasonably expect an important impact of ultra-high field MRI on the planning of sarcoma resection and sparing of healthy tissue.

345: Treatment outcome of childhood pelvic ewing sarcoma: children cancer hospital Egypt (CCHE-57357), Single Centre Experience

By Ahmed Elgammal | Manal Zamzam | Ahmed Kamel | Asmaa Salama | Ahmed M. El Ghoneimy | Iman Zaki | Hany Akosh | Ranin Magdi | Nehal Kamal | Ahmed Radwan | Mohamed Saad Zaghoul

Abstract ID: 345

Objectives: Ewing sarcoma is treated by systemic chemotherapy and local treatment using either surgery or radiotherapy or both. Pelvis is one of the commonest sites involved by Ewing sarcoma. This study aimed to assess the clinical outcome of pelvic Ewing sarcoma treated by chemotherapy and local radiotherapy or surgery as a local measure.

Design: Study included children with pelvic Ewing sarcoma presented to Children Cancer Hospital-Egypt from January 2008 till end of 2016. Chemotherapy was adopted from POG#9354/CCG#7942 (Vincristine, Adriamycin, Cyclophosphamide) alternating with (Ifosfamide, Etoposide). local treatment was by radiotherapy or surgery.

Methods: We retrospectively reviewed the records for all pelvic Ewing sarcoma patients. Descriptive statistical analysis and survival outcome were done.

Results: Study included 75 patients, 49 males and 26 females with median age of 12 years (range 2.5 to 18 years). Iliac bone was more affected than other sites (66.7% versus 33.3%) respectively. Fifty (53.3%) patients were metastatic while 35 (46.7%) patients had localized disease. Only 6 patients had tumor volume less than 100 ml. Sixty five patients received radiotherapy as local control while only 10 patients did surgery with or without radiotherapy. Median follow up duration was 29 months (range 5 to 111 months). For localized disease, the 3-year overall survival (OS) was 79% while the disease free survival (DFS) was 68%. Patients more than 12 years had a statistically inferior OS than others (53% Vs 82%) (P= 0.03). For metastatic disease, the 3-year OS was 50.3% while the DFS was 34% and it was not statistically affected by age, sex, site or tumor volume.

Conclusion: Though pediatric pelvic Ewing sarcoma mostly presents with large tumor volumes yet, we could achieve a good outcome using chemotherapy with local conformal radiotherapy or surgery. On the other hand, metastatic disease still needs more intensified treatment to achieve better outcome.

346: A study of 853 high grade osteosarcomas from a single institution-Are outcomes in Indian patients different?

by Dr Ajay Puri | Dr Ashish Gulia

Abstract ID: 346

AIMS:

To review outcomes of 853 patients of primary high grade osteosarcoma operated with curative intent between January 2006 to December 2013.

METHODS:

All patients underwent appropriate surgical resection after preoperative chemotherapy (non methotrexate based). Excised specimen was analyzed for margins and response to chemotherapy. We analysed various factors (sex, age, size, site, type of surgery, pathologic fractures, margin status, and chemotherapy induced necrosis) for their impact on outcomes.

RESULTS:

Five year overall survival (OS) for entire cohort was 49% and event free survival (EFS) was 42%. Seventy hundred thirty-eight non metastatic patients had OS of 53% and EFS of 47% at 5 years. The 3 year OS and EFS of the metastatic patients was 22% and 9%, respectively. Analysis of 738 non metastatic patients demonstrated that chemotherapy induced necrosis, size of tumor (< / >8 cms), type of surgery (limb salvage vs amputation) significantly affected overall survival. Local recurrence was 9%. Site of tumor (long bone vs pelvis), type of surgery and chemotherapy induced necrosis influenced local recurrence.

CONCLUSIONS:

Our patients appeared to have poorer survival compared to most Western data, possibly attributable to large tumors. In contrast to existing data, males (71%) were predominantly affected and only patients with 100% necrosis qualified as good responders regarding OS.

350: Outcome of cemented fixed hinge distal femur replacement for primitive malignant tumor. A multicentric analysis on 136 patients

by MATTEI Jean-Camille | CHAPAT Benjamin | FEREMBACH Benjamin | CRENN Vincent | GOUIN Francois | BIAU David | ROSSET Philippe | ROCHWERGER Alexandre

Abstract ID: 350

Introduction

Prosthetic distal femur replacement after bone resection for primary bone tumor is widely used. The aim of this study was to establish a basis of survival, complication rates and functional results of a one-brand-cemented prosthesis homogeneous series still in production in first surgery of distal femur primary bone tumors.

Methods

All massive modular prosthesis Stanmore Mets® for distal femoral reconstruction were included from 2004 to 2015 in 4 reference centers. Epidemiological data, MSTS score, physical and radiological examination, complications, survival curves with failure risk factors and Henderson failure modes were evaluated.

Results

136 patients (68 men and 68 women) of 40.8 [17-82] years were included. Mean follow up was of 81 [61-134] months. Most of complications (40) were infectious and 22 were mechanical. Prosthesis survival rates were of 78% and 77% at 5 and 10 years. According to Henderson, there were 8 Type 2 failures (5%), 6 Type 3 (4%), 8 Type 4 (5%) and 5 Type 5 (3%). Over 26 revisions, 3 ended up with amputation, 2 with total femur prosthesis. Mean MSTS functional score was of 82%.

Conclusions

Retrospective design is the main limit of this study, which however remains one of the most homogeneous to date. Literature comparison of our outcomes shows no difference compared

to other types of fixation or hinge, though majority of studies tend to mix protheses brands, metastatic disease with primary, proximal tibia and distal femur, etc., which limits comparison possibilities between literature results. Survival and revision rates are satisfying and can be held as reference in this specific localization with fixed cemented hinge in primitive disease. Controlled studies should be performed to definitively assess the best type of fixation and hinge in distal femur massive replacement.

351: Non-invasive monitoring of tumour after TNF-alpha and melphalan-based isolated limb perfusion: no evidence supporting the early destruction of tumour vasculature

by Lars Erik Podleska | Kristina Funk | Lale Umutlu | Florian Grabellus | Georg Taeger

Abstract ID: 351

Objective: Isolated limb perfusion with TNF-alpha and melphalan (TM-ILP) is a highly effective neoadjuvant treatment for non-resectable tumours of the extremities. Previous research suggests an almost immediate disintegration of the blood supply of the tumour as the key mechanism of action. The aim of the present study was to verify this hypothesis using new, non-invasive measurements of microvascular perfusion and tissue oxygenation.

Study design and methods: A total of 11 patients were included in the study. TM-ILP was performed under mildly hyperthermic conditions (39°C) in the extremities via proximal vascular access. Capillary-venous microvascular blood flow, haemoglobin level (Hb) and oxygen saturation (SO₂) were determined using laser Doppler and white-light spectroscopy (O₂C, Lea Medizintechnik, Germany), respectively, one day before TM-ILP and at 30 minutes, 4 hours, 1 day, 4 days, 1 week, 2 weeks and 6 weeks after TM-ILP from tumour and healthy muscle tissues.

Results: Blood flow and Hb were mostly higher, whereas SO₂ was lower, in tumour tissue compared with muscle tissue. In both tumour and muscle tissues, blood flow significantly increased immediately after TM-ILP and remained elevated for at least 2 weeks, followed by a return to the initial values 6 weeks after the procedure.

Conclusion: Non-invasive laser Doppler and white light spectroscopy can successfully be used to monitor tumour under, or after treatment. After TM-ILP no signs were found of early destruction of the tumour vasculature. The observations suggest that an inflammatory reaction is one of the key elements of TM-ILP.

354: Ewing sarcoma/PNET of bone and soft tissue in infants. A report from the Children Cancer Hospital of Egypt (CCHE)

by enas el nadi | manal amin | AHMED EL GHONEIMY | MAGED EL SHAFIEY | HALA TAHA | MOHAMED SAAD ZAGLOOL | IMAN ZAKI | NEHAL KAMAL | ALAA EL HADAD

Abstract ID: 354

Objective:

To analyze the clinical characteristics and outcome of children with diagnosis of Ewing Sarcoma below 3 years of age

Study Design

A Retrospective chart review of children below 3 years with pathological diagnosis of Ewing Sarcoma/PNET treated at CCHE-57357 from July 2009 till December 2016.

Methods

The records of 33 infants with ES/PNET will be analyzed for demographic details, pathologic details, management and outcome. Compare this age group with the older age group

Results

A review of 33 patients from 2009 to 2016 with a age range (3 months to 3 years). Primary site was Osseous (Ewing sarcoma) in 17 (51.5%) infant patients and Extra-osseous PNET in 16 patients. Soft tissue component in adult Ewing's is 17% (42 out of 250). Main site was the extremity 15 cases followed by chest wall (8 cases), pelvis 3 cases and head and neck 2 cases. Most of the cases (26 cases)were localized to primary site with 7 cases metastatic . All cases were treated according to COG with local control in the form of surgery in 12 cases radiotherapy in 11 cases and 8 cases had both surgery and RTH. Infantile Ewing sarcoma OS 5-years OS was 73.7% and Event Free Survival 5- years was 60.8% in comparison to 5 years OS for adult Ewing's 63% and 5 Years EFS for adult Ewing's.

7 Cases had disease relapse 4 cases distant,2 local and ne case distant and local. 2 cases died out of toxicity one cardiotoxicity and paracetamol toxicity

Conclusion:

Patients with Ewing sarcoma of bone and soft tissue younger than 3 years of represent an unusually young age group for documented Ewing sarcoma

357: Evaluation of critical-sized, metaphyseal bone defect regeneration in large standardized bone voids. A pilot study of a new ovine model

by Werner Hettwer

Objective

Assessment of bone graft material efficacy is difficult for a variety of reasons and verification of potential transformation of a synthetic bone graft substitute into vital bone represents a particular challenge. Since the most meaningful methods of evaluation (staged serial CT-scans and biopsies) are invasive and not ethically justifiable in humans, we wished to explore the analysis of a standardised and clinically relevant large animal bone defect model with a combination of multiple imaging methods and corresponding histology.

Study design

Experimental large animal study

Methods

Cylindrical bone voids of 10 ml volume were created in the medial femoral condyles of both hind legs in three merino-wool sheep and either left empty, or filled with cancellous allograft bone or a synthetic bone graft substitute. All six samples were followed with serial radiographs at monthly intervals and then further analysed with MRI, μ CT, DEXA and correspondingly aligned histology after sacrifice at six months.

Results

Conventional x-ray reproduced the typical imaging patterns observed in clinical practice. μ CT provided excellent insight into the structural changes within the defects, particularly progressive allograft incorporation and the bone graft substitute biodegradation process. MRI completed the picture by clearly visualising soft tissue in-growth into unfilled bone voids and presence of fluid collections. Histology was essential for verification of trabecular bone and osteoid formation. Conventional radiographs and DEXA could not differentiate details of the ongoing biodegradation/ remodelling process.

Conclusions and relevance for EMSOS.

We have developed a standardized large animal model with a critical sized cancellous bone defect that allows objective analysis, assessment and comparison of various bone defect reconstruction methods under clinically relevant and realistic conditions. This model appears well suited for detailed in-vivo and ex-vivo evaluation of BGS behaviour within large cavitory bone defects, as typically encountered after resection of benign or locally aggressive bone lesions.

358: Clinical outcome of proximal femoral reconstruction in patients diagnosed with symptomatic bone metastasis

by C.W.P.G. van der Wal | J.J. Willeumier | A. Leithner | M. Boffano | Y.M. van der Linden | P.D.S. Dijkstra

Objective

Due to better systemic treatment regimens, certain patients with long bone metastasis have a reasonable good survival. Therefore, challenges arise in providing good palliative treatment. Proximal femoral reconstruction is considered as a good long-term alternative for intramedullary nailing. However, literature on clinical outcome in these specific patients is scarce. We therefore sought to evaluate the incidence of and risk factors for complications of proximal femoral reconstruction in patients treated for bone metastasis.

Methods

We retrospectively identified ninety-two patients (59 female, 64%) who underwent proximal femoral reconstruction between 2000-2015. Predominant primary diagnoses were breast- (n=25, 27%), renal cell- (n=20, 22%) and lung carcinoma (n=13, 14%). Fifty-four (59%) received (neo)adjuvant chemotherapy. Sixty-three (69%) did not receive radiotherapy, twenty-five (27%) underwent (neo)adjuvant radiotherapy. Fifty-one (55%) impending-, thirty-three (36%) actual fractures and six (7%) failures of previous reconstructions were reported as reason for surgical intervention. Median overall survival was 13.3 months (95%CI: 1.0-25.5), median follow-up was thirty-six months (95%CI: 24.6-48.1).

Results

In total 50 complications were reported in twenty-nine patients (32%). Sixteen (17%), eight (9%) and five (6%) patients experienced one, two, or more local complications, respectively. Thirteen patients (14%) experienced a dislocation, of which eight with recurrent dislocations. Aseptic loosening and hardware failure was not observed. Eight patients (9%) developed an infection after primary surgery, one after revision surgery. Two patients (22%) underwent a successful DAIR procedure. All other infections led to suppressive therapy (n=3, 33%) or implant removal and spacer placement (n=4, 50%). Tumour progression was seen in six (7%) and acetabular wear in five patients (5%). Twenty patients (22%) underwent one or more revision surgeries.

Conclusions

Our study shows that one in four patients treated with proximal femoral reconstruction for bone metastases still needs revision surgery due to some form of local complication. Dislocation is the main mode of failure, even in this limited survival, followed by infection.

359: Breast cancer hormone receptor status effects remaining life-span at time of local treatment for long bone metastasis

by C.W.P.G. van der Wal | A. Leithner | J.A.N. Verhaar | I. de Pree | Y.M. van der Linden | P.D.S. Dijkstra

Abstract ID: 359

Objective

In order to adequately treat breast cancer (BC) patients with symptomatic long bone metastases(LBM), remaining lifespan, among others, should be taken into account. Large differences in survival is reported between BC patients with LBM. Differences in estrogen receptor- (ER), progesterone receptor- (PR) and human epidermal growth factor receptor 2 (HER2) status has been associated with survival at the moment of primary tumour treatment. This study aims to assess whether a difference in phenotype is associated with median overall survival (OS) in patients with LBM, and whether this should be incorporated into prognostic survival models.

Methods

We retrospectively reviewed 252 BC patients (250 female,99%) treated between 2005 and 2015 for symptomatic LBM and whose mutation status was known. Four different phenotypes were defined; luminal A (ER/PR+ and HER2-,LA), 176 (70%), luminal B (ER/PR+ and HER2+,LB), 43 (17%), HER2 (only HER2+) 12 (5%) and triple negative (TN) in 21 patients(8%). The association between phenotype and overall survival was analyzed and the results applied to the recently published OPTIModel.

Results

Median OS was 17.9 months (95%CI: 13.6-22.1). Median survival for LA, LB, HER2 and TN is: 19.5 (95%CI: 13.9-25.2), 24.9 (95%CI: 18.8-30.9), 6.1 (95%CI: 3.4-8.9) and 5.7 (95%CI: 1.2–10.1), respectively($p<0.001$). Patients with TN phenotype had an increased risk of death, 2.6 (95%CI: 1.6-4.3) and 3.2 times (95%CI: 1.8–5.7), respectively, compared to LA and LB, $p<0.001$. No difference was found when compared to HER2. Incorporating phenotype in the prognostic model improved its discriminatory power in BC patients from 0.54 to 0.59.

Conclusion

Based on our finding, BC patients with LA or LB phenotype have a significant longer expected survival than patients with HER2 or triple negative phenotype. Therefore, BC patients should not be treated as a single entity. These results were incorporated into the OPTIModel and improved its discriminatory power from 0.54 to 0.59.

360: Expandable endoprosthesis for limb- sparing surgery in children: long-term results

by Magdalena Rychłowska-Pruszyńska | Andrzej Szafrąński | Bartosz Pachuta | Justyna Dusińska | Agnieszka Duczkowska | Teresa Klepacka | Tomasz Walenta

Abstract ID: 360

Evaluation of long-term results of limb-sparing surgery with expandable endoprosthesis implantation in children due to primary malignant bone tumors (PMBT).

Out of 1100 patients with PMBT treated at our site in years 1996-2016, patients who underwent limb-salvage surgery with expandable endoprostheses were selected. The survival, complications, oncologic outcome and MSTScore were evaluated.

During follow-up period (18 to 215 months, median 85), 27 patients died from disease progression, 1 from post-chemotherapy complications, 1 committed suicide, 146 patients were alive at the end of follow up period. Two patients are treated for pulmonary recurrence. Complications that occurred were divided in accordance with the Henderson classification. Up to 5 years after treatment, type 4A dominated - 2.85% (early infection), in the period from 5 to 10 years type 3A-6.8% (implant breakage) and after 10 years type 3A - 2.2%. In total, the complications occurred in 29.9% of patients. Revision was performed in 50 patients (28.5%). There were six secondary amputations due to local recurrence and 3 due to infection. The mean MSTS score was 72%.

Expandable endoprostheses have become an acceptable modality to address the issue of limb-length inequality in limb-sparing procedures for skeletal immature patients with PMBT. Immediate weight bearing can often be allowed with these endoprostheses. There is a lower risk of infection and non-union when compared to allografts, and there is no risk of disease transmission.

361: Surgical treatment of spinal metastases - Results of a large single centre study

by Christoph Stihsen | Bernhard Springer | Josef Grohs | Petra Krepler | Reinhard Windhager

Abstract ID: 361

Introduction: Few studies focusing on spinal metastases receiving surgical treatment are currently available. The objective of the current study was to analyze a series of consecutive patients undergoing surgery for spinal metastases in order to identify factors that influence overall survival.

Patients and Methods: In a retrospective single-center study, 209 spinal metastases who received surgical treatment between 1990 and 2015 were reviewed. The group consisted of 87 female and 122 male patients with a mean age of 60 years (median: 61 years, range: 17-87 years). The mean overall follow-up of the cohort was 12 months (range: 0.1-160 months). The most frequent underlying malignancies were renal cell carcinoma in 65 cases (31%), breast cancer in 35 cases (17%), lung cancer in 33 cases (16%), cancer of the colon in 17 cases (8%), prostate cancer in 14 cases (7%) and thyroid cancer in 8 cases (4%).

Results: Overall survival was 70%, 45% and 27% at 6 months, one and two years post- surgery, respectively. On multivariate analysis, breast- and thyroid-cancer metastases showed a significantly improved survival, compared to the other entities. The presence of visceral metastases proved to have a significant negative effect on overall survival of the cohort ($p < 0.001$). The presence of disseminated spinal infiltration did not influence survival compared to solitary spinal lesions ($p = 0.9$). Preoperative embolization could be identified as prognostic factor towards improved survival for renal cell cancer metastases ($p = 0.04$).

Conclusion: Here we present the results of one of the largest single institution studies as found in the literature, analyzing the surgical outcome of spinal metastases. The histological entity of the primary tumor proved to be a strong prognostic factor in regard of overall survival. Surprisingly the presence of multi-level invasion did not affected the outcome of patients significantly. Further investigations have to be performed.

362: The information necessary for shared decision making in the treatment of giant-cell tumor of bone

by David Biau | Anne Barnaba | Manon Colas | Antoine Babinet | Valérie Dumaine | Philippe Anract | Frédérique Larousserie | Virginie Audard

Abstract ID: 362

Objective

To determine the main causes of surgical revision in patients operated on for GCT of bone and to identify variables significantly associated with revision and which can be part of the decision making during the treatment.

Study design

This was a single center retrospective cohort study of 194 patients operated on for a primary occurrence of a GCT of bone at a tertiary care center specialized in the treatment of bone tumors. The distal femur, proximal tibia, and distal radius accounted for 126 (65%) of all anatomical sites.

Methods

The primary oncologic treatment was curetage for 152 (79%) patients; the primary reconstruction type was cavity filling for 136 patients (71%). Cumulative incidence function and Cox regression model were used.

Results:

In total, there were 176 operations on 94 patients: 48 for mechanical reasons, 30 for infections, 86 for tumor recurrence, and 12 for other reasons. The cumulative probability of having another operation was 62% (95% CI: 51% - 70%) at 10 years. Choice of surgeon and choice of reconstruction type were significantly associated with risk of revision. Variables associated with mechanical revision were choice of oncologic treatment and choice of reconstruction type. Last, only choice of surgeon was associated with revision for tumor recurrence.

Conclusions:

When discussing treatment options, patients and surgeons should be aware that the overall surgical burden of treatment of giant-cell tumor of bone is important with infection being the leading cause of revision during the first year and tumor recurrence after. The choice of surgeon, the choice of oncologic treatment and the choice of reconstruction type are all significantly associated with revision.

363: Improved accuracy for navigated pelvic and sacral primary bone sarcoma resections using the AIRO[®] iCT navigation: a case-control study

by S.E. Bosma | M.A.J. van de Sande | R.J.P. van der Wal | P.D.S. Dijkstra

Abstract ID: 363

Objective

Wide surgical margins decrease local recurrence rate and improve oncological outcome. Intra-operative guidance techniques could assist in achieving higher surgical accuracy, especially in complex anatomical locations like the pelvic and sacrum. Aim is to evaluate the accuracy of AIRO[®] iCT navigation in pelvic and sacral resections.

Study design

Case-control

Methods

Patients undergoing resection with curative intent of pelvic or sacral primary bone sarcoma between 2000 and 2017 were included. Resections were classified according to Enneking and Dunham: ilium (T1), periacetabular (T2), pubis/ischium (T3), sacrum (T4) or combination. Accuracy was assessed by surgical margin as classified by Enneking. Wide margins were considered adequate; marginal or intralesional margins inadequate. Means were compared using t test; categorical variables by Chi square test.

Results

23 patients had AIRO assisted resections: five T1 (22%), two T3 (9%), nine T4 (39%) and seven combined resections (30%). Margins were wide in 17 (71%), marginal in 4 (17%) and intralesional in 3 (12%). 35 patients underwent non-navigated resection: four T1 (12%), six T2 (18%), four T3 (12%), six T4 (18%) and 14 combined resections (40%). Type of resection did not differ between both groups, 2×4 , $N=57$, $\chi^2=7.88$; $p=0.096$. Margins were wide in 17 (49%), marginal in 12 (34%) and intralesional in 6 (17%). Mean tumor diameter was $9,05 \pm 3,36$ for non-navigated versus $9,11 \pm 4,37$ for AIRO assisted resections ($p=0.953$). Mean surgical time was 333 ± 129 for non-navigated versus 335 ± 191 for AIRO assisted resections ($p=0.963$). Using AIRO[®] iCT 2 navigation significantly more adequate (wide) margins are achieved, $\chi^2=4,06$; $p=0.044$.

Conclusions

Using intra-operative guidance techniques like AIRO[®] iCT navigation the accuracy of resection of pelvic and sacral bone sarcomas greatly improved. More wide margins are achieved which allows for better oncologic outcome.

369: Personalizing Ewing sarcoma treatment: first steps in development of an advanced surgical staging system for patients with localized disease

by S.E. Bosma | A. Ranft | U. Dirksen | A.J. Gelderblom | P.D.S. Dijkstra

Abstract ID: 369

Objective

Evaluate the influence of surgical margins and histological response on local recurrence-free survival (LRFS) and overall survival (OS) in localized Ewing sarcoma.

Study design

Retrospective

Methods

620 localized Ewing sarcoma patients treated according to the EURO-EWING99 protocol receiving surgery after induction chemotherapy were included. Univariate log-rank test and multivariate Cox regression was undertaken. Surgical margins were defined by Enneking. Six stages were made based on margin status (adequate (I) = wide; inadequate (II) = marginal or intralesional) and histological response (a=100%; b= 90-99%; c=<90% necrosis).

Results

Surgical margins were wide in 486, marginal in 77 and intralesional in 26 resections. LRFS and OS improved when adequate (wide) margins were achieved compared to inadequate (marginal or intralesional), 93% versus 79% ($p<0.001$) and 75% versus 62% ($p=0.005$) respectively. Inadequate margins significantly influenced LRFS, HR 2.9 (95%CI 1.59-5.3; $p=0.001$). Histological response was 100% in 269, 90-99% in 162 and <90% in 148 patients. Histological response significantly influenced OS, HR 1.94 (95%CI 1.32-2.86; $p=0.001$) for 90-99% and HR 2.61 (95%CI 1.79-3.8; $p<0.001$) for <90% necrosis. Combining response with margins provides good prediction of OS: stage Ia (n=241) HR 1, Ib (n=127) HR 2.10 (95%CI 1.37-3.21; $p=0.001$), Ic (n=103) HR 2.87 (95%CI 1.89-4.35; $p<0.001$), IIa (n=22) HR 2.15 (95%CI 1.01-4.58; $p=0.047$), IIb (n=30) HR 2.64 (95%CI 1.39-5.02; $p=0.003$) and IIc (n=38) HR 3.48 (95%CI 2.0-6.03; $p<0.001$). LRFS decreases for stage IIb (HR 3.33; 95%CI 1.40-7.94; $p=0.007$) and IIc (HR 3.59; 95%CI 1.57-8.21; $p=0.002$).

Conclusions

Achieving wide (adequate) margins seems of profound prognostic significance for survival in Ewing sarcoma. If marginal or intralesional (inadequate) margins are achieved histological response seems to influence survival the most. Here the first steps are made in development of advanced surgical staging to personalize Ewing sarcoma treatment.

374: A Comparison of Extensor Mechanism Reconstruction Methods in Proximal Tibial Tumor Endoprostheses: Direct Reattachment vs. Medical Textile Augmentation

by Osman Emre Aycaan | Bugra Alpan | Natig Valiyev | Harzem Ozger

Abstract ID: 374

The knee function and implant survival depend on healthy and stable soft tissue healing around proximal tibial endoprostheses. Standard technique of extensor mechanism reconstruction involves direct reattachment of patellar tendon to medial gastrocnemius flap. Medical textiles (e.g. polypropylene mesh, Trevira) are widely used in orthopedic oncology to stabilize reconstructions by creating attachment sites and serving as scaffold for fibroblastic tissues. Infection is a feared complication of synthetic mesh. This study compares direct reattachment (DR) with medical textile augmented reattachment (MTAR) in terms of time-dependent change in function, complication profiles and survival.

Sixty-eight proximal tibial reconstructions, including 13 revisions, in 55 patients performed between 1990-2015 were evaluated. The most common diagnosis was osteosarcoma, which constituted 74.5% of the patients. The mean resection length was 161.1 ± 43.5 mm (110-240 mm) and the mean resection ratio was 39.6 ± 11.2 %. DR was performed in 30 (44.1%) and MTAR in 38 (55.9%) procedures. Mean age was 22.9 (9-64). Mean follow-up was 95.8 months. Active range of motion and extension-lag at 3rd,6th,24th months were measured. Long-term extension-lag incidence was 73.3% for DR and 44.7% for MTAR ($p=0.05$). Mean long-term extension-lag was 7.40(00-300) in MTAR. MTAR group yielded lower incidence ($p=0.011,0.001,0.019$) and mean degree ($p=0.000,0.000,0.001$) of extension-lag when compared to DR at 3rd,6th,24th months.

Mean MSTS score was 76% for MTAR. Better active flexion at 3rd,6th,24th months and rotating hinge design correlated with better MSTS scores at last follow-up.

Overall 5-year-survival was 94.7% in MTAR while it was 58.6% for DR. Within MTAR, rotating hinge mechanism implant survival (78.4%,10-year-survival) was better than fixed hinge mechanism (41.7%,10-year-survival).

MTAR is associated with better functional outcomes and no increased risk of complication when compared to DR. The results of this study encourage the use of medical textiles for extensor mechanism reconstruction in proximal tibial tumor endoprostheses.

378: Epidemiology, Incidence, and Survival of Rhabdomyosarcoma Sub-Types: Seer Database Analysis

by Kamil M. Amer | Joseph Ippolito | Jason Chan | Kathleen Beebe

BACKGROUND:

Rhabdomyosarcoma is the most common soft-tissue sarcoma in children and adolescents and accounts for 3% of all pediatric tumors. Sub-types of this disease include: Alveolar, Spindle cell, embryonal, mixed-type, pleomorphic, and rhabdomyosarcoma with ganglionic differentiation. Different subtypes have different characteristics, but the rarity of these disease makes study on the unique personality of each subtype very difficult. The purpose of this study was 1) to evaluate patient demographics, clinical behavior, incidence, and survival for Rhabdomyosarcoma sub-types and 2) to determine if there was a difference in the epidemiology, overall survival, and 5-year survival rate between the six sub-types of rhabdomyosarcoma recorded in the SEER database.

METHODS:

The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database was used to search for patients diagnosed with all sub-types of Rhabdomyosarcoma between 1973 and 2014. Patient demographics, tumor characteristics, incidence, and survival trends were all analyzed. Differences in the epidemiology, overall survival, 5-year survival rate, and incidence were also analyzed.

RESULTS:

There were a total of 3,237 patients were identified in the SEER database. Highest rate of metastasis was seen in alveolar (21.2%) and pleomorphic(17.6%) subtypes. Pleomorphic and Alveolar rhabdomyosarcoma had the worst overall survival with a 26.6 and 28.9% 5-year survival respectively. Embryonal rhabdomyosarcoma had the highest 5-year survival rate with 73.9%. Tumor size was significantly negatively correlated with survival months($p<0.05$), indicating patients with larger tumors had shorter survival times. Higher grade tumor and metastasis at presentation were significantly negatively correlated with survival months($p<0.05$). No significant differences in the survival was found between gender or race between all of the subtypes($p>0.05$).

CONCLUSION:

This study represents a population database study on rhabdomyosarcoma demonstrating that useful information can be gleaned from population database analysis for rare tumors. The results help to identify differences between the subtypes and a better understanding of the personality each subtype.

386: Epidemiology, Incidence, and Survival of Leiomyosarcoma Sub-Types: SEER Database Analysis

by Kamil M. Amer | Joseph Ippolito | Kathleen Beebe

BACKGROUND:

Leiomyosarcoma is an aggressive soft tissue sarcoma derived from smooth muscle cells typically of uterine, gastrointestinal or soft tissue origin. Sub-types of this disease include: Epithelioid, Myxoid, and Bizarre. Different subtypes have different characteristics, but the rarity of these disease makes study on the unique personality of each subtype very difficult. The purpose of this study was 1) to evaluate patient demographics, clinical behavior, incidence, and survival for Rhabdomyosarcoma sub-types and 2) to determine if there was a difference in the epidemiology, overall survival, and 5-year survival rate between the three sub-types of leiomyosarcoma recorded in the SEER database.

METHODS:

The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database was used to search for patients diagnosed with all sub-types of Leiomyosarcoma between 1973 and 2014. Patient demographics, tumor characteristics, incidence, and survival trends were all analyzed. Differences in the epidemiology, overall survival, 5-year survival rate, and incidence were also analyzed using ANOVA statistical test, a Chi-squared analysis, and pairwise tests with correction of multiple factors with the Holm-Bonferroni procedure. Significant differences were based on a $p < 0.05$.

RESULTS:

There were a total of 1,256 patients were identified in the SEER database. Highest rate of metastasis was seen in Myxoid (12.7%). Myxoid leiomyosarcoma also had the worst overall survival with a 34.2% 5-year survival rate. Higher grade tumor and metastasis at presentation were significantly negatively correlated with survival months ($p < 0.05$). No significant differences in the survival was found between gender, race, or use of radiation therapy between all of the subtypes ($p > 0.05$).

CONCLUSION:

This study represents a population database study on leiomyosarcoma demonstrating that useful information can be gleaned from population database analysis for rare tumors. The results help to identify significant differences between the subtypes, allowing a better understanding of the personality of each subtype.

387: IlluminOss Lightfix Trial: A Prospective, Multi-Center Study of the IlluminOss System for the Treatment of Impending and Actual Pathological Fractures in the Humerus from Metastatic Bone Disease

By Nicola Fabbri, MD | Richard Terek, MD | Richard L McGough, MD | Kurt R Weiss, MD | Mark A Goodman, MD | Daniel E Prince, MD | Felix Ho-Ming Cheung, MD | James C Wittig, MD | Brian E Brigman, MD | William Eward, MD | Cynthia L Emory, MD | Albert J Aboulafia, MD | Raffi S Avedian, MD | Joel Mayerson, MD | Brock W Adams, MD | Robert M Henshaw, MD | Nickolas B Reimer, MD | David G. Mohler, MD | Steven Gitelis, MD | John H Healey, MD

Abstract ID: 387

Surgical management of metastatic disease affecting the humerus can be a challenging problem. The IlluminOss System (IS, IlluminOss Medical, Inc., East Providence, RI) is a novel device designed to achieve bone stabilization with a minimally invasive delivery and stabilization technique.

Objective: Primary objective of the IlluminOss Lightfix Trial was to evaluate safety and performance data of this novel fixation system. Results from this study were used to confirm clinically and statistically significant reduction of pain and functional improvement for the purpose of US FDA marketing clearance.

Study Design: Prospective, multi-center, open label study with an accrual goal of 80 adults, suffering from pain due to single impending or actual pathological fractures of the humerus secondary to metastatic cancer. Enrollment started April 2015 and was completed in June 2016.

Methods: Clinical and radiographic follow-up evaluations were scheduled at 7, 30, 90, 180, and 360 days from surgery. Pain, MSTs function, and clinical performance of the device were evaluated. Primary endpoints were reduction in VAS Pain Score of 54, improvement of MSTs score of 7 (both > 80% of historical controls) over 90 days relative to pre-treatment, and determination of clinical and radiographic safety success.

Results: Eighty-one patients were enrolled from 13 centers. Average procedure time was one hour and 34 minutes from incision to closure (0:39 – 4:22). Between baseline and 30 days after surgery, VAS pain decreased from 83.8 to 38.1 and MSTs function scores increased from 8.3 to 17.9. Preliminary Safety Success was 94%. There were five device fractures, all in patients with complete fracture with renal cell carcinoma or myeloma.

Conclusions: Enrollment into the largest prospective, industry sponsored clinical trial in metastatic fractures has been completed and FDA approval obtained. Clinical outcome data analysis is ongoing. IlluminOss System is a valuable tool for management of humeral metastases.

389: Cryosurgery in musculoskeletal tumors

By Matteo Ceccoli | Fabio Cosseddu | Stefano Grossi | Ilaria Angelini | Sheila Shytaj | Federico Sacchetti | Lorenzo Andreani | Francesca Totti | Domenico Campanacci | Rodolfo Capanna

Abstract ID: 389

Wide resection is the treatment of choice for treatment of aggressive bone tumours. For some selected lesions salvage of limb can be obtained with marginal resection associated with supplementary techniques to sterilize tumour-bone interface. Argon-based cryosurgery has demonstrated less side effects than liquid nitrogen technique and it can be performed with smaller surgical exposure, thanks to the small sized probe-delivered freezing system. Several Authors obtained good results in pain control using image-guided percutaneous argon-based

cryosurgery for palliative treatment of painful bone metastases. Moreover, bone immersions in liquid nitrogen can be a good method to sterilize bone segments after excision. In a period of time from 2000 to 2018 we treated 147 patients with cryosurgery, with different indications and techniques. We treated 54 gct, 11 abc, 13 grade I chondrosarcoma, 3 grade II chondrosarcoma, 2 chondroma, 5 chondroblastoma, 5 hemangioma, 1 hemangioendothelioma, 3 fibrous histiocytoma, 4 chordoma, 35 metastatic bone lesions, 1 desmoid tumour, 1 fosfaturic tumour, 1 schwannoma, 2 osteosarcoma, 1 multiple myeloma, 1 soft parts sarcoma, 1 ewing sarcoma, 2 synovial sarcoma, 1 liposarcoma. We recorded 23 complications in the period of study related to wound healing problems (52%), neurologic disorders (8,5%), fractures (13%), bone reabsorption (9,5%), other (17%). 16 local malignancy recurrences were recorded. We suggest four main indications for cryotherapy: 1) sterilization of bony wall after marginal or intralesional procedures as curettage of bone lesion; 2) freezing of neoplastic lesions in order to solidify liquid (cystic, mucoid/mixoid, colliqued) areas, to prevent severe bleeding complications of hypervascular tumours and to ease treatment in high risk anatomical sites (pelvic and shoulder girdle); 3) post-excisional sterilization of bone segments with liquid nitrogen immersions, aiming at reconstruction with massive autologous bone grafting; 4) mini- invasive percutaneous treatment of bone and soft-tissue inoperable metastases or recurrent primary malignant bone tumours.

392: Tracing Resistance to Chemotherapy in Pediatric Osteosarcoma With Exosome-Based Blood Biopsy

by Yoav Binenbaum | Edo Sheffer | Ronit Elhasid | Yair Gortzak | Dror Levin

Abstract ID: 392

Introduction

The 10-year survival rate of Osteosarcoma (OSA) patients has not changed significantly since the introduction of the common treatment protocols used today. This is mainly due to tumor resistance to chemotherapy, and lack of tools to monitor response to treatment in a timely manner. We used exosome-based blood biopsies to identify transcripts of chemotherapy resistance genes in peripheral blood samples of OSA patients, during different phases of treatment.

Methods

mRNA transcripts of genes related to chemotherapy resistance in exosomes from drug resistant cell lines and healthy controls were compared. Transcripts found to be unique to drug resistant cell lines were further quantified in exosomes isolated from patient's blood samples.

Blood samples from OSA patients were obtained at timely intervals prior to chemotherapy blocks during treatment. Of the seven patients, two were resistant to chemotherapy, three were good responders, one patient had high risk features at presentation, and one had end stage metastatic dissemination. Samples from healthy subjects were used as controls.

Results

Transcripts of the genes APE1, GSTP1 and FOXC2 could be reliably identified and were differentially expressed in exosomes from drug resistant cell lines and controls. At the end of the neo-adjuvant treatment, transcripts of APE1, a gene responsible for DNA repair, were significantly overexpressed in exosomes from the high risk patient and those refractory to therapy, in contrast to the other genes assayed.

Conclusions

Here we demonstrate that mRNAs related to chemotherapy resistance genes could be identified and quantified using exosome-based blood biopsies in OSA patients. We propose that APE1 overexpression in exosomes might indicate chemotherapy resistance and high-risk features in OSA patients. The ability to monitor the response to chemotherapy during treatment, may allow clinicians to adjust treatment in a timely manner, before the disease becomes refractory to treatment, thus possibly improving cure rates of pediatric patients with Osteosarcoma.

393: Renal cancer metastases to the spine – novel prognostic scale. Decision making solutions

by Aliev M | Borzov K | Musaev E | Valiev A | Burliaev V

Abstract ID: 393

It is well known, that renal cancer has a high metastatic potential with the incidence in the spine 25%-50%. Conservative treatment of the patients with renal spinal metastases has low effectiveness. The question of surgical strategy treatment in these patients is still remains actual and ambiguous. None of the available prognostic scales can correctly predict the prognosis in patients with renal cancer metastases. We represent a novel prognostic scale, basing on the principles of ternary logic. This scale was firstly based on 158 patients with renal cancer metastases to the spine, treated in different ways, from 2002 till 2016. The prognostic factors such as: sex, age, treatment anamnesis, free disease interval, visceral and bone metastases, neurological and Karnofski status and some blood markers were included in the trial.

Results.

One-factor analysis showed that free disease interval, Karnofski index, number of spinal mets, Hb-level, Ca²⁺-level and the number of platelets, neutrophils a very important factors influencing the prognosis.

There were three grades for each prognostic factor: favorable, unfavorable a intermediate prognosis. The overall accuracy of this new prognostic scale was 88,24%. So we suggest this prognostic scale to use in clinical practice as a good option in decision making.

POSTER PRESENTATIONS

EMSOS 2018



4: Health related quality of life in patients with bone tumor around the knee after resection arthrodesis

by Wilasinee Sirichativapee

Abstract ID: 4

Background:

Most common aggressive benign bone tumor is giant cell tumor (second most common of benign bone tumor) and most common primary malignant bone tumor is osteosarcoma.

The knee is a common site for bone tumors, primary malignant and aggressive benign bone tumors, whether clinically painful or not.

This study aimed to assess the Health related quality of life of patient with bone tumor around the knee after resection arthrodesis.

Study design: Cross-sectional descriptive study

Method: Patients between 15 and 70 years of age who underwent resection arthrodesis in Srinagarind hospital more than 1 year were recruited. Patients were interviewed a short form-36 questionnaire (SF-36 Ver2.0 Thai version) regarding their daily life problems.

Results: Eighteen-patient with mean age 36.6 years (15-63 years) were included. (15 female) . Histological diagnosis were GCT 10 cases, osteosarcoma 7 cases and low-grade chondrosarcoma 1 case. Site of lesions were distal femur 15 cases and proximal tibia 3 cases. According to health related quality of life, patients have good quality of life (score SF-36 > 70) in all domains; (Mean score : physical functioning 75.55±21.88, Role-physical 71.18±22.70, Bodily-pain 85.41±22.51, Vitality 77.43±16.76, General health 74.44±19.16, Social functioning 83.05±26.40, Role-emotional 80.09±22.89 and Mental health 77.77±21.29). Complications post-operative are broken implants (3 cases, 16.7%) and infections (4 cases, 22.2%) (60% found in patients who underwent allograft reconstruction and all patients were cured from infection average time was 23 months.)

Conclusion: In patients with bone tumor around the knee after resection arthrodesis have a good quality of life in all domains in SF-36 ver 2.0 questionnaire including function, pain and mentality.

6: General health status of the patient is a risk factor for 30 day survival after surgery for metastatic bone disease in the extremities, magnitude of surgery is not. A validation study.

by Michala Skovlund Sørensen | Klaus Hindsø | Michael Mørk Petersen

Objective: Surgical treatment of metastatic bone disease in the extremity (MBDex) is a tradeoff between preserving limb function without posing a risk for residual survival. A previous study (Sørensen et al. Medicine 2016) has proven that extended surgical intervention is not a risk for 30-day mortality and we hypothesized that wide resection and reconstruction might even reduce the risk of postoperative mortality. Aim of study was to validate that the magnitude of the surgical trauma does not increase the risk of 30-day mortality in patients having surgery for MBDex and identify if “quick fix” surgery increases risk of mortality.

Study design and Methods: A prospective population based cohort of patients (n=168) having surgery for MBDex in the Capital Region of Denmark from May 2014-May 2016. Risk factors for survival was compared to findings in a cohort of patients having surgery at a tertiary referral center with joint replacement surgery (2003-2013) described by Sørensen et al. 2016. **Results:** 30-day estimated survival was 86% (C.I.: 80%-91%) (figure 1), this did not differ from the survival found in the 2003-2013 cohort described in 2016. A multivariate logistic regression identified Karnofsky score below 70, having surgery for longer than 90 minutes and treatment center as independent prognostic factors for survival beyond 30 days after surgery, see table 1 for full regression analysis.

Conclusion: We were able to validate the hypothesis that short surgery time, as typically seen with osteosynthesis, pose a risk for early mortality in patients having surgery for MBDex. This can be explained by not achieving absolute stability of the metastatic lesion and therefore decreased early mobilization. Also we can support the theory that the general health status of the patient is the most important factor for 30 day mortality in patients having surgery for MBDex.

7: Malignant Tumors Of The Shoulder Girdle : Surgical And Functional Outcomes

by Recep Öztürk | Şefik Murat Arıkan | Bedii Şafak Güngör

Objective: Large resection and reconstruction of malignant tumors of the shoulder girdle which provide maximum protection of the soft tissues with sufficient surgical margin have their own difficulties.

Study design: To review demographic data of 187 patients diagnosed with malignant tumors located around the shoulder in our clinic between 2001 – 2016, to evaluate the functional outcomes, surgical outcomes and to classify the resection methods according to new classification systems.

Methods: A total of 187 patients with 108 being male and 79 female with a mean age of 47.9 (range 2-87) at the time of surgery were included in the study. Fifty-one of these patients underwent biopsy alone ; 8 partial / total claviclectomy, 10 partial / total scapulectomy, 80 proximal humeral resection, 5 total humeral resection, 6 shoulder girdle resection, and 13 amputations were performed . Eighty-six prosthetic implants, five fibula transpositions, and one massive homologous bone graft were performed. Seven-one of 136 patients were followed-up for an average of 40.3 months.

Results: When the bone resections were evaluated; in the group which underwent glenoid preserving partial scapulectomy, partial / total claviclectomy and proximal humerus intercalary resection, best results were obtained in the case of preserved rotator cuff function. The results of total scapulectomy and proximal / total humeral resection operations were moderate because of partial or total injury of the abductor mechanism.

Conclusions: As a result, overall satisfaction was better in the all limb-sparing surgery methods, both evaluating psychological condition and hand function, compared with amputation.

8: Mid-term results of the LPSTM system for reconstruction of large bone defects in the proximal femur and distal femur/proximal tibia.

by Maria Anna Smolle | Jörg Friesenbichler | Magdalena Maria Gilg | Werner Maurer-Ertl | Andreas Leithner

Abstract ID: 8

Objective

The aim of this study was to investigate the mid-term results of the LPSTM-system used for reconstruction of complex surgery in the proximal femur and distal femur/proximal tibia.

Study design

Fifty-seven patients, of whom 40 had received the implant for oncological causes, treated between 2001 and 2010 at one institution were retrospectively included. The median follow-up of all patients was 5.0 years.

Methods

Complications emerging during follow-up were classified according to Henderson into 5 categories (1: instability/soft tissue failure; 2: aseptic loosening; 3: structural failure; 4: periprosthetic infection; 5: tumour progression). Competing-risk analyses were used to estimate implant survival with death as the competing event.

Results

Altogether, 26 patients (45.6%) developed a complication after a median of 1.6 years, most commonly being a periprosthetic infection (n=11). Of the 31 patients with a proximal femoral implant, 9 presented with complications (29.0%) in comparison to 17 out of 26 patients with a distal femoral/proximal tibial endoprosthesis (65.4%). The cumulative incidence of failure following resection at 3, 5 and 10 years was 33.5%, 38.2% and 58.9% at 3, 5 and 10 years, respectively. The only factor being independently associated with an increased risk of developing complications was a distal femoral/proximal tibial location of the prosthesis, irrespective of amount of resected bone, gender, duration of primary surgery and the reason for reconstruction.

Conclusions

Whilst the LPSTM system may be safely used in proximal femoral reconstruction, failure rates are higher in the distal femoral/proximal tibia in comparison to other commonly used modular systems (e.g. GMRS®, MUTARS®).

11: Outcome of pelvic/sacral resection and reconstruction for bone tumors, questions still waiting for answers!!

by Ahmad Shehadeh

Abstract ID: 11

The pelvic girdle is a common location for primary bone sarcomas and metastatic lesions with the periacetabular region being the most common location followed by the ilium and the pubis. Refinements in surgical techniques have allowed the execution of limb salvage surgery in these locations.

Methods and Materials:

Seventeen patients received pelvic/sacral resection From 2006 to 2016 by same surgeon (A.Shehadeh), using appropriate surgical techniques.

Type 1 (n=6), type 2 (n=4),type 3 (n=3),type 4(n=1), combined type 2&3(n=1), partial sacrectomy in 2 patients . Histopathology was chondrosarcoma 6 patients, Chordoma, , Ewing sarcoma, Osteosarcoma, 2 patients, GCT, Fibromatosis ,MM, High grade sarcoma and metastatic renal cell carcinoma one patient each. Reconstruction was performed in 3 patients (type 2 and combined type 2&3)using lumic cup prosthesis (Implant cast) and cage and Autogenous bone graft in one patient.

Negative resection margin was achieved in 11 patients, and 2 patients there was a microscopic positive margin.

Results:

At mean follow up of 33 month (6-55month), 2 patients(OS, GCT) developed local recurrence, and one of them died of the disease, 8 patients were disease free at last follow up, one patient developed skin edge necrosis and managed successfully with wound debridement, and one patient developed deep wound infection and managed successfully with removal of the implant, repeated debridement, IV antibiotic and vacuum dressing.

The average MSTS score for all patients was 80%.

Conclusion:

Pelvic resection is demanding surgery, to be done only by experts surgeon and in well-equipped Centers. When done by expert hands, Pelvic resection can provide long term local control and very good functional outcome in patients with pelvic tumors, involved surgical margin is associated with high local recurrence and subsequent death.

In carefully selected cases hemipelvectomy with all its physiological and psychological consequences can be avoided .

12: Shoulder Girdle Resection, Modification in The Surgical Techniques and Introduction of a New Classification System.

by Ahmad Shehadeh

Abstract ID: 12

Background:

Surgical techniques for resection of tumors at proximal humerus and scapula has been described in literature along with different classification systems, however , these techniques have not been revised for a while and the classification systems didn't respect the difference between bone and soft tissue tumors, or humerus vs scapula locations.

Material and Methods:

The author operated on 32 patients with shoulder girdle tumors , all are bone tumors, Ewings sarcoma (n=12), Osteosarcoma (n=7), Metastatic tumors (n=7) ,GCT (n=3),Chondrosarcoma (n=3).We assigned two separate classifications to humerus and scapula resection, . Resection of the humerus classified into:

- Type I: Intra articular proximal humerus
- Type II: Extra articular proximal humerus
- Type III: Intra articular total humerurs.
- Type IV: Extra articular total humerus .

And we classify the scapula resection into: Type I: partial , Type II : intra articular and Type III Extra articular.

In extra articular humerus resection, we found that sacrificing the acromion and coracoid process is not needed as a routine part of the extra articular resection of the proximal humerus shoulder., and for all tumors with no huge medial component, in our techniques there is no need to detach the muscle attachment from the coracoid , therefore, post operatively elbow extension as tolerated can be started immediately.

Results:

At 30 month mean follow up period, 2patients developed local recurrence),and 2 patients infection, one patient stem loosening, the average MSTS functional score for all patient was 83%.

Conclusion:

The modification of surgical techniques saved structures which were unnecessarily resected, and kept the integrity of more muscular tissue and attachments which were detached in previous described techniques with no obvious advantage leading to less restriction during the rehabilitation process. The new classification system is realistic, easy to be recalled and applicable to all patients.

17: Soft Tissue Sarcoma Abutting/Invading The Bone, a proposed guideline for surgical management.

by Ahmad Shehadeh

Abstract ID: 17

Background:

The incidence, surgical treatment and effect on overall survival and recurrence of bone invading/abutting soft tissue sarcoma, still poorly described in the literature.

Objectives:

To present an institutional experience regarding; surgical treatment and outcome of soft tissue sarcoma abuts the bone.

Material / Methods:

From July 2006 -Dec. 2016, 212 patients with wide local/compartement resection, at KHCC. Forty three patients (20%) the tumor were attached to the bone. Patients divided into 3 groups:

Group 1: bone abutment only (n=25)

Group 2: cortical invasion (n=10)

Group 3: either medullary canal invasion or total encasement of bone (n=8)

Tumor location includes: extremity 21, one case pelvic and one case chest wall, once case sacrum.

All patients with group 1 received subperiosteal resection of the tumor, group 2 received hemicortical resection, and group 3 received segmental bone resection of the involved bone.

Results:

At mean follow up of 56 month (16-78mo) 8 patients died of disease metastasis 4 patients developed local recurrence at the soft tissue, all of them the pathology of the resection show negative margin, 2 from group 1, and 2 from group 2.

two patients had radiation related femur fracture

6/10 patients with bone invasion on MRI , found to have bone invasion in histopathology exam.

5 yr. EFS = 53%

5 yr. OS = 76%

Conclusion:

This is a small group retrospective pilot study; the results show that STS abutting bone probably do not lead to worse outcome. Our proposed guideline for surgical management of different scenarios of soft tissue tumor with adjacent bone abutment/invasion can be the basis for objective mean to plan the management of this subtype of soft tissue sarcoma. Larger size study is needed to expand this guideline.

20: Case Study: Femoral Reconstruction After Navigation-Assisted Tumour Resection with a Custom-Made Extendible Joint Saving Prosthesis

by Kwow-Chuen Wong | Diogo Miguel Geraldès | Mike Stockdale | Shekar M. Kumta

Abstract ID: 20

Objective: A 6-year-old male was diagnosed with osteosarcoma in the right distal femur. Intercalary, intra-epiphyseal joint-saving tumour resection was planned after neoadjuvant chemotherapy, with distal resection 5mm distal to the growth plate at the distal femoral epiphysis performed in Hong Kong.

Methods: A diaphyseal replacement with 70mm extension capability was designed to match the length of bone resected and the cartilaginous surface of the remaining distal epiphysis. The implant anchored to the femoral shaft proximally through an uncemented HA coated stem, and into the remaining epiphyseal bone via cortical screws through extracortical plates and uncemented fins for stable bone fixation. The joint-saving interface was HA coated to promote osseointegration and its design preserved vascular supply to the epiphysis and the femoral ligament attachments for stability of the knee joint. An anteromedial skin incision and subvastus surgical approach exposed the distal femur osteosarcoma. Navigation-assisted

tumour resection ensured a negative surgical margin and matched the remaining distal epiphysis to the joint-saving interface which was prepared using a custom positioning plate and a high-speed bone burr. The implant was gently impacted and its precise fitting confirmed.

Results: Planar skeletal scintigraphy images showed a viable epiphysis post-operatively. This was confirmed radiographically, with a series of 7 years follow-up with planar x-rays which revealed continued growth of 12mm of the remaining epiphyseal bone, with no failure of fixation. The proximal tibial growth was unaffected. Leg shortening was corrected regularly as the child grew. To date, the patient is in disease remission with knee flexion and activity levels near normal (MSTS score of 29).

Conclusion: Femoral reconstruction after navigation-assisted tumour resection with a custom-made extendible joint-saving prosthesis may be a viable option for skeletally immature patients, that can restore the function of the affected leg by preserving the growth of the native knee joint and correcting leg shortening.

25: “Spare part” free leg flap for coverage after hemipelvectomy or hip disarticulation

by Roulet Steven | Louis-Romée Le Nail | Gualter Vaz | Antoine Babinet | Valérie Dumaine | Aurélie Sallot | Philippe Rosset

Abstract ID: 25

Objective : We describe seven patients with a pelvic malignant bone tumor or proximal femur with local extension. Interilioabdominal or hip disarticulation was necessary for carcinological resection reasons. The resulting defect was covered by a free flap corresponding to the muscle masses of the amputated leg. The aim of this work was to evaluate the reliability of this free flap and to detail the surgical technique.

Study design : cases serie.

Methods : Seven patients were operated on in three oncological orthopedic reference centers : six interilioabdominal disarticulations and one hip disarticulation. In three cases flap consisted of the posterior superficial compartment of the calf. In the other cases all the compartments of the leg including the fibula with its periosteum were harvested.

Results : Resection margins were clear in all patients. Mean follow-up at the last evaluation was 13 months (range 6.5 to 21 months). A complication developed in six patients with only one flap loss. No hernia was reported. Four patients were fitted with prostheses and walked with a canadian prosthesis with or without crutches. This multicenter study is the only one to present seven cases. Reliability was high in our study (86%) and no flap failure occurred in the 12 cases reported in the literature. This flap should be preferred as first-line treatment as it spares other potential flaps in the event of failure without increasing morbidity of what is

already a major procedure.

Conclusions : Use of a free flap from the amputated leg in proximal amputations avoids difficulties related to use local flaps, which is sometimes impossible, as well as the morbidity of conventional distant donor sites. This coverage technique is simple and reliable if it is performed with great technical rigor. It should be included among the coverage solutions after external hemipelvectomy.

26: New Technologies in Reconstruction of Bone Defects in Children and Youth with Primary Malignant Bone Tumors – Own Experiences

by Andrzej Szafranski | Magdalena Rychlowska-Pruszyńska | Bartosz Pachuta

Abstract ID: 26

Purposes: to improve the results of reconstruction after pelvic malignant bone tumours surgery.

Methods: To resolve the problem of reconstruction after resection the primary bone tumors in inconvenience localization or the big mass of the tumor we can to take advantage of new concept of using existing solutions or Innovation technology for replacement of massive bone defects after excision of primary bone tumor. Originally Lumic endoprosthesis was dedicated for hemipelvectomy type II and II+III by Enneking's classification. In specific situation we can use lumic for reconstruction i.e. after hemipelvectomy type I, II and III by Enneking's classification. In another situation we need Innovation technology for replacement of massive bone defects after excision of primary bone tumor, for example Stratos system to reconstruction in the cases with thorax bone tumor localization. Complete new technology is 3D printer. We can produce the implants of any localization, any shape. We need only a good CT scan and computer software to produce the needed replacement for young patients.

Results and Conclusions (by the clinical experience) Chance for reconstruction of bone defects in children and youth with primary malignant bone tumors depends on: localization and extent of the tumor, tumor reaction on neo-adjuvant chemotherapy, patients determination, surgeon determination in using of new concept of existing technology or in using of new technology.

Custom made endoprosthesis is very useful in the case of atypical tumor localization and it is possible to implant it after good response for neoadjuvant chemotherapy. Personal experience of operating surgeon and being faithful to success is of more importance for successful results.

27: Left humerus reconstruction in an 8- month-old girl with Ewing's sarcoma with the help of a growing megaendoprothesis.

by Andrzej Szafranski | Bartosz Pachuta | Magdalena Rychlowska-Pruszyńska

Abstract ID: 27

Objective: show the treatment process of a girl who at the age of 2 months has contracted Ewing's left sarcoma of the humerus.

Study design: complete comprehensive treatment of a 2-month-old infant.

Methods: presents the applied neoadjuvant treatment, its effects and detailed description of the surgical procedure of removal of the left humerus and its reconstruction thanks to the use of a growing custom-made endoprosthesis.

Results: thanks to the use of a floating endoprosthesis of the total humerus, the shoulder of the shoulder joint and the articular surface of the elbow were retained, thanks to which firstly a good functional effect was achieved in a such small child. We achieved a good functional result - all movements in the shoulder and elbow were preserved, as well as a very good function of the forearm and fingers. The final functional effect of surgical treatment can be seen in the attached film.

Conclusions: Endoprosthesis as a treatment method for a very young child allows to quickly achieve a good functional effect in reconstruction after excision of malignant bone tumors. It does not delay post-operative treatment resulting from a treatment protocol such as radiotherapy, bone marrow transplantation or adjuvant chemotherapy. The authors think that this type of solution - the use of tailor-made endoprostheses will allow in the future after its improvement to save even more limbs in young children with primary malignant bone tumors. It should be added that many small patients before the era of 3D printing techniques had amputated limbs, due to the lack of good ways to reconstruct the bone of a growing child.

30: Osteofibrous dysplasia with rhabdoid elements in a 38 year old man with spontaneous regression over 7 years

by G. Ulrich Exner | Arthur R. von Hochstetter | Christian W.A. Pfirrmann

Objective: Osteofibrous dysplasia (OFD, Campanacci lesion) is a rare benign fibro-osseous lesion. The treatment because of the possible association with adamantinoma is controversially discussed; aggressive radical extraperiosteal excision was considered indicated (1), while spontaneous regressions are also well known. With the presentation of this case we want to draw attention for a careful cautious approach to the treatment of OFD.

Case report: The 38 year old patient presented a multifocal partially confluent lesion in the proximal meta-diaphysial region of the left tibia incidentally found following a knee distorsion. The 99mTc-Bone scan presented a high uptake in the perfusion as well as in the late phase. Tru-cut biopsy remained unclear and was followed by open biopsy exhibiting the image of osteofibrous dysplasia / intracortical adamantinoma with the rhabdoid variant of keratin-expressing cellular component (2). It was decided to observe the further f/u. Images 7 months after the biopsy showed impressive regression of the changes.

Discussion: Although it appears generally accepted that there is a spectrum from OFD over osteofibrous-dysplasia-like adamantinoma (OFD-like adamantinoma) to 'classic' adamantinoma the terminology is somewhat confusing. In the light of the analysis of 73 consecutive patients with this group of lesions (3), in which none of the OFDs and OFD-like adamantinomas progressed to 'classic' adamantinomas, we prefer the diagnosis of OFD with rhabdoid elements for the pathology presented here.

Conclusion: The presented case is of interest for the rare presentation of OFD with rhabdoid differentiation and complete regression after biopsy.

32: Mazabraud's syndrome: two new cases and findings and literature review

by Cristian Lopez Muñoz | Fernandez Lopez, Angela | Martin Somoza, Francisco Jose | Jimenez Ortega, Placido | Doñate Perez, Francisco | Abad Ortiz, Lorenzo | Ruiz Picazo, David | Martinez Arnaiz, Javier | Gallach Sanchis, David | Martinez Cabezuelo, Jesus Amador

Objective:

Mazabraud's Syndrome is a benign disorder characterized by the association of single or multiple intramuscular myxomas with fibrous dysplasia, which can develop in a single bone (monostotic) or in multiple bones (polyostotic). This is a very rare disease, with fewer than 90 reported cases. Our aim is to describe two new cases diagnosed in our hospital non reported before. Furthermore, we discuss the imaging and clinic findings of those uncommon cases with a review of the related literature.

Study design and Methods:

We retrospectively reviewed 2 patients followed by our Service diagnosed of fibrous dysplasia (one of them monostotic and another one polyostotic), who came to our hospital after detected themselves a mass in lower limb. Both cases were women and they were 39 and 70 years old.

Results:

Magnetic Resonance was performed to our patients, been diagnosed with multiple myxomas located in the vicinity of the dysplastic bone in lower limb. Afterwards, surgery excision and anatomopathologic study were done, proving the initial diagnosis of intramuscular myxomas.

Conclusions:

Intramuscular myxomas are benign and rare tumors that affects predominantly the lower limbs. The association of myxomas and fibrous dysplasia, usually polyostotic, is rarer. This association is known as Mazabraud's Syndrome.

This syndrome is more frequent in woman in the middle age and patients are often asymptomatic.

Malignant transformation of myxoma has not been described, but malignant transformation of a fibrous dysplastic lesion into osteogenic sarcoma in patients with Mazabraud's Syndrome have been reported, supporting the necessity of clinical follow-up.

In our case, both patients presented a previous history of fibrous dysplasia and noticed a palpable mass in the thigh. After imaging studies were performed, they were diagnosed with Mazabraud's Syndrome, which was confirmed by histopathological study.

33: Femur giant cells tumor sequela. Alternative treatment using customized knee prosthesis achieved with 3D printing

by Lopez Muñoz, Cristian | Gallach Sanchis, David | Martin Somoza, Francisco Jose | Martinez Cabezuelo, Jesus Amador | Martinez Arnaiz, Javier | Ruiz Picazo, David

Abstract ID: 33

Background

With new customized joint replacement systems a individualized approach is offered in order to replace more precisely the joint, adapting to needs of each patient. This relatively new system of custom templates, allows us to create a three-dimensional system where, with the help of special software, the surgeon may perform a preoperative planning, selecting the cuts preoperatively and adjusting more precisely to anatomical deformities. Objectives

Show the benefits of customizing prosthetic treatment based on 3D technology, presenting a case where, by the usual technique, it possibly would have required a prosthesis more constricting, stems and femoral supplements due to a femur giant cells tumor surgery.

Study Design & Methods

We report a 45 years old woman case, with hip dysplasia history, diagnosed of Giant Cells Tumor (GCT) on left knee's epiphysis, treated with thorough curettage and refilled with cement. 10 years later, our patient developed disabling osteoarthritis on operated knee.

Because of that, we decided implanting a prosthesis, analyzing the classical alternatives versus the use of the current technology of personalized template.

Results

Through specific software-assisted planning, the articulation was replaced by a post-stabilized primary prosthesis. With the use of conventional techniques, the distal cut would have interfered with the cement filling of the giant cell tumor, necessitating the extraction of it, placement of a femoral stem and use of femoral supplements or structural grafts. To date, the patient has a good clinical and radiological evolution, according to the Knee Society Score (KSS) and Knee Injury and Osteoarthritis Outcome Score (KOOS).

Conclusions

The theoretical advantages of using customized templates in the specific case of total knee arthroplasty with 3D printing are: less blood loss, shorter hospital stay, less aggressiveness of the procedure, as well as less use of resources in relation to stockage and sterilization. In our specific case, the indication was try to avoid a prosthesis of high constriction and need for grafts in a young patient, being able to achieve this objective by modifying the cut parameters in the preoperative planning.

38: Next generation sequencing and immunohistochemical study in adamantinoma and osteofibrous dysplasia

by Pr Gomez-Brouchet Anne

Abstract ID: 38

Objective: Osteofibrous dysplasia (OFD) and adamantinoma (AD) divided in classic AD and OFD-like AD, are rare primary fibro-osseous bone tumours with variable epithelial component. All these lesions mostly arise in the tibia of young individuals, and have clinical, radiological, histopathological and cytogenetic similarities, with increasing aggressiveness from OFD to classic AD. Microscopically, diagnostic criteria may be lacking due to the heterogeneity of the tumours, leading to inappropriate therapeutic management. Here we try to clarify the histopathological and biologic relationship between these tumours through immunohistochemical and next generation sequencing (NGS) analysis.

Methods: Six AD (4 OFD-like and 2 classic AD) and 1 OFD were collected from centres of the French Sarcoma Group (GSF-GETO) and were compared with 2 ameloblastomas (odontogenic tumours mimicking classic AD). Immunostainings were performed with AE1/AE3, calretinin, cytokeratin 5/6/8/18/14, E-cadherin and BRAF V600E antibodies. We carried out RNA sequencing (RNAseq) in all tumours. Whole exome sequencing results of 2 OFD-like AD were also analysed and matched with normal tissues.

Results: By immunohistochemistry, no differences were found between AD and OFD. Both showed AE1/AE3 and cytokeratin 5/6/14 expression. Only ameloblastomas were positive for cytokeratine 8/18, E-cadherin and BRAFV600E. Hierarchical clustering analysis of the

transcriptional profiles showed that OFD and AD were more closely related to each other than to ameloblastomas. Furthermore, six recurrent mutated genes A(RMC8, CACNA1G, DIP2A, DUSP5, LAMA2 and USP42), associated to oncogenesis were specifically identified in AD and OFD by RNAseq and whole-exome studies). By RNAseq, two other mutated genes related to cancers (KCNRG and UTP20) were detected in 3 cases of AD and/or OFD.

Conclusion: by NGS, we have found recurrent mutations not yet described in OFD and AD that highlighted their close overlapping and provide promising new perspectives to better stratify patients.

39: Giant gouty tophus may mimic a soft tissue sarcoma

by Israel Rubio Saez | Luis Rodrigo Merino Rueda | Eduardo Jose Ortiz Cruz | Irene Barrientos Ruiz | Manuel Peleteiro Pensado

Abstract ID: 39

Introduction: Rarely, gout can develop tophus as large as a mass compatible with a soft tissue sarcoma.

Study design: Case report. Level of evidence: IV.

Methods: 48 years-old male patient complained of a mass in the anterior part of his left ankle for several months. The mass is painful and limited his range of motion (ROM) with his daily activities. He denied any trauma or constitutional symptoms. As relevant past medical history, he suffered of psoriatic polyarthritis and he was on Leflunomide.

On physical exam, it is detected a 60mm x 30mm soft tissue bland mass, non deep, freely mobile and tender on palpation. His left ankle ROM was reduced because of pain.

As complementary studies, an ultrasound (US) was performed and the tumour was described as a ovoid hyperechoic mass with a rise of blood flow. Later on, he underwent a left ankle MRI where it was observed an apparently neoplastic lesion in relation to anterior tibialis tendon compatible with a giant cell tumour of tendon sheath, a tendon fibroma, a sinovial sarcoma or myxofibrosarcoma, as differential diagnosis.

An US-guided biopsy was performed in order to define the lesion. On Pathology studies, the sample showed a giant gouty tophus.

Because of severe symptoms, a marginal tumoral resection is carried out.

Results: On 3-months follow-up visit, he had no pain and restrictions. He was on Alopurinol and Colchicine prescribed by his Rheumatologist. He was very satisfied after surgery and his problem has been resolved.

Conclusions: A gouty tophus is not from neoplastic origin and it is uncommon. This case report teaches us how an inflammatory lesion could behave and it should be within our differential diagnosis in a soft tissue diagnostic study.

41: Giant cell-rich extraskeletal osteosarcoma above patella: an extremely rare entity in uncommon site that may mimic benign giant cell tumor

by Thanapon Chobpenthai | Pichaya Thanindrarn

Abstract ID: 41

Giant cell-rich osteosarcoma is a rare histologic subtype of osteosarcoma that usually occurs in the extremity. Extraskeletal giant cell-rich osteosarcoma is extremely rare. Herein, we report a case of 11-year-old Thai girl presented with 10-centimetre painless mass over her right patella bone along with two 4-centimetre right inguinal lymph nodes 3 months before visiting our institute.

The radiographic work-up revealed heterogenous soft tissue tumor beneath subcutaneous fat without patella bone invasion. Histologic evaluation from core needle biopsy showed numerous multinucleated giant cells in a background of medium-size round cells to spindle cells with osteoid formation. There are often abnormal mitoses, multi-nucleation and bizarre nuclei.

The final diagnosis was extraskeletal osteosarcoma, giant cell-rich variant. One out of two inguinal lymph node was positive for metastatic sarcoma. Neoadjuvant chemotherapy was given, then wide resection with rotational flap coverage was performed. Tumor necrosis was less than 1%. In this exceedingly rare entity, clinicians should be aware of misdiagnosis between this sarcoma and benign soft tissue giant cell tumor that may leads to improper treatment. Accurately pathologic examination is very crucial.

44: Atypical lipomatous tumor: retrospective analysis, prognostic factors and MRI in differential diagnosis

by Francesco Muratori | Giuliana Roselli | Leonardo Bettini | Filippo Frenos | Antonio D'Arienzo | Domenico Andrea Campanacci | Nicola Mondanelli | Davide Matera | Pierluigi Cuomo | Guido Scoccianti | Giovanni Beltrami | Totti Francesca | Rodolfo Capanna

Abstract ID: 44

Authors analyzed retrospectively 98 ALT / WDL treated in a single institution, 96% of which localized at the extremities and 4% at the trunk, assessing MRI, surgical treatment, local recurrence, follow-up and dedifferentiation ability.

Authors used the MRI in order to identify their size, site, the presence of septa and the enhancement. Surgical margins were divided at final histology in wide/radical, marginal and intralesional.

The most common localization was the lower limb in 84% of cases, 52% showed sizes larger than 10 cm; 80% were deep-seated, whereas only 20% were superficially located. MRI revealed thick septa in 83% and enhancement in 78% of the cases. Eleven local recurrences of the disease (11%) have been reported. Only surgical margins represented a significant prognostic factor on local recurrence ($p = 0.0007$). No dedifferentiation has been reported.

The slow growth and the dedifferentiation ability in ALT/WDL needs a long follow up. MRI is the imaging method of choice. The optimal treatment is wide/radical resection.

46: Surgical approach to rare case of recurrent Pheochromocytoma and bones metastatic Paraganglioma

by Fabio Cosseddu | Federico Sacchetti | Stefano Grossi | Francesco Rosario Campo | Antonio D'Arienzo | Rodolfo Capanna

Abstract ID: 46

Malignant pheochromocytoma \ paraganglioma (PCC \ PGL) is a very rare association of neoplasms. The diagnosis of malignant PCC \ PGL is based on the local recurrence of phaeochromocytoma or primary paraganglioma removed or distant metastasis. Currently, a few dozen cases of this metastatic form are described in the literature and it is not known whether multiple skeletal localizations have ever been described.

We describe a rare case of relapsing phaeochromocytoma associated with bone metastases from paraganglioma.

A 37-year-old woman reported in 2012 a diagnosis of paravertebral paraganglioma with associated pheochromocytoma of the right adrenal gland. After genetic screening, the SDHB mutation was found: diagnosis of PGL syndrome of type 4 was then made. An adrenalectomy was then performed. In 2016, the follow-up highlighted the recovery of disease with a recurrence of right phaeochromocytoma and of multiple skeletal metastases of

paraganglioma. In our center a resection of vertebral metastasis was performed on tenth dorsal vertebra for the risk of bone marrow invasion.

The phaeochromocytoma / malignant paraganglioma association is an exceptionally rare entity. There are no significant data on the frequency of skeletal metastases associated with this pathology. To our knowledge, our case could be the first described in the literature of multiple bone metastases of paraganglioma in patients affected by this syndrome. We also have little significant data on the survival of patients affected by these metastases and on the usefulness of surgical resections or adjunctive therapy. Oncological referral hospitals should share these rare cases to better characterize the prognosis and therapeutic strategies to be adopted for these patients.

47: Innovative technologies in difficult revision arthroplasty. (The East-European Sarcoma Group)

by Anatoly | Vladimir | Romi | Mamed | Sokolovsky | Sokolovsky | Badyrov | Aliev

Abstract ID: 47

Introduction/Purpose: Annually on the territory of Russian Federation, at least 350 primary and revision arthroplasty are performed in primary and metastatic malignant tumors, benign tumors. The purpose of this work was to improve the technology of revision arthroplasty, increase the survival of the endoprosthesis, implement individualized principles of revision implants choice, developing promising innovative technological solutions, modern high-tech equipment, endoprosthesis design solutions and stem fixation.

Material and methods: Since 2004 to 2016 was included 271 revision arthroplasty of all regions. There were 124 males and 147 females with a mean age of 34,4 years (range, 18-78). After proximal shoulder resection 7, shoulder diaphysis 3, elbow joint 4, total shoulder megaprosthesis 2, coxofemoral joint 16, distal femur resection 147, proximal tibia 59, distal femur and proximal tibia resection 4, total femur megaprosthesis 2, femur diaphysis 3, ankle joint 5, total tibia megaprosthesis. All revision arthroplasty were performed with the use of innovative technologies. Failure modes were classified according Henderson et al.

Results: As a result of the introduction of modern principles in revision arthroplasty, the number of repeated surgeries reduced 2 times over a period of 7 years. Thus, the total number of all complications for the period of 5 years from 2004 to 2009 was 44.5%, for the period of 7 years from 2010 to 2016 it was 22.4%. The average period before the detection of non-oncological complications after revision endoprosthetics - 24.5 months (3-144 months). The average period before the detection of non-oncological complications: after revision endoprosthetics - 24.5 months (3-144 months). The total number of non-oncological complications after revisions in 2.4 times higher than after primary endoprosthesis. The conducted research allowed to develop and introduce into routine practice 6 innovative, conceptually new directions of technological development of revision endoprosthetics. Among them:

1. Ultrasonic technology of bone cement removal under endoscopic video control;
2. The revision technology of cement-free stem fixation after previous cement fixation;
3. Individual articulatory spacers in two-stage revision replacement;
4. Innovative technologies of broken stem removal;
5. Implant selection in accordance with individual biocompatibility;
6. Individualized technological solutions based on architectonics of bone structures.

Conclusion: Improvement of oncological results determines the need for a fundamental change in views on the problem of revision arthroplasty. The introduction of innovative technologies in the production of implants, equipment and techniques for performing surgeries can drastically improve the results of treatment.

49: Comparison of the effect of extracorporeal irradiation and liquid nitrogen on nerve recovery with the rat sciatic autograft nerve model

by hüseyin kaya | Dünder Sabah | Burçin Keçeci | Levent KÜÇÜK | Dilek TAŞKIRAN | Oytun Erbaş | Fatih Oltulu | Gürkan Yiğittürk

Abstract ID: 49

Objectives:In order to achieve wide margins sometimes removal of important structures with the tumor is indicated. But reconstruction of big nerves such as sciatic nerve is usually not possible because of the difficulty of finding suitable nerve to be harvested. The purpose of this study is to reveal the effects of the two major oncological sterilisation methods on the biological healing of the nerve and as a result to see if a nerve defect could be reconstructed successfully with treated avascular nerve grafts.

Methods:48rats were divided into three groups as autograft, irradiation and nitrogen. 10 mm long nerve defect created in the right sciatic nerve was reconstructed with autograft obtained from the nerve itself. Group1 underwent reconstruction with a standard nerve autograft. Group2 underwent reconstruction with devitalized nerve autograft treated through extracorporeal irradiation. Group3 underwent reconstruction with devitalized autograft treated through liquid nitrogen. 24 rats were evaluated in early stage at 12 weeks and the other half in late stage at 16 weeks. Final evaluation; EMG, motor strength at the curved table and histomorphologically nerve changes were observed.

Results:Better motor function values were observed in early and late stages of the autograft group but this difference was not significant statistically. In EMG; autograft group exhibited the best latency time, while nitrogen group did the worst, where early period myelination process was under focus. There was no difference among 3 groups in the late period.

In histological study of myelinated nerve fibers; autograft group showed better results in all the assessments than both nitrogen and irradiation. According to assessment made in the late period; nitrogen group in the graft segment and irradiation group in distal segment of the graft

showed high myelination rates. Also revascularization rate in irradiation and liquid nitrogen groups were lower than fresh autograft.

Conclusions: As anticipated, the autograft model had the best results. But on the other hand autografts treated with liquid nitrogen and irradiation also showed to have healing capacity.

52: Difficult osteochondromas: a report of 4 complex cases

by Fabio Cosseddu | Sacchetti Federico | Shytaj Sheila | Grossi Stefano | Ceccoli Matteo | Francesco Rosario Campo | Antonio D'Arienzo | Andreani Lorenzo | Capanna Rodolfo

Abstract ID: 52

Bone osteochondroma is the most frequent benign bone tumor. Symptomatic lesions, vascular or nervous compression, and the suspect of malignant transformation are the main indications for surgical treatment. In these paper we describe several rare cases of osteochondromas that required particular attention in surgical planning and management to reduce risk of complications. We report some cases of "Difficult exostoses".

Case 1: A 50 years old female affected by an osteochondroma at lesser trochanter level with symptomatic compression of sciatic nerve. Case 2: a 22 years old male, affected by a prominent osteochondroma of the proximal humerus complicated with a false aneurysm of the humeral artery. The patient underwent excision of osteochondroma and resection of the false aneurysm. Case 3: A 19 years old male with a 10 cm osteochondroma arising from posterior cortex of the distal femur. We excised the mass with double surgical approach to obtain wide vision considering its risky position. Case 4: A 20 years old male, professional soccer player, with symptomatic osteochondroma of the fibula that compressed the anterior and posterior tibial vasculo nervous bundle.

Despite excision of osteochondromas is usually not recommended especially when diagnosed at young age, when the lesion compress vascular or nervous structures or cause reiterative inflammations to nearby tissues, surgical excision is requested. In some rare cases, excision can be a very hard quest due positioning, dimensions and mostly by closeness to vascular and nervous structures. When a "difficult exostoses" have to be removed, special care in surgical planning and management is mandatory.

The treatment of these "difficult exostoses" have to be planned carefully and often in a multidisciplinary way, as our case suggest. These patients should be addressed to specialized centres.

53: Giant malignant forearm glomangioma: extradigital mass causing bone erosion, case report and literature review

by Federico Sacchetti | Marco De Gori | Carmine Citarelli | Stefano Grossi | Fabio Cosseddu | Antonio D'Arienzo | Rodolfo Capanna

Abstract ID: 53

Glomus tumors (GT) are rare soft tissue neoplasms, more frequently described in the extremities in subungual areas, they are usually diagnosed years after their onset thanks to pain related symptoms. Malignant glomus tumors (MGTs) are exceptional but pose diagnostic and therapeutic challenges, complete excision is recommended treatment, no data are available concerning adjuvant therapies.

We present an exceptional case of extradigital deep seated GT of the forearm that infiltrated bone. To our knowledge this mass is one of the biggest ever found. Our case was considered as a MGT and treated with complete resection. We performed complete resection of the neoplasm with wide margins including epiphysis of the right ulna (tumor size was 6x3x1cm). Despite wide resection functional outcome was not poor, he had no functional loss and he has come back to his full daily activity.

We've done a literature review of forearm GTs. We would highlight the importance of data sharing among hospitals, first of all oncological or university centres. Prospective trials are needed to better understand and plan therapeutic strategy for malignant glomus tumors.

54: Surgery in Osteosarcoma: Our Experience in the Last 20 Years

by Sancar BAKIRCIOĞLU | A. Mazhar TOKGÖZOĞLU

Abstract ID: 54

Objective: In the last 30 years, limb salvage procedures has come into prominence in surgical treatment of osteosarcoma (OS). In this study, we evaluated the long-term results of limb salvage procedures and other surgical procedures performed with the help of new- generation megaprothesis in OS treatment in the last 20 years.

Study Design: Retrospective Cohort Study

Materials and Method:We retrospectively analyzed 136 patients with primary osteosarcoma who underwent surgery between 2000 and 2016 in our clinic. Survival rates of patients, implant survival and additional surgical requirements of the patients who were separated according to the applied surgical procedure were examined.

Results: The mean age of the patients was 20.3 (range 5-78 years). The placement of the tumor was 68.3% in about the knee (47% in femur distally and 21.3% in tibia proximal) and Proximal humerus was 12.5%. 33 (24.2%) patients underwent amputation and 103 (75.8%) patients underwent limb salvage procedures as a treatment method. 51 patients with limb salvage

procedure had megaprosthesis (37.5% of all patients), 19 patients (13.9%) with resection, and 16 patients (11.7%) with allograft reconstruction. Five of the 51 patients who underwent megaprosthesis were revised because of infection (9.9%) and 4 patients (7.8%) due to non-infectious mechanical causes. The mean follow-up period of patient whom underwent limb salvage procedures with megaprosthesis was 46.2 months and the prosthesis survival rate was 72% at 5 years. The survival rate of the study patients was 66.2% at 5 years.

Conclusions: Advances in megaprosthetic technology have provided a good survival reconstruction of patients undergoing limb salvage procedures. Infection, implant failure rates are also decreasing with the increase of our experience. These developments have increased our choice of megaprosthesis as an option for limb salvage surgery in OS treatment.

58: Physical Function and Pain Intensity in Patients With Metastatic Bone Disease.

By Stein J. Janssen | Nuno Rui Paulino Pereira | Quirina C.B.S. Thio | Kevin A. Raskin | Jos A.M. Bramer | Santiago A. Lozano-Calderon | Joseph H. Schwab

Abstract ID: 58

Objective: To assess what factors are associated with physical function and pain intensity in patients with bone metastasis. In addition, we will assess how physical function and pain intensity are interrelated and how these compare to population averages.

Study design: Cross-sectional survey study

Methods: We included 211 patients with bone metastasis from two tertiary care centers (2014-2016). Data from these studies was secondarily used for the current study. Outcome measures were the PROMIS Physical Function and PROMIS pain intensity t-scores (US population average:50). Explanatory variables were: age, sex, race, education, marital status, presence of other disabling conditions, tumor type, location of bone metastasis, previous surgery and radiotherapy, multiple bone metastasis, and visceral metastasis. We used multivariable linear regression to establish what factors were independently associated with function and pain.

Results: We found that having prostate (β :7.5, 95%CI:1.3 to 14, $p=0.019$) or thyroid (β :8.1, 95%CI:1.1 to 15, $p=0.024$) carcinoma was associated with better function, and having other disabling conditions (β :-2.9, 95%CI:-5.7 to -0.11, $p=0.042$) was associated with worse function. Having prostate carcinoma (β :-8.4, 95%CI:-14 to -3.0, $p=0.002$) or lymphoma (β :-6.6, 95%CI:-11 to -1.7, $p=0.008$) was associated with less pain, not knowing whether there were any visceral metastasis (β :5.6, 95%CI:1.3 to 9.9, $p=0.010$) was associated with more pain. There was a moderate correlation between pain and function ($\rho=-0.45$, $p<0.001$)(figure 1). Function was substantially worse as compared to the US population average of 50 (t-score: 37, SD: 9.7, $p<0.001$), whereas pain was slightly less compared to the US population average of 50 (t-score: 47, SD: 8.7, $p<0.001$).

Conclusions: Patients with bone metastasis have, on average, poor function. There is reasonable correlation between pain intensity and physical function. Physical function and pain intensity depend on tumor type, but also on potentially modifiable factors such as other disabling conditions and knowing whether one has other visceral metastasis.

59: The validity of the Mirels score for predicting impending pathological fractures

by Emma Howard | Karen Shepherd | Gillian Cribb | Paul Cool

Abstract ID: 59

Objective: To establish the validity of the Mirels score for predicting impending pathological fractures by evaluating the inter and intra observer reliability of scoring between clinicians.

Study design: Analysis of radiographs of patients with metastatic disease.

Methods: Plain radiographs of 76 patients with confirmed metastatic lower limb disease were scored using Mirels system by the four authors. The pain parameter of the score was determined by electronic patient records rather than observer scoring. Radiographs were anonymised and randomised. Radiographs were rescored 2 weeks after the initial scoring. Inter and intra observer reliability was calculated using Cohen's Kappa and the Kappa Fleiss test.

Results: The kappa values for the inter-observer reliability of the parameters of the Mirels score were $k = 0.554$ for site, $k = 0.342$ for size, $k = 0.443$ for lesion, and $k = 0.294$ for the total score. Kappa values of the site and lesion parameters showed moderate agreement between investigators. However, kappa values showed fair agreement between investigators for the size parameter and total score. Kappa values for the intra-observer reliability were $k = 0.608$ for site, $k = 0.579$ for size, $k = 0.614$ for lesion and $k = 0.323$ for the total Mirels score. For site and lesion parameters, there was substantial agreement between the authors upon rescored the radiographs. For the size parameter there was moderate agreement of investigators on rescored, and for the total score, fair agreement.

Conclusions: Mirels score is commonly used in clinical practice to predict impending pathological fractures in patients with metastatic bone disease. However, few attempts have been made to validate the score. Our study has shown only moderate inter and intra observer variability and the subjectivity of the Mirels score. More objective methods are required to accurately predict pathological fractures in the clinical setting.

65: Multicentric synchronous osteosarcoma with various regression grades on neoadjuvant chemotherapy - case report update.

by Dr Paul Ruckstuhl | OA Dr Marko Bergovec | OA Doz Jörg Friesenbichler | Prof Herwing Lackner | Prof Bernadette Liegl-Azwanger | Prof Andreas Leithner

Abstract ID: 65

Multicentric osteosarcoma is a very rare entity of osteosarcoma, with an incidence of 1- 3% of all osteosarcomas. It is characterized by two or more osseous osteosarcomas, either synchronous or metachronous, without pulmonary metastases or other visceral involvement.

We present the further process of a case report of a 14-year-old male. All diagnostic procedures: X-ray, CT, MR, bone biopsy and finally multiple biopsies confirmed a suspicion multicentric osteosarcoma: distal femur and proximal tibia on a left side, and distal and proximal femur right. The treatment consisted of neoadjuvant chemotherapy and a wide resection of all lesions followed by adjuvant chemotherapy. The left knee joint was reconstructed with a growing distal femur endoprosthesis and a custom-made proximal tibia component. The proximal right femur was operatively treated with an allograft and a trochanter hook plate. The right distal Femur was resected and reconstructed with an allograft fixed with a distal femur LISS plate.

During the follow-up examinations, other malignant lesions were found after 15 months in the left proximal and distal humerus. A wide resection of the whole humerus including a extraarticular shoulder and extraarticular elbow resection was performed. Reconstruction was made with a total humerus / proximal ulna endoprosthesis. Histology reports again revealed different regression grades, indicating various responses on chemotherapy for different localizations.

Reflecting the different response to neoadjuvant chemotherapy the update of this present case underlines our thesis that in this present case the osteosarcomas are of multiprimary pathologic entity rather than bone metastasis. Therefore, we suggest an equally aggressive surgical approach for all tumor locations as in case of singular osteosarcoma. Further research is needed to confirm our findings and to develop clearer treatment recommendations.

66: Selective arterial embolization as a neoadjuvant treatment in hip pseudotumors: Technique notes and case series.

by Mehmet Ali Tokgöz | Andrea Sambri | Giuseppe Bianchi | Giuseppe Rossi | Davide Maria Donati

Objective: Excision of pseudotumor (PT) can be extremely demanding as it can bleed a lot. Selective arterial embolization (SAE) has been widely used as an adjuvant treatment in sarcoma surgery in order to make surgical procedures easier and to reduce bleedings. The purpose of this study is to describe our results with SAE for the treatment of PT associated with Total Hip Arthroplasty (THA).

Study design and Methods: This retrospective study includes 17 patients affected by hip PT between October 2011 and December 2016. Most of the patients affected by larger and more aggressive PT. Seven patients were treated only surgically without any adjuvant treatment (group A), 9 patients received pre-operative SAE (group B). Pseudotumors characteristics were classified according to pre-operative imaging, using both Magnetic Resonance Imaging (MRI) and Computerised Tomography (CT). Digital Subtraction Angiography (DSA) and Selective Arterial Embolization were performed by inserting a catheter through the common femoral artery. The duration of all surgical procedures was recorded and blood losses were estimated using the number of blood units which were given during and after surgery. In the analysis of continuous data, if there were two groups, Independent Sample T Test, if there were more groups, Kruskal Wallis Test was used.

Results: All patients in group B were found to have feeding vessels which were closed using SAE. Embolization did not change the amount of bleeding during surgery ($p=0,619$). A shorter mean surgical time was observed in group A when compared to group B ($p= 0.03$). Both the blood losses and the duration of surgery were higher in more severe grades ($p= 0.046$, $p= 0.035$, respectively).

Conclusions: Selective arterial embolization is a reliable technique with very low risk of complications which can make pseudotumor surgery easier, in particular in more severe cases according to preoperative imaging.

67: Antitumor effect of sclerostin against osteosarcoma

by Masanori Okamoto | Kazushige Yoshida | Jun Sasaki | Kaoru Aoki | Yasuo Yoshimura | Munehisa Kito | Naoto Saito | Hiroyuki Kato

Objective: Wnt signaling regulates the development, growth, maintenance, and differentiation of stem cells. Canonical Wnt signaling regulates the expression of various genes, in addition to cell proliferation and differentiation. Hyperactive Wnt signaling promotes tumorigenesis and metastasis of various cancers. Sclerostin, an extracellular soluble factor secreted by osteocyte, inhibits bone formation via canonical Wnt signaling. Here, we investigated the antitumor effect of sclerostin on osteosarcoma, a malignant tumor derived from osteoblast lineage cells.

Method: Osteosarcoma model mice were prepared by transplantation into the dorsal region of C3H/He and BALB/c-nu/nu mice using osteosarcoma cell lines LM8 (mouse) and 143B (human), respectively. AlamarBlue and scratch assays were performed to evaluate cell proliferation. A migration assay was performed to evaluate the cells' migratory ability. Sclerostin was administered intraperitoneally to the mice once a day at 80 ng/g body weight for 7 days to examine the suppression of the increase in tumor diameter and prolongation of survival. mRNA and protein levels were evaluated by RT-qPCR, and western blotting and immunostaining, respectively.

Result: Administering sclerostin to osteosarcoma cells suppressed the expression of Wnt target genes, and significantly inhibited the growth and migratory ability of osteosarcoma cells. Sclerostin significantly inhibited tumor growth and improved survival of mice, as shown by the Kaplan Meier curves and survival data.

Conclusion: Sclerostin suppressed the proliferative capacity and migratory ability of osteosarcoma cells. The osteosarcoma model mice showed inhibited tumor growth and prolonged survival periods. Since sclerostin is not a cytotoxic agent, it is necessary to investigate the effect of its combined use with existing anticancer drugs, such as doxorubicin, for future clinical applications.

69: Reconstruction with Constrained Reverse Total Shoulder Arthroplasty After Malignant Tumors of Proximal Humerus : Short-Term Results

by Riza Mert Cetik | Mehmet Ayvaz | A. Mazhar Tokgozoglu

Abstract ID: 69

Objective

Reconstruction with prosthesis following wide resection of malignant tumors located in the proximal humerus is a frequently used treatment option. "Dislocation" is the most common complication of this method. The objective of our study is to evaluate the short-term results of the patients treated with a "constrained" reverse total shoulder arthroplasty.

Study Design

Case-series, a descriptive study.

Methods

We retrospectively reviewed 18 patients that are diagnosed with malignant tumors and treated with a constrained reverse total shoulder arthroplasty. Patient and implant survival, complication rates and the need for a revision surgery are the main outcome measures.

Results

18 patients have met the inclusion criteria; among which 7 are women (%38,9) and 11 are men (%61,1). Mean age at diagnosis was 47,2 . The patients' diagnoses were diverse; among which metastatic tumors were the most common.

Mean duration of follow-up is 7,2 months. 3 patients (%16,7) have died during follow up. Revision surgery was performed on 1 patient due to humeral stem loosening, and 1 patient required a forequarter amputation due to local recurrence. Dislocation or infection was not detected in any of the patients.

Functional results were interpreted as range of motion and MSTS scores. Mean degree of maximal flexion was 80°, abduction was 78°, and external rotation was 15°. The mean value of MSTS scores was %74.

Conclusions

The results of reconstruction with the new constrained reverse total shoulder systems following wide resections are found to be satisfactory. The prevention of dislocations as the most common complication was successful so far.

70: Sarcomatous degeneration of paget's disease, multicentre study

by Laura Velasco Gonzalez | Iraia Arteagoitia Colino | Ana Peiró Ibañez | Laura Trullols Tarragó | Andreu Combalia Andreu | Oscar Pablos González | Federico Portabella Blavia | Isidro Gracia Alegria

Abstract ID: 70

Objective:

Sarcomatous degeneration of Paget's disease is an infrequent complication, only 1% of cases. Osteosarcoma is the most frequently found histologic type of tumour (50-60% of cases). These secondary osteosarcomas are more aggressive than conventional ones and therefore with worse prognosis.

The aim of our study was to analyse clinical characteristics of our patients with this sarcomatous degeneration and to evaluate the evolution in survival terms.

Study design:

We made a descriptive, multicentre and retrospective study. We identified 18 patients with malignant degeneration to osteosarcoma of Paget's disease, treated in Santa Creu and Sant Pau, Clínic and Bellvitge Hospitals, between the years 1980-2017. All these patients were included in the study.

Results:

There were 9 male and 9 female, mean age of 70years (range, 59-87years). Paget's disease was monostotyc in 16 cases, affecting: 8 pelvis, 4 proximal humers, 2 proximal femurs, 1 tibia

and 1 occipital bone. Two cases had polyostotic Paget's disease, located in: pelvis and vertebra in one case, and proximal humer and proximal femur in the other one.

The most frequent symptom of secondary osteosarcoma was pain in 50% of cases, pain and mass in 22%, and pathological fracture in 22%. In 8 cases, Paget's disease and osteosarcoma were diagnosed simultaneously, and in 10 cases osteosarcoma appeared on a long-term Paget's disease.

At the moment of diagnosis, metastases were present in 7 patients, all of them with poor survival (<4 months). The rest of the patients also had less than one year disease-free survival, except one patient who survived for 15 years. Secondary osteosarcoma was treated with palliative Chemotherapy (ChT) and Radiotherapy (RDT) in 5 cases and with surgery and adjuvant therapies (ChT and/or RDT) in 13 cases (4 limb amputations and 9 tumor resection).

Conclusions:

The prognosis of patients with sarcomatous degeneration of Paget's disease is poor, with less than 5,5% disease-free survival at one-year after treatment, especially if they had metastases at the moment of diagnosis.

We have observed that the patients treated with an amputation surgery, have greater survival than those treated with conservative surgeries, so if the intention is curative, we must be aggressive with the treatment of these tumours.

Despite all the advances in oncological and surgical treatments, the prognosis of this disease continues being very poor.

72: Mid-term Results of LUMİC(R) Endoprosthetic Reconstruction After Periacetabular Malignant Bone Tumor Resection

by Bulent Erol | Osman Mert Topkar | Evrim Sirin | Tolga Onay | Ahmet Hamdi Akgulle | Said Erkam Baykan

Abstract ID: 72

Objective: We aimed to analyze the mid-term outcomes of LUMİC endoprosthetic reconstruction after periacetabular malignant bone tumor resection.

Study Design: Retrospective case series

Methods: Eleven patients [seven male, four female; mean age 47 (38-64) years] with a (R) pelvic sarcoma or carcinoma metastasis underwent pelvic reconstruction by a LUMİC prosthesis [Implantcast, Buxtehude, Germany] for a periacetabular defect after internal hemipelvectomy. The tumor was pathologically diagnosed as Ewing's sarcoma in three, chondrosarcoma in five and bone metastasis from carcinoma in three. Internal hemipelvectomy included type II resection in seven, type II+III in two, and type I+II/I+II+III

(proximal osteotomy line was extended to mid-portion of ilium) in two patients (Figure 1A-F; Figure 2A-C). Trivera tube [Implantcast, Buxtehude, Germany] was used in nine patients to augment reconstruction and prevent dislocation. Follow-up periods ranged from one to four years (mean = two years). Patient and implant survival, functional and radiological follow-up, complication and re-operation rates were recorded.

Results: Oncological outcomes were DOD (died of disease) in four cases, NED (no evidence of disease) in five, and AWD (alive with disease) in two. Implant survival rate was 91%; one patient with implant loosening required revision of LUMiC(R) prosthesis at 18 months follow-up. In remaining patients, endoprosthesis preserved its original adequate position radiologically. The mean Musculoskeletal Tumor Society (MSTS) functional score was 60% (50%-80%). The overall complication rate was 45.5% (five patients) and 36.3% required re-operation [early mechanical debridement for deep infection (one); open reduction under general anesthesia for dislocation (one); wound revision (one); endoprosthesis revision (one)]. One patient with pelvic obliquity was followed conservatively.

Conclusion: At short-term follow-up, LUMiC(R) prosthesis demonstrated a low rate of mechanical complications and failure. Even though the overall complication rate was high, this endoprosthetic reconstruction provided a stable pelvis with good functional and radiological outcomes in the management of periacetabular malignant tumors.

75: An Algorithm for Soft Tissue Reconstruction Following Standard or Complex Resections Performed In Initial or Revision Surgery of Primary or Recurrent Bone and Soft Tissue Sarcomas

by Bulent Erol | Melek Ozkan | Nihal Kocaaslan | Osman Mert Topkar | Ozgur Baysal | Said Erkam Baykan

Abstract ID: 75

Objective: We aimed to reveal how often a soft tissue reconstructive procedure is required at initial management or follow-up of bone and soft tissue sarcomas and develop an algorithm.

Study Design: Retrospective case series

Methods: Between 2003-2017, 202 (23%) of 872 patients in our bone and soft tissue sarcoma registry required a soft tissue reconstructive procedure for coverage, filling the dead space or function. One hundred and ninety-two (22%) of these with a regular minimum follow-up of 6 months were included in the study. The average age of the study group was 47 (8-84) years. A soft tissue reconstruction in the form of pediculated or free flap was performed following standard resections in 81 (81/643; 12.6%) primary cases, complex resections in 76 (76/168; 45.2%) recurrent or inappropriately managed cases [Figure 1A-F; Figure 2A-G], and revisions in 35 (35/61; 57.3%) cases. An algorithm based on the type of procedure (limb-salvage or

amputation; primary resection/re-resection/revision), the extent of resection (wide/radical), the type of bony reconstruction (endoprosthetic/biological) and localization of the tumor was used; the procedures included local pediculated muscle or faciacutaneous flaps (140; 73%) or free flaps (52; 27%) in both upper and lower extremities and trunk. The overall follow-up was 3 (1-14) years.

Results: The patient survival was 72% at 5 years. The overall complication rate was 27% (52/192 patients) and 22 (11.5%) of them were purely related to soft-tissue reconstruction, including failures. A total of 11 (4 pediculated, 7 free flaps; 5.7%) soft tissue reconstruction was failed postoperatively. All failed soft-tissue reconstructions required additional procedure(s) in the form of another soft-tissue reconstruction [8 patients (72.7%); alternative pediculated or free flap] or amputation [3 patients (23.3%)]. Seven of the remaining 11 soft-tissue related complications required a re-operation preserving the flap.

Conclusion: Soft tissue reconstruction frequently is required following re-resections of bone and soft tissue sarcomas and revisions of previous reconstructions. These procedures make limb salvage possible in these conditions. An algorithm can be helpful to clarify the options for each individual case.

76: Experiences with total femur replacement for malignant bone and soft tissue tumors

by Bulent Erol | Osman Mert Topkar | Omer Yonga | Ahmet Hamdi Akgulle | Ozgur Baysal | Said Erkam Baykan

Abstract ID: 76

Objectives: We described the survival, function and complications of total femur replacement performed for malignant tumors of bone and soft tissues.

Study Design: Retrospective case series

Methods: Twenty-four patients [14 male, 10 female; mean age 38 (range, 11-59)] underwent total femur replacement for the treatment of malignant bone and soft tissue tumors of the lower extremities. The tumor was pathologically diagnosed as osteosarcoma in four patients, Ewing's sarcoma in nine, chondrosarcoma in three, soft tissue sarcoma in four, and bone metastasis from carcinoma in four. Follow-up periods ranged from one to 11 years (mean = four years three months). Total femur replacement was applied following wide resection in majority (21 patients = 87.5%); it was performed as a primary procedure in 16 (Figure 1A-D) and re-resection for recurrence (two) or inappropriate interventions (three) in five patients (Figure 2A-D). Previous tumor prosthesis which was applied for a tumoral condition was replaced by a total femur in three patients (12.5%). Growing total femur was applied in two children. Three young children underwent acetabular replacement as well to prevent acetabular resorption and migration. Bipolar femoral head was used in remaining patients.

Patient and implant survival, functional and radiological follow-up and complications were recorded.

Results: Oncological outcomes were died of disease (DOD) in seven cases, NED (no evidence of disease) in 12, and AWD (alive with disease) in five. Except for one case, none of the patients required a revision for total femur endoprosthesis; 95.8% implant survival rate was achieved. The mean Musculoskeletal Tumor Society (MSTS) functional score was 60% (range, 50%-90%). The overall complication rate was 20.8% (five patients) and 12.5% required surgical intervention [two-stage revision for deep infection (one); closed reduction under general anesthesia for hip dislocation (one); soft tissue reconstruction with local muscle flap for wound problem (one)].

Conclusion: These results suggest that total femur replacement is useful as a means of reconstructing affected limbs in patients with malignant bone and soft tissue tumors.

77: Glomus tumor of uncertain malignant potential in axillary area: a case report and review of literature

by Pichaya Thanindratarn

Abstract ID: 77

Glomus tumor is an uncommon benign tumor usually presenting with a small mass in the dermis or soft tissue of the extremity. Its presentation around the axillary area is rare. Herein, we report a case of a 48-year-old Thai male presenting with a large painful mass around his axilla for 2 months. The tumor biopsy found sheets and cords of relatively uniform tumor cells with foamy cytoplasm and round to oval hyperchromatic nuclei without atypia. The mitotic count was 0 per 50 HPF but the questionable vascular tumor emboli was present. The Ki-67 was 0-5%. Immunohistochemical study showed that the tumor cells were positive for SMA, vimentin and collagen IV. The final diagnosis was glomus tumor of uncertain malignant potential. To the best of our knowledge, both the location and the histologic type of this glomus tumor are extremely rare. The prognosis is good but close follow-up is required.

79: Surgical treatment of lower extremity soft tissue sarcoma: a pilot study of functional outcomes among 19 consecutive patients

by Gilber Kask | Ian Barner-Rasmussen | Jussi P. Repo | Carl Blomqvist | Erkki Tukiainen

Abstract ID: 79

Objective

Soft-tissue sarcomas (STS) are rare malignant tumors. The most common location is the lower extremity. The present standard of care in treating lower extremity STS is function- sparing limb-preserving resection and reconstruction with or without oncological therapy. Studies have found that functional outcome after amputation for sarcoma is inferior or equal compared to that of limb-salvage surgery patients. The aim of this pilot study was to investigate the functional outcomes of Finnish lower limb STS patients after operative treatment.

Study design

Retrospective pilot study.

Methods

Between June 2015 and December 2015 consecutive surgically treated outpatients were asked to participate in the study. Data on demographics, tumor histology, treatment, complications, and oncological outcome was collected from patient records. Two functional outcome questionnaires were used: the Toronto Extremity Salvage Score (TESS) and the Musculoskeletal Tumor Society (MSTS) score.

Results

Nineteen lower-limb STS patients with mean follow-up time 2 years 10 months were included. Twelve were male. Mean age was 62.3 years. Thirteen had high grade sarcomas. Eight wounds were closed directly, four using skin grafts, five required flap reconstructions. One patient needed a tumor prosthesis, and one an above-knee amputation and rotationplasty. Fourteen patients received oncological therapy. Overall TESS score was 88 and MSTS score was 76.

Conclusions: Conclusions and relevance for EMSOS

The present pilot study suggests that the functional outcome may vary from moderate to excellent after lower extremity STS treatment. The results also suggest that functional impairment is more severe for patients with larger defects.

80: A collaborative research initiative for the establishment of the INTernational Endoprosthesis REGistry for Sarcoma Treatment (INTEREST) Study Group.

By Roberto Velez | Matias Vicente | Patricia Schneider | Michelle Ghert

Abstract ID: 80

Background and Objectives: In contrast to the continuous improvement in survival rates of standard joint replacement reconstructions, endoprosthetic reconstructions continue to present poor long-term results. Although failure modes have been identified and classified, there is a general lack of knowledge of risk factors for endoprosthetic failure. Currently there are no multicenter collaborative endoprosthetic registries that could help better understand biologic and mechanical risk factors that lead to failure patterns. In a recent MSTS consensus initiative, the research question "What are the outcomes over time for orthopaedic oncology

implants? (Methodology: Prospective Registry)" was the second highest voted priority in our field. Therefore we have set out to develop the INTernational Endoprosthesis REgistry for Sarcoma Treatment (INTEREST) Study Group. The main objectives of this study group are to improve reconstruction and patient function, and reduce perioperative and long-term complications.

Study Design: We surveyed international collaborators in our field in order to determine both the level of potential investigator engagement in the INTEREST Study Group and industry funding capabilities.

Methods: An online survey was created and sent to 98 research collaborators from the PARITY Study, which included questions on demographics, contact information, experience level, research support and preferred implant companies. Implant company distribution was calculated by dividing the total number of endoprostheses implanted per surgeon per year evenly between the companies they preferred. The survey was closed on March 1st 2017. Annual implant spending was estimated with average costs of a standard 15 cm distal femoral reconstruction. A descriptive analysis was performed.

Results: Fifty surgeons (52% response rate) completed the survey with an average age of 46 years (range: 35-67) and an average of 13.7 years experience in orthopaedic oncology (range: 2-34). Twenty-seven participants work in North America, 4 in South America, 13 in Europe, 1 in Africa and 5 in Asia Pacific. Participants perform 47 endoprostheses per year on average (range: 4-400) for a total of 2362 implants per year. Twenty-six percent of implants were Stanmore (n = 608), 22% ZimmerBiomet (n = 508) and 19% Stryker (n = 450). Forty-five percent of the implants were either Stanmore or Stryker and 36 surgeons (72%) used either or both. Annual implant spending by all 50 surgeons was estimated to be approximately 20 million euros.

Conclusions: There is a solid community of international research collaborators willing to participate in the INTEREST Study Group. Annual endoprosthetic procedures within the study group could enable big data analysis from a prospective database. Considering endoprosthetic annual costs, the INTEREST Study Group has started discussions with the industry for financial support of this project. The European Spine Study Group, founded in 2010 by an international group of collaborators with similar objectives to the INTEREST Study Group and financed through industry support, has had a progressive yearly research output with 23 indexed publications in the last 4 years. All EMSOS members are invited to participate in the INTEREST Study Group and provide insight into funding opportunities.

82: Longitudinal change in quadriceps cross-sectional area after wide resection of quadriceps muscle for soft tissue sarcoma -CT scan based study-

by Munenori Watanuki | Masami Hosaka | Shinichirou Yosida | Toshihisa Yano | Eiji Itoi

Abstract ID: 82

INTRODUCTION:

The quadriceps muscle group is one of the most common site for extremity soft tissue sarcomas. Several studies reported that the degree of quadriceps resection has a strong impact on the isometric strength of the muscle and functional outcome. There is no report about the longitudinal changes in strength of the residual muscle after extensive quadriceps muscle resections. The quadriceps cross-sectional area (CSA) has been shown to correlate with quadriceps muscle strength. The aim of this study was to investigate the longitudinal changes in CT-based quadriceps cross-sectional area after quadriceps resection.

METHODS:

From 2008 to 2013, 10 patients had quadriceps resection. The average age of patients was 62.0. CT scan was taken preoperatively, and postoperatively at 6, 12, and 24 months. Mid thigh quadriceps muscle CSA (in cm²) was assessed from a 1-mm CT slice taken preoperatively and at 6 months (6MCSA) and 24 months (24MCSA). Analysis of variance (ANOVA) was used to examine correlations between gender, number of resected muscles, and the change in affected quadriceps 6MCSA and 24MCSA. Simple linear regression analysis was used to examine correlations between age, the change in unaffected quadriceps preoperative CSA and 6MCSA, the change in unaffected quadriceps 6MCSA and 24MCSA, and the change in affected quadriceps 6MCSA and 24MCSA.

RESULTS:

6MCSA of the affected quadriceps were significantly smaller (average 20%) than those of the unaffected side. Eighteen months (6 - 24mo) longitudinal changes in CSA of the affected limb increased slightly (average 3.6%). CSA of the unaffected limb increased in all cases from preoperative to at 6 months (average 10%). From 6 months to 24 months, CSA of the unaffected limb slightly decreased (average 6%).

CONCLUSIONS:

This study suggests that the CSA of residual quadriceps muscle might recover to a certain degree over time, even after extensive quadriceps muscle resections, and the maintenance of physical activity after discharge might improve affected limb function.

85: Methodology to Prevent Cement Interdigitation of 3-D Printed Molds

by Jonathan Morris | Paul Booth | Peter Piechocniski | Sariah Khormae | John H. Healey

Abstract ID: 85

Objective: 3-D printed molds can make prosthetic intra-operatively. Commonly utilized materials for stereotactic lithography create macro- and micro- crevices allowing polymethylmethacrylate (PMMA) cement interdigitation. The purpose of this study is to examine methodologies that can be used in the operating room to prevent cement

interdigitation in the mold, and allow successful creation and extraction of acrylic cement implants from 3-D printed molds.

Study Design: Translational engineering

Methods: Three molds were virtually designed and rendered utilizing 3-D printing technology over 4 days. The materials utilized were Acrylonitrile Butadiene Styrene (ABS), Acrylic and Epoxy photopolymer (3-D Systems, Littleton, CO), and biocompatible photopolymer resin (Formlabs, Boston, MA). The molds were unaltered, lined with paraffin wax, foil, or nitrile. Each mold was filled with 40g of PMMA impregnated with 1g of tobramycin (Simplex P with Tobramycin, Strkyer, Mahwah, NJ). The PMMA was hand-mixed for 90 seconds and cured for 10 minutes. Ability to open the mold and remove the spacer was graded on a binary scale.

Results: Independent of material of the mold, all three molds with unaltered surfaces and lined with paraffin wax could not be opened after the PMMA cured. The foil was unable to smoothly line the molds and resulted in cement seeping through. The nitrile acted as an impregnable layer that prevented undesirable interdigitation of the bone cement in all three mold materials.

Conclusions: Custom implants require time to design and manufacture. Tumors not requiring neo-adjuvant therapy need surgery promptly before custom implants can be manufactured. An acrylic cement spacer made from a 3-D printed custom mold creates a functional implant, maintains soft tissue tension, appropriately fills the cavity, elutes antibiotic, and has a short pre-surgical time.

88: Epiphyseal hyperplasia caused by an ectopic ossification centre of the distal tibia: presentation of a paediatric case with 13 years of radiological surveillance

by Susanne Scheipl, MD, PhD | Stefan Tauber, MD | Marko Bergovec, MD | Jörg Friesenbichler, MD, PhD | Reinhard Windhager, Prof., MD | Martin Ornig, MD | Andreas Leithner, Prof., MD | Gerhard Ranner, Prof., MD

Abstract ID: 88

Background: Great caution is required in the differential diagnosis of bone lesions to discriminate potentially self-limiting conditions from others that might require invasive diagnosis and/or therapy, particularly in children. Herein we report the case of a 4-year-old boy, who presented with a cortical lytic lesion of his distal tibia.

Case Report: The lesion was located eccentrically, measured 2 cm in its craniocaudal diameter, and was associated with a lamella-like soft-tissue mineralisation that resembled a periosteal reaction. Thus, the lesion's radiographic features were initially suggestive of an aggressive disease. However, further imaging revealed the lesion to be of cartilaginous origin and to extend into the metaphysis, thus creating the aspect of hyperplastic epiphyseal cartilage. This cartilaginous hyperplasia was likely caused by an ectopic ossification center, although no

similar cases have yet been reported. Since radiology and clinics no longer indicated the imminent threat of a high-grade malignancy, we decided against a biopsy to avoid interfering with epiphyseal growth. However, because of the unprecedented nature of the given constellation, we closely monitored the lesion radiologically to rule out an untypical manifestation of a benign but potentially expanding lesion, as well as a growth disturbance resulting from the lesion itself. However, further imaging indicated that mineralisations and ossifications, which were already present at the lesion's initial presentation, increased over time, until the lesion fully disappeared after 13 years of clinical and radiological surveillance.

Conclusion: This case is outstanding due to its singular morphology and the long-term follow-up that illustrates its self-limiting natural course. This report provides support in differential diagnosis to help discriminate potentially self-limiting conditions from other diseases that might require invasive diagnosis and/or therapy.

89: Alveolar sarcoma. A case series of a very uncommon tumour

by Israel Rubio Saez | Guillermo Suazo Carrilo | Rodrigo Merino Rueda | Irene Barrientos Ruiz | Eduardo Ortiz Cruz | Manuel Peleteiro Pensado

Abstract ID: 89

Introduction and objective: Defining common characteristics of prognosis and treatment in alveolar sarcomas diagnosed in our center, a very rare type of soft tissue tumor with few information only based on case reports and small case series.

Study design: Case series. Level of evidence: IV.

Methods: 4 patients were diagnosed of alveolar sarcoma in the period from 1997 and 2017 in our specialised tumor unit. Clinical data was collected from electronic and physical medical histories. Descriptive analysis was performed by the tool SPSS 23.0v. The median follow-up was 45,8 months.

Results: 3 tumours were of soft tissue origin and 1 of osseus origin. The average age of diagnosis was 26,5 years and gender proportion was 1:1. The main complaint was a painful mass during an average of 8,67 months. 3 cases developed in lower limbs (proximal femur, leg soft tissue and gluteus maximus) and 1 case in upper limb (forearm with cubital extension). A half of cases had metastases at diagnosis and the other 2 cases during the follow-up. Most frequent metastases were pulmonary (4) and 1 in frontal bone and 1 suprarenal gland. 2 patients recieved neoadyuvant therapy, but no detectable necrosis. All cases were treated by surgical wide resection and reconstruction. 2 perioperative complications were observed (1 pathologic fracture, 1 radial neuroapraxia). 1 case presented local recurrened and required above knee amputation. 2 cases of lung metastases were treated by surgery and chemotherapy without detected recurrences. 1 exitus occurred after 80,5 months from

operation with local recurrence and lung metastases and 3 patients stay alive at the present moment with a average follow-up of 45 months.

Conclusion: Despite of research limitations, we suggest sarcoma alveolar is a malignant tumour of young people with high probability of metastases at diagnosis and in atypical locations and we observed disease control by wide resection.

90: Resection of bilateral chest wall sarcoma and rib reconstruction with GORETEX-Patch and MatrixRib

by Wolfram Weschenfelder | Christian Spiegel | Matthias Vogt | Robert Lindner

Abstract ID: 90

Introduction

The chest wall functions as a protective cage around the vital organs of the body, and disruption of its structural integrity can have dire respiratory and circulatory consequences. Successful reconstructions are dependent upon detailed knowledge of the functional anatomy. Operations of chest-wall sarcomas represent a transitional area between thoracic and orthopaedic surgery.

Case presentation

We present the case of a 50 year-old male patient presenting with impairment of external rotation of the right shoulder. MRI revealed a hyperintense soft-tissue mass arising laterodorsally between the 3rd and 7th rib. Open biopsy confirmed a spindlecell sarcoma. PET-CT staging revealed one tumor suspect of metastasis in the contralateral 8th intercostal space. After interdisciplinary case evaluation, resection of the tumour including ribs 3 to 7 via a longitudinal incision at the anterior border of the latissimus dorsi and a second incision at the medial border of the scapula was performed. The pleural defect was reconstructed with a GORETEX®-Patch and the resected ribs were reconstructed using an artificial metallic plates system (MatrixRib®).

After pulmonal recompensation and histological confirmation of margin-free resection, the contralateral lesion was operated in a similar manner with resection of the ribs 8 and 9 and consecutive reconstruction. The patient recovered well and was discharged after 2 weeks. Postoperative imaging was without any abnormalities.

One month postoperatively, the patient complained of progressive dyspnoea; chest x-ray revealed a large pleural effusion of the right lung. Chest-CT indicated a new thickening of the right pleura. Video-assisted-thoracoscopy was conducted and the instantaneous histological section verified pleural carcinosis. The patient now receives palliative chemotherapy with doxorubicin and olaratumab.

Conclusion

Reconstruction of chest wall defects following radical resection is often challenging. Careful planning, use of reliable artificial material and interdisciplinary execution are crucial for favorable outcomes.

91: Treatment of high-grade femoral osteosarcoma. Tumoral prosthesis placement and revision surgery: A CASE REPORT

by López Muñoz, Cristian

Abstract ID: 91

Background:

Osteosarcoma is a known disease but not completely understood. It accounts for 20% of primary bone sarcomas. Despite the fact that cure rates can approach 65-70% in cases of localized disease, treatment is long, multimodal and arduous. Given the progression improvement in survival, new therapeutic challenges are constantly emerging.

Objectives:

Multidisciplinary approach of the patient with femoral osteosarcoma, with involvement of the knee joint and review of the literature about a case.

Study design and methods:

We present a 69-year-old man referred to our service in August 2015 because of an expansive lytic lesion in the distal third of right femur with involvement of soft tissues. After extension study and biopsy, he was diagnosed with high-grade fibroblastic osteosarcoma, 10 cm long cranio-caudal stage IIB (Enneking), affecting entire metaphysis and epiphysis, with no distant metastases. After neoadjuvant chemotherapy, in October 2013, the tumor was resected and a hinge-type reconstruction prosthesis was placed. The patient continued with cycles of chemo and radiotherapy. In February 2015 an aseptic loosening of the prosthesis was evident and the loosened stem was replaced.

Results:

The patient has been followed by the services of Orthopedic Surgery and Traumatology and Medical Oncology, with satisfactory evolution, walking with the help of a crutch. There is no active disease at this moment and patient is completely independent.

Conclusions:

In the presence of high-grade osteosarcoma in a patient without other concomitant diseases, curative treatment should be our first option, and cooperation between services is essential to achieve the best possible results.

In our case, thanks to the active participation of the Oncology, Pathology and Orthopedic Surgery Services, after aggressive surgery and chemotherapy and radiotherapy sessions, we achieved the cure of the disease and a completely functional lower limb.

92: Differential diagnosis of solitary bone lesion as an incidental finding in capitate bone of the hand: A case report.

by López Muñoz, Cristian | Ruiz Picazo, David | Gracia Rodriguez, Indalecio | Martín Somoza, Francisco José | Gaspar Aparicio, Natalia | Jiménez Ortega, Plácido | Doñate Pérez, Francisco

Abstract ID: 92

Introduction and objectives:

Avascular necrosis of hand's capitate bone is a rare entity, considering the position of relative protection that this structure presents in the distal row of the carpus. We should always bear in mind it against a wrist pain, even in the absence of serious trauma, if clinical and complementary explorations arouse this illness. Our aim is to discuss the diagnosis of solitary bone lesion in hand's capitate of a child. Furthermore, we discuss the imaging and clinic findings of it with a review of the related literature.

Study design and Methods:

We present an 11-year-old woman, with no pathological history, who came to the consultation referring an atraumatic pain in left wrist of a month of evolution. She was seen in the emergency room, being diagnosed with tendonitis. On examination, she presented pain in the first row with mild inflammation associated, without limitation of joint mobility and normal neurovascular status. On radiographic study, increased radiodensity of capitate bone is seen. Given these findings, we suspect the patient may have an avascular necrosis (AVN) of capitate bone, with possible involvement of other carpal bones.

Results:

Magnetic resonance imaging of the carpus is performed, evidencing a spiculated lesion, hypointense in all sequences in capitate bone that, correlated with simple radiography, is compatible with bone island. There are no signs of NAV.

Conclusions:

Enostosis or bone island is a benign neoplasm that usually appears in the adult age, having a predilection for axial skeleton bones and long bones metaphysis. Given our incidental finding, the age of our patient and location of the lesion, results were given by exclusion diagnosis, ruling out the most probable entity, avascular necrosis. It should be noted that there are practically no published cases describing enostosis in bone capitate, specially at such an early age.

93: Parosteal lipoma: three new cases and findings and literature review

by Lopez Muñoz, Cristian | Martin Somoza, Francisco Jose | Gaspar Aparicio, Natalia | Doñate Perez, Francisco | Ruiz Picazo, David | Martinez Arnaiz, Javier | Gallach Sanchis, David | Martinez Cabezuolo, Jesus Amador

Abstract ID: 93

Objective:

Parosteal lipoma is an extremely rare benign tumor composed mainly of mature adipose tissue with a bony component. It is among the rarest neoplasms of skeleton, accounting for less than 0.1% of primary bone tumors and 0.3% of all lipomas. To the best of our knowledge, of the approximately 150 cases of parosteal lipoma reported, only 1 case has been previously described of parosteal lipoma of scapula. Our aim is to describe three new cases diagnosed in our hospital non reported before. Furthermore, we discuss the imaging and clinic findings of them with a review of the related literature.

Study design and Methods:

We retrospectively reviewed 3 patients followed by our Service. One of them with a big mass on the lateromedial aspect of the left upper arm since 4 months. Another one noticed a lump in the lower limb, next to medial shaft of tibia 2 months ago. The last of them with a bundle located at her back, in contact with scapula 3 months old. All swellings were painless, nontender and not attached to superficial or deep planes. Patients have no complaints of painful or restricted movements of affected limbs. There wasn't history of trauma events in any case.

Results:

Magnetic Resonance was performed to our patients, and swellings were described as soft tissue masses with chondroid component free from adjacent muscles located in the vicinity of the humerus, tibia and scapula, respectively. Afterwards, surgery excision and anatomopathologic study were done, proving the initial diagnosis of parosteal lipomas.

Conclusions:

Parosteal lipoma is a rare benign neoplasm composed mainly of mature adipose tissue that is contiguous to the underlying periosteal bone.

There is no indication to date that this tumor undergoes malignant degeneration.

These tumors can be resected without much damage to the adjacent structures, thus preserving the function of the affected limb.

94: Atypical presentation of hibernoma with significant infiltration and cortical erosion of the iliac bone. Case report

by Martín Somoza, FJ | López Muñoz, C | Gaspar Aparicio, N | Martínez Arnaiz, J | Doñate Pérez, F | Jiménez Ortega, P

Abstract ID: 94

Objective: To review the typical characteristics of this classically benign lesion of which only one case has been published as “malignant hibernoma” based on muscle infiltration.

Study design: We present an atypical case of hibernoma (brown fat origin) with significant infiltration and cortical erosion in the iliac bone that force to make a differential diagnosis with other atypical lipomatous lesions and more aggressive as liposarcomas. The classic clinical and anatomopathological characteristics that define it as a benign tumor will be discussed and we will review the literature in search of malignant variants.

Methods: A 67-year-old woman with infiltrating ductal carcinoma of the left breast undergoing treatment for Oncology and several benign thyroid nodules as a medical history of interest, presented a tumor in the left buttock, slow growing, soft and not painful. Given the oncological history, the case is presented in the Tumor Committee to assess attitude. Several imaging tests were necessary for its study (ultrasound and magnetic resonance) as well as a thick needle biopsy (TNB).

Results: Imaging tests showed a mixed predominantly fatty neoplastic mass with significant osteolysis of adjacent iliac bone suggesting a diagnosis of hibernoma vs malignant hibernoma that required differential diagnosis with other malignant lesions. In TNB, fibroadipose tissue was seen, without signs of malignancy. In the context of infiltrating ductal carcinoma of the breast, in the Tumor Committee the exeresis and biopsy of said lesion were chosen. The anatomopathological study of the surgical specimen showed the definitive diagnosis of hibernoma.

Conclusions: Hibernoma is a benign tumor originated from vestiges of fetal adipose tissue, therefore it should be considered as an entity different from traditional lipomas. They are usually lonely, not painful and slow growing. The signs of local aggressiveness of these tumors are very rare, with few publications in the literature reviewed.

95: Atypical and late presentation of recurrence of a well-differentiated liposarcoma. Case report.

by Martín Somoza, FJ | López Muñoz. C | Gaspar Aparicio. N | Martínez Arnaiz. J | Losa Palacios, S | Doñate, P

Abstract ID: 95

Objective: To review a rare malign entity, which includes, in the latest updates, a large subgroup of pathologies.

Study design: We present a case of recurrence of a well differentiated liposarcoma (WD- LPS) after 23 years from its initial excision. The clinical and histopathological features that confirm

its diagnosis will be discussed. Imaging tests, photographs of the intervention as well as the surgical piece are provided.

Methods: A 84-year-old woman with hypertension as the only medical record of interest, presented 23 years ago with a tumor located on palmar face of the thenar eminence in her left hand. It was surgically removed in another hospital. Histopathology diagnosed well-differentiated liposarcoma. The patient was referred to our hospital to assess a new lesion in the same area. The tumor had slow growth in recent months, was hard and not painful. New imaging tests were requested to study the lesion and the case was presented in the Tumor Committee for therapeutic decision.

Results: The resonance report confirmed the need to make a differential diagnosis with soft tissue sarcomas. Once the case was presented in the Tumor Committee, it was decided to propose surgical excisional biopsy based on the age of the patient and the lack of neoadjuvant options. During the surgery, the tumor was dissected, adhered to deep planes, and extracted together with its capsule. In the histopathological examination of the surgical specimen, the diagnosis of well-differentiated liposarcoma recurrence was confirmed.

Conclusions: Liposarcomas represent almost 20% of all sarcomas and WD-LPS represent 40-50% of liposarcomas. It has an intermediate malignancy. The most important forecast factors are the evolution time and the location. Peripheral lesions rarely recur after extirpation with adequate margins and if they do it, are less aggressive.

96: Cervicobrachial pain of neoplastic etiology. Review of 3 cases of scapuloclavicular tumors.

by Martín Somoza, FJ | López Muñoz, C | Gaspar Aparicio, N | Martínez Arnaiz, J | Doñate Pérez, F | Jiménez Ortega, P

Abstract ID: 96

Objective: Provide a differential diagnosis of tumor lesions that may cause cervicobrachial pain with radiculopathy involvement due to its location and specific characteristics.

Study design: A review of 3 cases of tumor lesions of different histological lineage (high-grade myxofibrosarcomas vs plexiform neurofibroma vs malignant peripheral nerve sheath tumor - MPNST) is presented, with similar location and clinical characteristics, which required an extensive study of imaging and pathology for their diagnosis and definitive treatment.

Methods: We present 3 cases of tumor lesions, two located in the clavicular fossa and another in the subscapular region. All of them were fast-growing and adhered to deep layers. Clinically, they did cause radiating pain to the upper limb, discomfort to the mobilization and two of

them also presented distal sensory alterations. Different imaging tests and pathological studies were needed for the diagnostic orientation. They were also assessed in a Tumor Committee to decision-making

Results: In the radiological images they all had characteristics of soft tissue sarcomas, being the first impression diagnosis. The pathological results were disparate: one of them was suggestive of MPNST without ruling out the possibility of metastatic melanoma; another tumor suggested benign lesion, posing differential diagnosis between Schwannoma and plexiform neurofibroma; the third tumor was suggestive of high-grade sarcoma (myxofibrosarcoma). In the Tumor Committee, each case was individualized, opting for resection surgery to treat the benign tumor and adjuvant therapy plus resection surgery for malignant lesions.

Conclusions: Soft tissue tumors can cause focal and irradiated symptoms depending on the location and aggressiveness. For their diagnosis, radiology, pathology and extension study are important, as well as a multidisciplinary approach for a correct therapeutic attitude.

97: The use of compress technology in primary as well as revision surgery for malignant bone neoplasms; comparison between conventional endoprosthetic replacement and compress technology regarding aseptic failure, complication and prosthetic survival rates.

by An-Sofie Van de Kelft

Abstract ID: 97

OBJECTIVE: Different endoprosthetic fixation options in limb-salving surgery are possible. Aseptic failure, secondary to stress shielding and particle-induced osteolysis, is the primary cause of endoprosthetic replacement (EPR) failure, seen in conventional stemmed reconstruction prostheses (CIS) at mid- to long-term. In an effort to decrease these aseptic failure rates, CPS was developed as an alternative fixation system. Early clinical reviews reporting outcomes after CPS technology have been encouraging, yet often limited by population size and follow-up. The aim of this study is to retrospectively compare (1) aseptic loosening and failure rate and (2) the complication rate and overall implant survivorship in CPS versus CIS implants.

STUDY DESIGN: Retrospective comparative study.

METHODS: Between 1981 and 2017, 123 patients with musculoskeletal tumors of the knee, hip, shoulder or elbow were treated with EPR. 49 CPS and 86 CIS implants were available for review, with an average implant follow-up of 82.0 months (range 0-324m). The mean age at diagnosis was 33.3 years (± 19.83). Kaplan-Meier survival plots were used to examine failure rates as well as overall implant survivorship.

RESULTS: Aseptic failure occurred in 3 (6.1%) CPS implants versus 22 (25.6%) CIS implants ($p=0.005$). Failure of CPS implants was seen within the first year postoperatively. 32.7% of the CPS implants versus 54.7% of the CIS implants had at least one complication ($p=0.004$). The overall 5-year CPS versus CIS implant survival rate was resp. 91.2% versus 83.9% ($p=0.688$).

CONCLUSION: Compressive osseointegration of endoprostheses seems to be a reliable option in reconstruction after musculoskeletal tumor removal. Our data demonstrate significant lower aseptic failure rates, all occurring within the first year postoperatively, lower complication rates and a comparable 5-year overall implant survivorship when compared to the traditional fixation system at intermediate- to long-term follow up. Further research seems justified, evaluating the aseptic failure and implant survival rate at long-term.

101: The treatment of secondary lesions of the hip: a new classification for a common language

by Carmine Zoccali | Jacopo Baldi | Nicola Salducca | Leonardo Favale | Fabio Erba | Roberto Biagini | Andrea Piccioli

Abstract ID: 101

Introduction: because of the increase of survival of metastatic patients, orthopedic surgeons have to take into account not only the biomechanical aspect but the oncological aspect as well so, today, wide resection and prosthesis reconstructions are more common than in the past moreover in the femur. The aim of presenting paper is to identify a common language and to clear indication for surgery for tumor located at the hip joint.

Materials and Methods: All patients which underwent surgeries in a research hospital for secondary tumors located in the hip (proximal femur and acetabular roof) were analyzed to classify the pathological aspect and codify relative surgery.

Results: Four principal groups of lesions were identified basing on the structured involved; the capital letter "A" is used to for acetabular lesions, the capital letters "HN" for lesions located in the head or femoral neck, the capital letters "GT" and "LT" for lesions located in the greater and lesser trochanter, respectively. Every group is the specified basing on the risk of fracture and indicated with subscripted lower case letters "i", "ni" or "f", if the affected segment is a high risk of fracture (impending fracture), not a risk, or if the fracture already occurred, respectively. The further subscripted lower case "j" refers to a intraarticular involvement.

Discussion: the correct approach is based on three main factors: site of lesion, patient's survival and mechanical instability. Considering those factors, intramedullary stabilization, resection and prosthesis reconstruction with simple or very complex devices can be suitable.

Conclusion: more efforts have to be done to better estimate survival and risk of factor to individuate the best treatment for patient affected by hip metastases.

103: 3D-Printed Titanium Custom-made prostheses in reconstruction after resection of pelvic bone tumors: our indications and first results.

by Carmine Zoccali | Gennaro Scotto | Jacopo Baldi | Roberto Biagini | Alessandro Luzzati

Abstract ID: 103

Purpose: wide resection is the mainstay treatment for primitive bone tumors; it can be also a good option in long survivors metastatic patients. Reconstruction in limbs is generally performed with modular prostheses whereas composite massive allografts reconstruction is usually indicated when tumor is located in pelvis or scapula. 3D-Printed Titanium Custom-Made Prostheses (3DPTCMP) could be a valid alternative in complex reconstructions. The aim of the presenting paper is to analyze the first 10 pelvic prostheses implanted by our research group valuing indications, complications and preliminary results.

Methods: the first 10 hemipelvis 3DPTCMP implanted in two major orthopedic research institutes were considered. The epidemiologic and clinical data were analyzed.

Results: All patients were affected by localized disease, only a patient suffered of multimetastatic epithelioid hemangioendothelioma stable after two years since chemotherapy interruption.

At 18 months of average follow-up, 6 patients are completely free of disease; one died for postoperative complication, one died for heart attack, one died for pneumonia and infection not correlated to the surgery, one is free of disease but had three lung metastases removed, the patient already metastatic presents a stable disease without local recurrence.

All patients are able to walk with one or two crutches.

Discussion: 3DPTCMPs are a valid alternative to pelvic homograft in reconstruction after tumor removal, nevertheless consistent is the mortality associated to this high demanding surgery moreover correlated to other causes.

104: The “IlluminOss fluid nail” in intramedullary stabilization of the humerus: preliminary experience

*by Carmine Zoccali | Jacopo Baldi | Dario Attala | Alessandra Scotto | Ulrica Scaffidi-Argentina
| Nicola Salducca | Leonardo Favale | Roberto Biagini*

Abstract ID: 104

Introduction: metastases of the humerus are very commune lesions. They are usually treated conservatively: immobilization and radiotherapy are often sufficient because of the humerus das not have to support weight baring. Nevertheless, when the osteolysis is important surgery could be advisable to decrease the risk of fracture. Intramedullary nailing is considered the mainstay treatment for radiosensitive metastasis but unfortunately the resence of an electron dense material interferes with successive radiotherapy and with its effectiveness.

The IlluminOss system consists in an intramedullary stabilization with a fluid monomer that exposed to UV polymerizes becoming harder, so that it can be drilled and locked with screws. We present the preliminary experience in treating fractures and impending fractures with this system.

Patients and methods: from October 2014 to January 2018, ten patients underwent intramedullary stabilization with IlluminOss system for metastatic osteolysis of the humerus. The average age was 69,9 years (62-77); six were affected by multiple myeloma, two by metastases of breast cancer and two by metastases of lung cancer. Lesions were located at the proximal metaphysis in 6 cases, at the central diaphysis in 3 cases and at the distal diaphyseal third in one case.

Results: all surgeries were performed without problems and complications; a screw was used to lock the nail in metaphyseal lesions. Nine out ten patients completed adjuvant radiotherapy with a good consolidation/ossification with an easy identification of the target by the radiotherapists; in the last performed case radiotherapy is still ongoing.

Discussion: intramedullary stabilization is the mainstay treatment in metastatic patient for impending or already occurred fractures. Several nails are commercially available but the most of them gives artifacts at CT scan interfering with adjuvant chemotherapy. The presenting system is characterized by a low artifacts level allowing a safer postoperative treatment. Moreover it is inserted in a fluid status so that the access is minimally invasive and less obliged than that of traditional nails; it better adapts to the intramedullary shape of the bone even it those case were a deformity is present.

Conclusion: the IlluminOss intramedullary stabilization system could be considered a good method for treating osteolysis of the humerus. More studies with more numerous series are necessary to verify the effective advantages for the patients and possible problems in case of removal.

108: 3D printed prostheses for the reconstruction of osseous defects following resection of primary malignant bone tumors of the long bones in the upper limb - presentation of two cases

by Thomas Ackmann | George Gosheger | Dimostheneous Andreou

Abstract ID: 108

Objective

Wide tumor resection is the standard local therapy for patients with primary malignant bone tumors. In rare cases, resection of the entire affected bone may be required. 3D printed endoprostheses represent a new and innovative reconstruction alternative. Until now, this procedure has only been described for clavicular and scapular constructions.

Study design

Case report

Methods

In a five-year old girl with a highly malignant osteoblastic osteosarcoma of the humerus and a 53-year old man with a dedifferentiated leiomyosarcoma of the radius, complete resection of the affected bone was required due to the tumor's expansion. In planning the 3D printed prosthesis, a low-dose CT scan of the corresponding contralateral bone was carried out initially. The virtual 3D bone image was digitally mirrored, and the prosthesis produced by additive manufacturing.

In both patients there was no sign of distant metastases during staging. Following the neoadjuvant chemotherapy, resection of the entire affected humerus including the axillary nerve took place in the first case and the entire affected radius including parts of the radial nerve in the second case. The defect was then reconstructed with 3D printed prostheses.

Results

About a year after surgery, both patients are doing well and living pain-free normal lives. Despite a postoperative drop hand that affected the 53-year old man, he is able to carry out everyday activities. The now six-year old girl is also able to engage in normal activities with her left arm such as eating. Both patients are tumor-free to date.

Conclusion

Both these cases show that reconstruction of osseous defects in the upper limb with 3D printed prostheses constitutes an innovative option and involves a good functional result in the short-term follow-up.

110: What are the short term costs associated with endoprosthetic reconstruction versus surgical fixation of bone metastases from renal cell carcinoma?

By Mohammed Karim, MD | Kevin A. Raskin, MD | Joseph H. Schwab, MD, MS | Santiago A. Lozano-Calderón, MD, PhD

Abstract ID: 110

Objective: The purpose of this study is to determine the short-term costs to the hospital and payer charges associated with endoprosthetic reconstruction versus surgical fixation for bone metastases from renal cell carcinoma.

Study Design/Methods: An orthopaedic oncology database of two affiliated tertiary care centers was queried for adult patients with appendicular bone metastases from renal cell carcinoma from 2006 to 2015. Data on costs incurred by the hospital, charges submitted, and payments received were requested from the hospitals' billing departments for each patient over a 90 day period beginning from the date of surgery. Demographic data, location of the bone metastasis, and the surgical technique were recorded.

Results: 51 patients with 57 surgical episodes were identified; 6 patients had 2 surgical procedures separated by more than 90 days. Endoprosthetic reconstruction was performed in 29 cases (51%) while surgical fixation was undertaken in 28 (49%). Mean cost, charge, and payment for all patients who underwent surgical fixation procedures were \$36,822 (SD = \$20,918), \$119,909 (SD = \$64,141), and \$40,903 (SD = \$30,741), respectively. Mean cost, charge, and payment for all patients who underwent endoprosthetic reconstruction were \$65,620 (SD = \$37,255), \$218,763 (SD = \$114,286), and \$82,711 (SD = \$76,951), respectively. The difference in the mean values between surgical fixation and endoprosthetic were statistically significant.

Conclusions: In patients with bone metastases from renal cell carcinoma, surgical fixation is less expensive than endoprosthetic reconstruction in the first 90 days. For patients with widely metastatic disease and limited life expectancy, surgical fixation is clearly the more cost effective method for addressing pathologic/impending fractures. Patients with solitary or oligometastatic disease, however, are known to have improved survival with resection involving negative margins; thus the increased short term cost of resection and endoprosthetic reconstruction may be justified by better survival in this subgroup of patients.

114: Evaluation of the Olecranon-Ulnar (OU) Angle in Preoperative Planning of Distal Humeral Replacement

by Caleb M. Yeung, MD | Jonathan Lans, MD | Joseph B. Kuechle, MD, PhD | Zachary Wright, BS | Connie Y. Chang, MD | Santiago A. Lozano-Calderón, MD, PhD

Objective: The purpose of this study is to (1) evaluate the normal variation of the OU angle in the general population, (2) identify demographic predictors of the OU angle, and (3) identify the effect of the OU angle on the sizing of the ulnar stem component in the Solar Elbow System (SES) and the Modular Universal Tumor and Revision System (MUTARS) templating.

Study Design/Methods: 514 radiographs of the elbow were retrospectively evaluated. Multivariate regression was used to determine the effects of demographic data (age, gender, race, height, weight, and BMI) on the OU angle. MUTARS an SES templating was performed using lateral elbow radiographs to determine the relationship between OU angle and ulnar stem sizing.

Results: Median OU angle overall was 4.7° (Q1 =2.8°, Q3 = 6.5°). Regression analysis showed no substantial explanation of the variance in OU angle by collected demographic data (adjusted R2 = 0.02, F(6, 508) = 2.704, p=0.01). The MUTARS implant fit in 97% of elbows with OU angle <5° and in 91.6% of elbows with OU angle ≥5° (p=0.26). The largest SES combination fit 100% of elbows with OU angle ≤10° versus 93% of elbows with OU angle >10° (p=0.029). Elbows accommodating the largest SES combination had a smaller median OU angle (5.4° vs. 11.7°, p=0.034). Elbows in which the MUTARS implant fit had a smaller median OU angle (5.4° vs. 5.8°, p=0.34).

Conclusions: The OU angle is an important preoperative planning tool for distal humeral replacement. In patients with OU angle ≥5°, alternatives to the MUTARS should be made available as the curved ulnar stem may not fit. The utility of the SES implant, while more easily accommodated, may also be limited due to the small size of the ulnar component, resulting in an overly high stem to intramedullary space ratio.

115: What is the fate of the hip in multiple exostosis patients?

by Osman Emre Aycan | Buğra Alpan | Abdi Keskin | Alper İncesoy

Multiple exostoses (ME) is a progressive disease of the skeletally immature bone characterized by metaphyseal flaring, multiple osteocartilagenous extensions and deformity. Periacetabular lesions may lead to deformities and dysfunctions regarding the involved region. This study aims to determine the radiological features of the hip in various age groups of ME patients, evaluate their functional manifestations and define the anticipated deformity.

The clinical and radiological data of 78 patients with the diagnosis of ME between years 1995 and 2015 in our clinic are retrospectively evaluated. The mean age was 20.5(range 6-51), median follow-up was 120 months(range 3-528). On physical examination, both hip range of

motion (ROM) are noted. Osteochondroma are evaluated by anteroposterior (AP)/lateral hip radiographs. Femoral-neck/shaft angle, acetabular depth on hip AP radiographs, alfa angle on axial proximal femur radiographs are measured. The diameter of femoral head on hip AP radiographs and the largest diameter of the femoral neck along the longitudinal axis of the neck are measured to evaluate the flaring. Limb length discrepancies (LLD) on orthoroentgenograms are evaluated.

The mean periacetabular and proximal femoral osteochondroma number was 2 (median, 1; 0-8). The mean femoral-neck/shaft angle was $145.8^{\circ} \pm 8.4^{\circ}$ and consistent with coxa valga. ($p < 0.01$) The mean alfa angle was $^{\circ} \pm 6150.3.2^{\circ}$, demonstrated impingement. ($p < 0.01$) The mean femoral head/neck ratio was 0.99 ± 0.23 , the flaring of the neck was significant. ($p < 0.01$) The mean flexion of the hip was $119.7^{\circ} \pm 15.9^{\circ}$, extension was $27.4^{\circ} \pm 7.6^{\circ}$, abduction-adduction range was $35.6^{\circ} \pm 9.7^{\circ}$, internal rotation was $30.2^{\circ} \pm 10.5^{\circ}$ and external rotation was $30^{\circ}.7 \pm 11.3^{\circ}$. The mean LLD was 12.3 mm (median, 8; 0-69). Femoral-head/neck ratio was found significantly correlated with hip ROM. ($p < 0.001$)

More than half of the patients experienced problems in sitting on the floor which limit their daily activities socioculturally. Most of the patients developed coxa valga as the final deformity. Femoral-head/neck ratio may be a helpful parameter in ME patients for predicting limited hip ROM and coxa valga development.

116: Surgical treatment of primary solitary fibrous tumors involving the pelvic ring: how aggressive should we be?

by Yifei Wang

Abstract ID: 116

Background and objective: The surgical treatment of primary solitary fibrous tumors involving the pelvic ring has not been reported previously. In this study, we aimed to evaluate the efficacy of surgical treatment of this disease. Study Design: Retrospective cohort study. Method: From 2009 to 2015, 13 patients underwent tumor resection at our hospital; with an average age of 49.5 years (27-68 years). Results: Four patients underwent en bloc resection, and 9 patients underwent piecemeal resections; One patient died 32 months after surgery, Among the patients who received gross total resection, 2 patients (2/12, 16.7%) experienced recurrence at the 16th and 26th postoperative months. One patient th who received subtotal resection experienced recurrence at the 48 month (the overall recurrence rate was 23.1%), and 3 patients exhibited metastasis at the 27th, 48th, and 72nd postoperative months. A Chi-square test was used to compare the postoperative recurrence rates between the en bloc resection and the piecemeal resection groups $p(= 0.68)$, and no significant difference was found between the benign and malignant solitary fibrous tumor groups ($p = 0.44$). The 5-year survival rate of the patients in this study was 83.3%, and the 5- year progression-free survival rate was 63.5%. The progression-free survival rate was not significantly different between the en bloc resection and piecemeal resection groups ($p = 0.97$). The tumor of the patient who received neoadjuvant apatinib therapy was significantly liquefied and necrotic, and the

patient's symptoms were relieved. The intraoperative bleeding volume of this patient was 600 ml, which was significantly less than the average bleeding volume. Conclusion: Piecemeal resection can also achieve acceptable local control, particularly for patients with sacral tumors, as they may achieve even better postoperative function with sacral nerve preservation. Among the patients in this study, the patient who received apatinib preoperatively had a tumor that was significantly liquefied and necrotic, indicating that this treatment may be an effective neoadjuvant therapy. Recurrence and metastasis occur relatively late in the course of this disease; long-term follow up is necessary.

117: Limb Salvage using Liquid Nitrogen Treated Tumour Bearing Autograft

by SUDHIR GARG | JAGANDEEP VIRK | GMCH SECTOR 32 CHANDIGARH

Abstract ID: 117

Introduction

Various methods have evolved to offer limb salvage surgery to patients with musculoskeletal sarcomas. It can be achieved by using artificial endoprotheses or biological reconstruction modalities like allografts or recycled autografts. In carefully selected tumour patients recycling of autograft can be done with methods like irradiation, autoclaving, pasteurization or cryotherapy using liquid nitrogen. Role of Liquid nitrogen as a method of sterilization for tumour bearing autograft as an effective and reliable modality needs to be highlighted.

Methods

From 2010 to 2016, 10 patients of primary musculoskeletal sarcoma underwent limb salvage surgery (LSS) by wide resection of the tumour and reconstruction. The resected bone was dipped in liquid nitrogen for more than 25 minutes, thawed at room temperature for 15 minutes, followed finally by dipping in vancomycin mixed saline for 10 minutes. The recycled excised bone was re-implanted into its original site by internal fixation.

Results

Union was achieved at 15 out of the 16 osteotomy sites in all 10 patients with a mean union time of 5.2 months (range 4 to 7months). Good functional outcome was reported. No local recurrence was reported and no requirement for augmentation with allograft/ fibula was required. No complication like fracture of the autograft, implant failure or deep/superficial infection was reported in any of our cases. The mean follow-up period was 28.6 months (range 12 to 78 months).

Conclusion

Recycled tumour bearing autograft is an anatomical, cost-effective, relatively simpler and reliable technique for reconstruction of bone loss after resection in primary musculoskeletal sarcoma patients.

119: Multiple soft tissue sarcomas in a single patient: An international multicentre case series and literature review

by Johnathan R Lex | Ahmed Aoude | Jonathan Stevenson | Jay Wunder | Scott Evans | Peter Ferguson | Nikolaos Stavropoulos | Lee Jeys | Krista Goulding | Robert E Turcotte

Abstract ID: 119

Objective

Developing multiple soft tissue sarcomas (STS) is a rare process, sparsely reported in the literature to date. Little is known about the pattern of disease development or outcomes in these patients. We sought to answer these questions by identifying all cases in our centres and in the literature.

Study Design

Patients were identified from three tertiary orthopaedic oncology centres, in Canada and the UK. Patients who developed multiple extremity STS were collated retrospectively from prospective oncology databases. A literature review using Medline was also performed. Six patients were identified in the case series from these three institutions and five studies were identified from the literature review.

Results

Overall, 17 patients were identified with a median age of 51 years (range: 19 to 77). The prevalence of this manifestation in STS patients is 1 in 1225. The median disease-free interval between diagnoses was 2.3 years (range: 0 to 19 years). Most patients developed the secondary STS in a metachronous pattern, the remainder, synchronously. The median survival after the first sarcoma was 6 years and 1.6 years after the second. The 5-year overall survival rate was 83.3% and 50% following the first and second STS diagnosis, respectively.

Conclusions

Patients with two STS have a worse prognosis than the typical reported survival for STS. Developing a second STS is a rare event with no identifiable histological pattern of occurrence. Presentation in a metachronous pattern is more common. A high degree of vigilance is required in patients with a previous STS, to detect both local recurrence and to identify new masses remote from the previous STS site. Acquiring an early histological diagnosis should be attempted.

Through raising awareness of this manifestation at a larger scale (via EMSOS) we hope there is greater recognition and documentation about it by surgeons in the future.

120: Preservation of the nerve completely involved in sarcoma by "In situ preparation"

by Seiichi Matsumoto | Keisuke Ae | Taisuke Tanizawa | Keiko Hayakawa | Yuki Funauchi

Objective:

The standard treatment for complete peripheral nerve involvement by sarcoma has been to sacrifice the nerve. However, because the epineurium acts as a barrier to sarcoma extension, nerve fibers may escape from the invasion of sarcoma in some cases. If transplantation of sarcoma cells to healthy surgical beds can be prevented, sparing procedures of the involved nerve can be safely performed. We applied an “in situ preparation” (ISP) method, which was developed in 2002 to spare nerves that are completely surrounded by sarcoma.

Patients and Methods:

From January 2007 to June 2014, 651 cases with soft tissue sarcoma were operated at our hospital. Among them, four cases showing complete nerve involvement by sarcoma with no neurological symptoms underwent nerve-sparing surgery to preserve the affected nerve. Histological types were UPS in three cases and rhabdomyosarcoma in one patient. Evaluated nerves were median, sciatic, radial, and peroneal nerve.

Methods:

With ISP, the tumor is resected with a wide margin while preserving the continuity of the nerve. The mass including the nerve and tumor is isolated from a sterile surgical bed with vinyl sheeting. The aforementioned mass is subsequently excised longitudinally, and the nerve is separated from the tumor in an isolated space. If the neural surface looks normal, the nerve can be preserved after soaking in alcohol.

Results:

There were no local recurrences or nerve disorders after operation. One case with UPS died of another cause 34 months postoperatively. As for the other three case, the follow-up periods were as follows: 43 months, 46 months, and 130 months. Prognoses are CDF in two cases and DFS in one case.

Conclusion:

ISP is a useful method for nerve preservation in cases with complete nerve involvement by sarcoma.

121: Acute calcific tendonitis at the pectoralis major attachment - a benign cause of red flag signs

by christian gray stephens

Introduction

Acute calcific tendonitis at the pectoralis major insertion is rarely reported in the radiology literature, but not in the Orthopaedic literature. We present a case that illustrates the typical findings with discussion from a shoulder surgeon, and a senior radiologist.

Case Study

A 60-year-old woman was woken at night with sudden onset left shoulder and arm pain. She was otherwise systemically well. Her shoulder range of motion was globally restricted. Past medical history included previous spinal surgery and a hepatitis A infection within the last year.

Investigations

Plain radiographs (figure 1) of the shoulder and humerus were unremarkable save for a small anterior proximal humeral protuberance at the junction of proximal third and distal two-thirds of the humeral shaft. Blood tests were unremarkable.

CT and MRI imaging showed a calcific tendon with associated cortical defect, and surrounding inflammation. (Figure 2, 3).

Because of the sinister red flag symptoms (night pain) and suggestion of cortical erosion with periosteal reaction, the differential diagnosis list included sarcoma. For this reason, it was referred to the local sarcoma service.

MDT review

This was reviewed by a senior radiologist. The diagnosis of calcific tendonitis of pectoralis major calcific tendonitis was made. The decision was made by the Sarcoma MDT to not biopsy the lesion but instead review clinically with interval scan and safety netting.

Follow up

On 6 weekly follow up the patient's symptoms had improved. Because of the knowledge regarding this potential diagnosis, unnecessary invasive diagnostic procedures (CT biopsy) or surgeries were avoided.

Conclusion

Both Orthopaedic surgeons within sarcoma services and wider members of the multidisciplinary team should be aware of this diagnosis. This would help to prevent over investigation of benign self-limiting pathologies.

123: GTC Of The Patella. Case Report.

by Ilkin Mikailov

Abstract ID: 123

Background

The most common tumor lesion of the patella is GCT. The frequency of cases reaches 40% of all tumors of this localization. Most often, the disease occurs in young people from 20 to 40 years.

Case Presentation

We observed 8 cases of tumor patellar lesion in our department from 2010 to 2017, in 2 of which GCT was diagnosed.

All of patients had nonspecific pain in the knee during flexion. The results of CT and MRI indicated the presence of an intraosseous lytic lesion with thinning of the cortical layer. In both cases, a pathological fracture was diagnosed. A preliminary biopsy was performed and histopathological diagnosis was performed, which confirmed the diagnosis of GCT. Both patients underwent curettage of the tumor, plastic defect with bone cement and screws, followed by treatment with denosumab according to the standard scheme for 3 months.

Outcomes

In the first case, the observation was 44 months with no signs of local recurrence and MSTS score was 83%. In 2016, the patient was injured as a result of which total destruction of the patella occurred. Revision surgery was performed: total replacement of the patella with an allogeneic graft. MSTS score 3 months after revision surgery 76%.

In the second case, the follow-up period was 8 months, with no signs of local progression, MSTS 86%.

Both patients at the time of the last observation are engaged in moderate-intensity sports: swimming, cycling, fitness, tourism.

Discussion

The use of cement plastics in combination with denosumab can be used as the first stage of treatment in patients with GCT of patella.

This method shows a satisfactory functional result and provides sufficient local control. If the outcome is unsatisfactory, it is always possible to use radical removal of the patella with the replacement of allograft as a second step.

125: T.B. masquerading as tumour. A 7 year study on 30 cases of long bone tuberculosis presenting as tumors

by Dr Manish Agarwal

Abstract ID: 125

Objective: To formulate protocols for diagnosis of long bone tuberculosis masquerading as tumors, and to understand certain characteristic features on imaging and patient work up to prevent errors in diagnosis.

Study design: Retrospective analytical.

Methods: Tuberculosis affects on an average 2.79 million people in India annually, of this only 10 to 15 % affect the osteoarticular regions of the body .Majority of these infections affect the spine and smaller bones of the body and have characteristic radiological findings. However they pose a great clinical and radiological dilemma when they affect the long bones of the body, a relatively uncommon site of presentation and may present(or be reported) as a locally aggressive or even malignant lesions. In our study we also identified and diagnosed patients with sarcomas with suspected metastatic disease from the primary to the lungs which of further evaluation was pulmonary tuberculosis with demonstration of acid fast bacilli. Our institute analysed the age, sex, region of stay (to determine endemicity), history, clinical signs and symptoms at presentation region of affection, radio-logical imaging and reports along with the blood workup, histopathological reports tissue and blood cultures.

Most importantly we matched the radiological findings of these patients with the tumors they were reported on X-ray, MRI and CT scan with a team comprising of orthopaedic oncologists, radiologists, clinical pathologists, microbiologists, nuclear medicine specialists, infectious disease specialists and chest physicians to determine what led to the diagnosis of a tumor rather than a infectious disease.

Results

:9 out of 30 had a positive culture for T.B. bacilli.

21 patients were positive on MGIT

2 patients needed a repeat biopsy on account of poor slide quality and insufficient material

28 patients showed epitheloid granulomas on histopathology.

4 patients required a surgical intervention.

Conclusions and relevance for EMSOS: In india with tuberculosis being rampant it forms an important differential diagnosis in any aggressive looking lesion on imaging of the appendicular skeleton. It is often missed as most patients with osteoarticular disease have no cardinal features of tuberculosis like weight loss, fever or cough.In the absence of acid fast bacilli in the sputum and biopsy (considered as the gold standard for diagnosis of osteoarticular tuberculosis)Imaging, correct biopsy techniques,microbiological studies have a decisive role in diagnosis.In Europe the incidence of osteoarticular tuberculosis is far less compared to India and may pose a diagnostic challenge. Hence a systematic approach aims to reduce these challenges in management and diagnosis in regions where the disease is less common.

126: Radiation induced post surgical wound complications an unbelievable challenge and effectiveness of vacuum assisted closure (V.A.C)

by Dr Vikas Agashe | Dr Manish Agarwal

Abstract ID: 126

Objective: To assess the challenges faced during management of Local infection after Radiation therapy.

Study design : Retrospective analytical

Materials & methods: We retrospectively reviewed the records of 5 patients who presented to us with infected wounds after high-dose-rate radiation therapy as treatment for soft tissue tumours in a span of 4 years

These patients were operated previously for excision of tumour mass, after which they received radiation therapy and developed surgical site infection. We reviewed their serial cultures, antibiotic sensitivity, wound sizes as well as secondary procedures like skin grafts and flaps that were additionally required in these patients.

Results: A total of 5 patients were included in the study, all males aged between 16 to 54. On an average the patients required 4.5 VAC applications.

The mean time for wound healing was about 5.4 months.

2 patients required additional wound coverage in the form of skin flaps

1 patient had a re infection of the wound and had a flap failure. 4 out of the 5 patients had a polymicrobial infection on culture. 3 had antibiotic resistance and sensitivity only to colistin . All the patients developed infections post radiation therapy that were resistant to the standard modes of treatment.

Conclusions: It was concluded that post radiation therapy induced infected wounds required multiple debridement and additional wound coverage, they posed great challenges in terms of infection control , wound coverage as well as required multiple interventional procedures in addition to Vacuum assisted closure (VAC)therapy . However encouraging results have been achieved by using VAC in patients with post radiation therapy induced wounds in terms of closure and control of infection.

127: O-arm guided arthroscopic excision of recurred Chondromyxoid fibroma of distal femur

by Sang Soo Eun | Sang-Ho Lee

Abstract ID: 127

Objective

Management of chondromyxoid fibroma is mainly limited to conventional open curettage. We are reporting a case of recurred chondromyxoid fibroma of distal femur in a 19 year male, treated by arthroscopic excision under O-arm guidance. O-arm can pin point the exact intra-operative location of the lesion and arthroscope offers minimal invasiveness.

Study design
Technical case report

Methods

After direct visualization of the lesion by arthroscope and further confirming it on O-arm, we used curette and grasper to remove the tumor. At the end of the procedure, O-arm was used to make sure that lesion has been completely removed

Results

Surgery was successful and the patient recovered quickly without any complications. There was no sign of recurrence or symptom after 3 year follow up.

Conclusions

Arthroscopic minimal invasive surgery can be used in selected cases of benign neoplasm with confirmed tissue diagnosis. It offers direct visualization and complete removal of tumor with all the advantages of minimal access surgery. Modern imaging technique like O-arm further increases the therapeutic efficacy.

128: Incidence of surgical interventions for metastatic bone disease in the extremities: A population based cohort study

by Michala Skovlund Sørensen | Klaus Hindsø | Peter Frederik Horstman | Anders Troelsen | Stig Dalsgaard | Tobias Fog | Tomasz Zimnicki | Michael Mørk Petersen

Abstract ID: 128

Objective: To identify 1) incidence, demographics and survival of a population based cohort of patients having surgery for metastatic bone disease in the extremities (MBDex); 2) the rate of referrals/referral pattern to a musculoskeletal tumour centre (MTC) and 3) if treatment centre influence survival probabilities.

Study design/Methods: A prospective study of a consecutive population based cohort of patients having surgery for MBDex from 2014 to 2016 in a cross section of the population. Patient demographics, indication for surgery, oncological status, and postoperative survival was obtained from patient interviews, surveillance scans and patient records.

Results: We identified 164 patients treated for 175 bone lesions in 168 procedures (figure 1 and 2), resulting in an incidence of MBDex surgery of 48.6 lesions/million inhabitants/year. The most common primary cancers were breast, lung, renal, prostate and myeloma. Patients referred for treatment at MTC (59% of all patients) had better prognostic preoperative

parameters for survival compared to patient treated at a local secondary specialised centre (SSC). Twenty-nine lesions represented the debut of cancer and 22 lesions the debut of relapse. Patient referred for treatment at MTC had better prognostic baseline characteristic than patients treated at SSC (lower ASA score ($p<0.001$), less patients with visceral metastasis ($p<0.001$), lower age ($p>0.001$) and better prognostic group of primary cancer ($p<0.001$). Overall one-year postoperative survival was 41% (95% C.I.: 33%-48%). One-year overall survival was higher for MTC patients compared to SSC patients ($p=0.006$). Multivariate regression analysis of risk factors for overall survival showed that patient treated at SSC had an HR 1.43 (95% C.I.: 0.97-2.11).

Conclusion: Present study is, to our knowledge, the first to describe a prospective population based cohort of patient having surgery for MBDex. We find increased survival in patients treated at a MTC and prove selection bias of referral although improved survival due to treatment centre cannot be excluded.

129: Infection in endoprosthetic reconstruction for oncological limb salvage - an integrated approach

by Francisco Xara Leite | Ana Ribau | Arnaldo Sousa | Vânia Oliveira | Ricardo Sousa | Pedro Cardoso

Abstract ID: 129

OBJECTIVE: To evaluate infectious complications and risk factors of endoprosthetic reconstruction after tumour resection.

STUDY DESIGN: Retrospective study of data related to patients and endoprostheses performed in our department, complications and adjuvant treatments, with minimum follow-up (FU) of 12 months.

METHODS: From 24 treated patients (mean age 38, 19-82, mean FU 51 months), 32 endoprostheses were performed, 8 as secondary implant. Fifteen were silver-coated. We involve a multidisciplinary infection-dedicated team in the management of our patients, and differentiate acute infection – early surgical aggressive debridement and mobile components substitution – from chronic infection – two-stage revision surgery.

RESULTS: Most common complication was infection (29.1%). In 46% of the patients, a successful result was achieved after primary surgical procedure, but most required 2+ surgeries, which related to a higher tendency to infection (37.5% vs 25%, $p>0.05$). The latter presented also a poorer functional outcome ($p<0.05$). Amputation was the final solution for 2 chronic infection failures. Nevertheless, a majority of patients (15) presented good function at last visit, with successful treatments among them of acute (2) and chronic (1) infection.

After Henderson type2 (aseptic loosening, 3) or type5 (disease progression, 1) revision surgeries, 50% eventually infected. Only 1 (33%) was successfully treated with two-stage revision after a Henderson type4 failure (infection). However, at last visit there was no remaining chronic infection.

All patients had prophylactic cephalosporins extended to 72h. Among our intraoperative microbiological isolates, 53% were Gram positive, but no MRSA. From 3 multi-positive cultures, 2 had multi-resistance.

We found no relation between chemotherapy and infection. Also, this limited sample was not able to show silver-coated implants superiority.

CONCLUSION: Our results show a high rate of infection in these patients, especially when subject to more than 1 procedure, regardless of its nature. Revision surgery results in poor function. Also, we highlight the potential benefits of dedicated infection management protocols.

131: Osteolytic metastases of thyroid cancer: treatment of a late complication

by Joerg Friesenbichler | Paul Ruckstuhl | Werner Maurer-Ertl | Marko Bergovec | Maria Smolle | Andreas Leithner

Abstract ID: 131

Objective:

Several study groups tried to create treatment algorithms for metastatic disease depending on the risk for pathologic fracture and the expected survival. Local treatment consists of radiation therapy and/or surgery but the decision has to be made individually.

Thyroid cancer (TC) is known to have a 5-year survival rate of nearly 90% depending on type and stage of disease.

Methods:

Between 2006 and 2016, 11 patients were treated for metastatic bone disease of TC. The mean age at time of surgery was 65 years (range, 31-81, STD $\pm 13,8$), whereas, the mean age at time of first diagnosis was 53 years (range, 15-75, STD $\pm 20,1$).

There were three pathological fractures and eight patients had pain due to impending fracture. All patients, except of two with solitary metastasis, had further metastases at the lung, bone and lymph nodes at time of presentation.

Results:

Five patients died of disease, three were lost to follow-up and three patients are alive with disease. The mean postoperative follow-up was 30 months (range, 3-74).

Two patients had a solitary metastasis and were treated with wide resections to cure the disease. One patient underwent an open biopsy of an osteolysis at the rib with postoperative local radiation therapy and further systemic treatment.

All other patients were treated with intramedullary nails (n=3), compound osteosynthesis with a nail or a plate and bone cement (n=2) or endoprotheses (n=3). Seven patients had a radiation therapy, postoperatively.

Conclusions:

In the current series, time between first diagnosis of TC and the appearance of bone metastases was about 12 years, therefore, it can be stated that osteolytic metastases are a late complication. The surgical treatment included all types of stabilization techniques and endoprosthetic reconstructions but each decision had to be made individually. Osteolytic lesions with unknown origin always have to be biopsied.

132: The Use of Denosumab in Giant Cell Tumors of the Spine - About a Case

by Pedro Manuel Serrano | Ana Ribau | Tiago Barbosa | Andre Carvalho | Marta Santos Silva | Vania Oliveira | Pedro Cardoso

Abstract ID: 132

INTRODUCTION

Giant Cell Tumors (GCT) are typically benign, but often aggressive, bone tumors. They comprise 5% of bone neoplasms, and, in the Spine (SGCT), are distinctly rare above the sacrum, with a reported incidence in the mobile spine of 1.4%-9%.

En bloc vertebrectomy to remove SGCT associates with low recurrence rates, but significant higher morbidity, when compared to intra-lesional resections (IR) such as curettage. Hence, adjuvant treatments which reduce recurrence still allowing the advantages of IR are needed. Denosumab has been approved to treat unresectable GCTs or when surgery is likely to result in severe morbidity. Although it has been described to cause sustained complete regression of the tumor, it has usually a neo-adjuvant function, and in post-surgery control of the disease.

OBJECTIVE

To review the available literature on the recommended uses of denosumab in SGCT and to describe the case of a SGCT successfully treated with denosumab plus surgery.

METHODS

A 17 year-old girl presented with a 4-month persistent left paravertebral dorsal pain. X-ray was normal, but a MRI identified an osteolytic mass at T9, involving the left posterior part of the vertebral body, pedicle and transverse and inferior articular processes, extending marginally to the superior articular process of T10. A CT-guided biopsy diagnosed a SGCT.

After multi-disciplinary meeting, denosumab was prescribed (120mg, 28/28 days) for 9 months with great clinical and analytical tolerance and resolution of pain shortly after institution. A control CT-scan revealed a reduction in size and a sclerotic halo and periosteal reaction. Posterior left T9 costo-transversectomy, pedicle resection and vertebral body curettage of the lesion was performed and the spine was stabilized with T8-T10 pedicle screws.

RESULTS

Interestingly, histopathology examination found no evidence of remaining GCT-cells in the specimens sent, confirmed in slide review.

There were no post-operative complications. After surgery, denosumab was re-instated until completion of 12 months of treatment.

CONCLUSIONS

SGCT have a very high rate of unresectability, rendering adjuvant therapies paramount to their approach. However, given their rarity, little evidence is available. A systematic review by Charest-Morin⁶ supports the use of Denosumab in SGCT progression control, with response rates surpassing 90%, but deems the evidence available still of very low quality. This highlights the importance of case descriptions such as this, providing clinicians with higher insight into potential treatment options.

Worth noting, recurrence after denosumab plus surgery has been reported at 15% reminding the importance of close follow-up, especially in the first 3 years after surgery.

133: Reconstruction with Modulus stem after proximal femoral tumor resection

by Yoko Hagiwara | Yutaro Munakata | Ken Okazaki | Shintaro Iwata

Abstract ID: 133

Reconstruction of massive bone defects after wide resection of bone tumors occurring in the proximal femur has been performed using tumor megaprosthesis. However, the megaprosthesis does not allow precise adjustment of the size of femoral head, neck length, or neck shaft angle, unlike conventional total hip arthroplasty (THA). We present a case of the Modulus stem used for reconstruction after resection of a proximal femur tumor.

Eight patients who underwent resection of the proximal femoral tumor were assessed: five patients with bone metastases from carcinomas (liver, kidney, lung, and colorectal) and two with myeloma. Another patient underwent second-look revision of tumor megaprosthesis due to an infection implanted six years ago after wide resection of leiomyosarcoma arising beneath the femoral head. All patients underwent reconstruction surgery using the Modulus stem. All patients obtained walking ability with fully weight bearing within one week after surgery, and no complications, such as dislocation or hip pain, were seen within a median follow-up of 12 months.

The Modulus stem is generally used for a revision surgery after THA involving massive bone defects. Broad size variation of the stem and femoral head of this system enables more appropriate selection of the femoral head and neck with precise adjustment during the reconstruction procedure. In addition, favorable early fixation is possible due to its design. Although only short-term follow-up was conducted, we believe that use of the Modulus stem would be an alternative approach to reconstruction after resection of proximal femur tumor, especially in metastatic disease.

134: Is the linea aspera an adequate landmark for rotational alignment of the distal femur during megaprosthesis surgery?

by Arne De Smet | Dries Verrewaere | Gwen Sys

Abstract ID: 134

Introduction: Optimal positioning of reconstruction prostheses is essential to achieve a good function of the implant, but can be challenging. After a wide resection of the distal or proximal femur, the linea aspera is the only remaining anatomical landmark for rotational alignment, but its reliability remains to be investigated. In this study, the position of the linea aspera relative to the anterior side of the femur at the level of the osteotomy was assessed. Furthermore, we studied the angulation error if the osteotomy was performed one centimeter above or below the targeted level using 3D models.

Material and methods: In order to define the linea aspera, 3D models (Mimics, Materialise NV, Leuven, Belgium) were generated using CT-scans of seventeen cadaveric femurs. Virtual cuts were made every centimeter, starting 7 cm proximal to the notch of the femur until 4 cm distal to the tuberculum minor. To define the anterior-posterior (AP) axis of the knee, a perpendicular line to the posterior condylar line (PCL) was drawn through the center of the best-fitting circle around the diaphysis. The orientation of the linea aspera (lateral and medial labium) was described as the angle between the labium and a parallel line to the PCL through the center of the circle (fig. 1).

Results: There is a significant correlation between the angles defined on CT and the angles defined on the 3D model. For the 17 femurs studied, the orientation of the linea aspera relative to the anterior side of the femur was significantly different, and was highly dependent on the level of the cut (fig. 2). The regression line, medial and lateral, have both a parabolic curve with a bending point located around the midshaft of the femur. At this point, the lateral labium approaches 90° (true posterior) the closest. Only 39 (8.2%) of the 473 measured lateral labium angles were truly posterior. At the midshaft (mid 1/3), the angulation error between 3 consecutive cuts had the least variation for the individual femur.

Conclusion: Surgeons cannot blindly rely on the linea aspera for rotational alignment. Before performing a distal or proximal femoral reconstruction, the surgeon should be aware of the orientation of the linea aspera. 3D reconstruction can be used in order to prepare surgery. Future research will address the possibility to design 3D guides to obtain an optimal rotational placement of the megaprosthesis.

136: Quality of life changes after surgery for spine metastatic disease: a systematic review and meta-analysis.

by *Nuno Rui*

Abstract ID: 136

Objective: To quantify quality of life (QoL) changes after surgery for spine metastatic disease, and how surgery affects physical, social/family, emotional, and functional well-being.

Study design: Systematic review and meta-analysis.

Methods: We performed a literature search including studies measuring QoL before and after surgery for spine metastatic disease, applied strict exclusion criteria, and critically appraised the quality of included studies. With a random-effect model we assessed standardized mean differences (SMD) of summary QoL scores between baseline and 1, 3, 6, or 9-12 months after surgery.

Results: We screened 456 titles/abstracts, 52 full text studies, critically appraised 14 studies, and included 8 studies for data extraction. Seven studies mentioning the EuroQol 5 Dimensions (EQ5D) and Functional Assessment of Cancer Therapy – General (FACT-G) questionnaires were included for QoL meta-analysis. The pooled QoL summary score improved from baseline to 1 month (SMD 1.12, $p = 0.013$), to 3 months (SMD 1.21, $p < 0.001$), to 6 months (SMD 1.22, $p < 0.001$), and to 9-12 months (SMD 1.08, $p = 0.001$) (Figure 1, figure 2). Surgery improved physical well-being during 1 month (SMD 0.72, $p = 0.013$), did not affect social/family well-being, and improved emotional well-being (SMD 1.44, $p = 0.040$) and functional well-being (SMD 1.48, $p < 0.001$) during the first 3 months (Figure 3).

Conclusions: In the context of shared decision making, our results can inform patients on postoperative expectations, and help physicians to understand the postoperative course and use this for decision-making. Surgery can improve QoL for patients with spine metastatic disease, and may rapidly improve physical, emotional, and functional well-being; it may not affect social/family well-being.

137: Physical Function and Quality of Life after Resection of Mobile Spine Chondrosarcoma

by Nuno Rui Paulino Pereira

Abstract ID: 137

Objective: (1) To assess patient reported outcomes –physical function, pain, and quality of life—in patient who underwent resection of a mobile spine chondrosarcoma. (2) To assess 90-days complications, readmissions, reoperations, oncological outcomes, and neurologic status.

Study design: Retrospective cohort

Methods: Thirty-three patients with spinal conventional chondrosarcoma resection between 1984 and 2014 at one hospital were included. The primary outcome measures were – minimally 6 months after surgery—the EuroQol 5 Dimensions (EQ5D), PROMIS Physical Function, PROMIS Pain Intensity, and Oswestry (ODI) or Neck (NDI) Disability. Fourteen (70%) patients completed all questionnaires.

Results: After spine chondrosarcoma resection, patients reported worse physical function (median: 43, range: 22-61, $p=0.026$), worse quality of life (median EQ5D: 0.70, range: 0.04-1, $p=0.022$), and comparable pain intensity (median: 47, range: 31-56, $p=0.362$) when compared with US general population values. The median NDI/ODI was 25 (Range: 0-72) indicating mild to moderate disability. Patients undergoing reoperation had worse patient reported outcomes than those who did not. Eighteen (55%) patients suffered 90-days complications, fourteen (42%) had unplanned readmission, and thirteen (39%) underwent reoperation. Intralesional resection was associated with increased readmission, reoperation, and recurrence rate (Figure 1).

Conclusions: Patients reported worse physical function and quality of life compared to US population averages, whereas pain intensity was comparable after resection of spinal chondrosarcoma. Chondrosarcoma resections came at the cost of high complication and reoperation rates. Our findings can be used to inform future patients about expected outcomes.

139: Fatal peripheral T-cell lymphoma following intramuscular tuberculosis of the forearm

by Taweekok Wisanuyotin

Objective

To report the first case of peripheral T-cell lymphoma following intramuscular tuberculosis of the forearm.

Study design

Case report

Methods

A 43-year-old male presented with chronic swelling of the right forearm for 2 years. The right forearm revealed generalized swelling with superficial vein dilatation (Fig 1). Other examinations were normal. The blood chemistry tests were unremarkable. Plain radiographs of the right forearm showed only soft tissue swelling (Fig 2). MRI of the right forearm showed diffusely enlarged muscles, with intermediate and hyperintense signal intensity on T1 and T2-weighted image. The lesions had infiltrated along the intramuscular plan, involving the entire flexor group (Fig 3). An incisional biopsy was ordered (Fig 4). Microscopically, the lesion revealed chronic granulomatous inflammation, acid-fast bacilli was negative (Fig 5). Tissue cultured was confirmed *Mycobacterium tuberculosis*, so antituberculous drugs were administered for 12 months. At the end of treatment, the forearm was slightly decreased in size; but he developed progressive enlargement of cervical, axillary and groin lymph nodes. A biopsy of the cervical lymph nodes revealed chronic inflammation. Three weeks after the biopsy, the patient was admitted to the hospital because of dyspnea and fever. The septic workup showed para-pneumonic effusion, so empirical antibiotic therapy was administered; however, the clinical picture did not improve. The patient died three weeks later.

Results

The autopsy was performed. There were generalized lymphadenopathies of subclavian, para-aortic nodes. Microscopic examination revealed peripheral T-cell lymphoma infiltrating the right subclavian and para-aortic lymph nodes, lung parenchyma and right forearm muscles (Fig 6). Peripheral T cell lymphoma was diagnosed based on features of the immunohistochemical study.

Conclusions and relevance for EMSOS

This condition should be considered in any tuberculosis patient who had generalized lymphadenopathy. Health care professionals should know this fatal condition because of the tuberculosis patients are increasing nowadays.

141: Low Survival Rate in High Grade Osteosarcoma: A Retrospective Study at A Single Institution in Indonesia

by Andriandi

Aim: Osteosarcoma is a very rare malignant bone tumor, it is an aggressive bone neoplasm. Combination of surgical removal and systemic multidrug chemotherapy is the current strategy of treatment. The study aim to evaluate the prognostic factors influencing the survival rate in our center.

Methods: A retrospective cohort study of patients diagnosed as osteosarcoma between January 2012 and December 2014.

Results: A total of 58 osteosarcoma patients were included in this study, including 36 men (62%) and 22 women (38%), with a mean age at diagnosis of 15 years. The median survival of this group was 12 months. Patients with no pulmonary metastases after treatment had better survival rates of 18 and 90% at 2 years.

Conclusion: The overall survival of osteosarcoma patients in this study is low. Patients who do not comply with treatment had worse survival. Patients with pulmonary metastases have a significantly increased risk of death.

146: Non Hodgkin Lymphoma presented as periprosthetic fracture of the Femur

By Christian Spiegel | Wolfram Weschenfelder | Robert Lindner | Matthias Vogt

Abstract ID: 146

Introduction

In a collective of 30.000 patients the incidence of periprosthetic fractures of the femur is about 1% after primary total hip replacement. Common causes are mechanical failure, wear of several components (mainly polyethylene) and trauma. Rarely, periprosthetic fractures are caused by malignomas.

Case presentation

We present the case of a 68 year old female patient with a periprosthetic fracture of the left femur, Vancouver C, after minor trauma. The patient complained of pain of the left hip for half a year in advance. X-ray revealed an osteolytic lesion with periosteal reaction at the fracture site. CT staging revealed no other susceptible lesions. Blood analysis showed normal leucocyte count, normal platelet count and decreased red cell count. First differential blood count demonstrated decreased lymphocyte count and increased neutrophil granulocytes.

Open biopsy was performed and confirmed a B-cell Non-Hodgkin lymphoma. After interdisciplinary case evaluation, resection and reconstruction with proximal femoral replacement was conducted. Bone marrow biopsy of the left iliac crest showed no lymphoma infiltration. The patient was included in the OPTIMAL-study and induction therapy with 6xR-CHOP-14 and Rituximab was initiated three weeks postoperatively.

Currently the patient has completed the third session of her chemotherapeutic cycle. Re-Staging evaluation showed no evidence for malignant lesions.

Conclusion

Tumor development is a rare differential diagnosis for periprosthetic pain and fractures. Suspect anamnesis and radiological imaging should raise the awareness and lead to more detailed differential diagnostics. Vague cases need interdisciplinary discussion and histological validation should be obtained

147: Incidence and survival of bone and soft tissue sarcoma (STS) in England between 1996 and 2015: an analysis from the National Cancer Registration and Analysis Service (NCRAS)

by Sandra J Strauss | Andrew Bacon | John Broggio | Sarah McDonald | Kwok Wong

Abstract ID: 147

Background: Sarcomas are rare tumours representing 1% of cancers. Accurate, contemporary national data is valuable to patients, clinicians, service providers, patient advocacy groups, charities and researchers. In England, the National Cancer Registration and Analysis Service (NCRAS) collects data on all patients diagnosed with cancer but analysis is demanding due to small numbers, complex pathways and the heterogeneous nature of disease.

Methods: NCRAS data was analysed to determine incidence and survival of patients with sarcomas in England between 1996 and 2015. Incidence was reported per 100,000 person-years. Kaplan- Meier 5-year overall survival was reported according sarcoma subtypes and changes across 5 –year aggregated cohorts. The log rank test was used to compare the survival trend between periods.

Results: Between 1996 and 2015, an average of 514 (range: 442-577) and 3107 (range 2488-3766) patients were diagnosed per year with bone and soft tissue sarcoma (STS) respectively. Between 1996-2001 and 2011-2015, five–year survival improved for bone sarcomas from 46.0% to 63.0% ($p<0.0001$) and STS from 46.5% to 55.5% ($p<0.05$). An improvement in survival was observed for all patients with osteosarcoma between 2001-2005 and 2011-2015 from 36.2% to 49.5% and for those under 40 years from 52% to 65.1% ($p<0.01$). Angiosarcoma had the poorest five-year survival at 29.1% for 2011-2015 with no improvement since 1996 ($p=0.07$).

Conclusion: This national population analysis demonstrates an improvement in survival for bone and STS over last the two decades including patients with osteosarcoma. Further analysis is required to determine factors influencing outcome and is ongoing.

148: Clinical Outcomes and Cost Analysis of 31 Hemipelvectomies

by Edgard Eduard Engel

Abstract ID: 148

Objective: To correlate the death and complication rates, the number of reoperations and cost to patient and surgery characteristics.

Design: Observational.

Methods: The medical records and radiographs of 31 patients undergoing hemipelvectomy from 1999 to 2015 were analyzed. Surgery time, type of resection, type of reconstruction, pelvic organs involvement and the use of implants were analyzed. Costs of hospitalization, surgery, and implants were analyzed separately.

Results: The complication rate was 54.8%. Among the 17 patients who experienced complications, 9 (29.0%) had an infectious condition, 5 (16.1%) evolved to death during the hospitalization period, 2 (6.5%) had dehiscence of the abdominal wall and 2 had urinary fistulae (6.5%), one of them progressed to death. The success rate of infection treatment was 88.9%. Five deaths were related directly to the procedure (16.1%) and five late deaths, up to 6 months after surgery, due to the progression of neoplastic disease or due to complications. The occurrence of complications was related to age, length of operation and accomplishment of bone or internal organ reconstruction. That led to a 470% increase in the total cost. The occurrence of infection was related only to operation length causing an increase of 276% in costs. Mortality was correlated with age, pelvic organ commitment, and comorbidities. Surprisingly, histological grade, body mass, previous surgery, chemotherapy or radiotherapy and tobacco use could not be related to the outcome variables.

Conclusion: Complications rate is about 50%. It is most often related to infection and may be resolved in at least 85% of cases. The most important factors related to infection occurrence are operating time and the aggressiveness of resection. We found that the occurrence of complication increased the cost of the procedure four times, at least.

149: Treatment of Benign Tumour Curettage- Induced Bone Defects with Elastic Osteosynthesis Instead of Grafting

by Edgard Eduard Engel

Abstract ID: 149

Objective: Large, fracture impending bone defects created after benign tumor curettage are usually treated with bone graft, bone substitutes or bone cement. These options do not allow the combination of early mechanical stability and bone remodeling of the defect. In this study,

an elastic osteosynthesis method that enables mechanical stress to induce bone remodeling and decreases fracture risk is presented as an alternative.

Study design: Case series.

Method: The elastic osteosynthesis consists of thin plates (one-half or one-third tube plates) placed over the bone window and fixated with one screw at each end of the plate. A series of 16 patients (12 men, 4 women, mean age of 13.6 years) underwent curettage of benign bone lesions followed by elastic osteosynthesis. Full weight-bearing was allowed at an average of 3.5 weeks after the operation (range 0–12 weeks). Patients were undertaken to clinical examination and conventional radiographs immediately and 1, 3, 6 and 12 months after surgery to detect complications and to measure the defect size. Bone defects corresponded to 80.3% and 81.3% of the anteroposterior and lateral diameters of the bone respectively. Initial defect volume was 45.6 cm² (5.5 – 188.5)

Results: The defect volume reduction 1, 3, 6 and 12 months after surgery was -16% (p=0.06), -47% (p<0.01), -79% (p<0.01) and -90% (p<0.01) respectively. One patient presented a non-displaced humerus fracture after a 2 meters high fall and one patient presented a bone cyst recurrence around the screw.

Conclusion: These preliminary results suggest that elastic osteosynthesis is strong enough to prevent fracture occurrence at the lesion site, but allows mechanical tensions to stimulate bone remodeling. Elastic osteosynthesis seems to be a good treatment option for benign bone tumors it allows early weight bearing and dispenses the use of bone graft or other substitutes.

150: Clinical results of limb-salvage surgery with pasteurized bone graft for malignant bone tumors

by Kayo Suzuki | Taketoshi Yasuda | Kenta Watanabe | Yoshiki Washizuka | Masahiko Kanamori | Tomoatsu Kimura

Abstract ID: 150

Objective

Pasteurized autograft bone (PAB) is one of the limb-salvage reconstruction methods for massive bone defect after resection of malignant bone tumors. However, there are some risks such as infection, bone absorption and recurrence. The purpose of this study was to investigate the clinical results of reconstruction surgery using PAB.

Materials & Methods

This retrospective study was enrolled 18 malignant bone tumors treated with PAB for reconstruction of massive bone defects between 2005 and 2017 in our hospital. These patients included 8 primary malignant bone tumors, 2 bone invasion of soft tissue sarcomas and 8 metastatic bone tumors with the mean follow-up period of 23.5 months. We evaluated 1) site of affected bone, 2) graft type of PAB, 3) bone union period between host and PAB, 4) ISOLS score of function, 5) complication, and 6) oncological outcome.

Results

The site of affected bone was 12 long bones, 4 flat bones and 2 vertebrae. The graft types of PAB were included 11 intercalary bone grafts, 3 osteoarticular grafts, 2 inlay grafts, 2 arthrodesis grafts. The rate of PAB union was 66.7%, and the period until union was 8.3 months postoperatively. The mean ISOLS score was as good as 73.1% while the score of osteoarticular cases for tibial proximal osteosarcoma was 30%. The complications of PAB were 3 infections, 2 absorptions, 1 dislocation of PAB. There was no local recurrence. The oncological outcome showed NED in 5, AWD in 4, DOD in 7 and unknown in 2.

Conclusions

PAB is a biologically reconstruction material that shows high osteoinductive ability without tumor recurrence. Functionally, the graft type other than osteoarticular maintained good function. The combined use with artificial bone or vascularized autograft bone might be useful for the blood supply for PAB. Furthermore, rigid internal fixation as a measure against absorption of PAB is also important.

151: Biomechanical computer modeling of behavior structure "bone-fixator-endoprosthesis" after different types of internal hemipelvectomy

by Diedkov Anatolii | Lazarev Igor | Kostiuik Viktor | Skiban Maxim

Abstract ID: 151

Introduction: Behavior of the biomechanical structure "bone-fixator-endoprosthesis" after pelvic ring reconstruction by spacer (individual intraoperative prosthesis) in patients with pelvic tumors, who undergoing limb-salvage surgical intervention, remains important issue for modern orthopedic oncology.

Aim: To study the behavior of biomechanical systems under loaded condition in different types of internal hemipelvectomy.

Materials and methods: In computer "SolidWorks" software package were created 3-D simulation models of various hemipelvectomy types after tumor removal and defect reconstruction by spacer consisting from elements of transpedicular fixator, polymethylmethacrylat (PMMA) and hip joint endoprosthesis. By finite element analysis was investigated the stress-strain state and construction behavior according to stress and total deformation values PMMA, rod and screws under static load 75 kg in bipedal standing.

Results: The maximum stress values at the bone cement was observed at I-III hemipelvectomy type (24.67 MPa) and significantly lower at III (7.32 MPa), II (6.59 MPa) and II-III (6.46 MPa) types. The maximum stress at the rod and screws was observed at I-II hemipelvectomy type (169,27 MPa), slightly lower at II (141,27 MPa), I-III (132,34 MPa) and minimal at III (107,11 MPa) type.

The maximal total deformation values was observed at I-II hemipelvectomy type (3.78mm), slightly lower - at II (3.51mm) and II-III (3.51mm), the minimal – at III (2,84mm) type.

Conclusions: The conducted biomechanical studies of stress-model allows to optimize performing of reconstruction of pelvic ring taking into account the resection level.

153: Influence of Postoperative and Two-Stage (Pre- and Postoperative) Radiation Therapy on the Outcome of Treatment in Patients With Soft Tissue Sarcomas of Extremity and Trunk

by Anatolii Diedkov | Ostafiichuk Vasyl | Kukushkina Maria | Korovin Sergiy

Abstract ID: 153

Background: Surgery is the standard of care for extremity and truncal soft tissue sarcomas (STS). Radiation therapy (RT) have been associated with improvement of local control. RT in the neoadjuvant setting may results in reducing of tumor size, but it is associated with a higher wound complication rate. Systemic chemotherapy can be used to reduce the risk of subsequent metastatic disease.

Objective: To evaluate an influence of postoperative and two-stage (pre- and postoperative) RT in combination with chemotherapy on the outcome of treatment inpatients with STS of extremity and trunk.

Methods: During 2011-2015 81 patients with primary localized extremity and truncal STS stage IIB-III were randomized in 2 groups. Group 1 (40 patients) were treated with preoperative chemotherapy (CyVADIC, 2 courses) with subsequent surgery and postoperative RT (50 Gy, 1,8-2 Gy) with adjuvant chemotherapy (CyVADIC, 2 courses). Group 2 (41 patients) recieved preoperative RT (40 Gy) and chemotherapy (CyVADIC, 2 courses) followed by surgery and postoperative RT (20 Gy) with adjuvant chemotherapy (CyVADIC, 2 courses).

Results: By Response Evaluation Criteria in Solid Tumors (RECIST) the objective response (partial and complete response) in Group 1 was 5.0%, in the Group 2 - 19.4% (p = 0,04). 3- year relapse-free survival, progression-free survival and overall survival in the Group 1 were

87,2±5,2%, 51±6,8% and 75,0±6,8%; in the Group 2 were 89,5±4,6%, 58,5±7,1% and 70,7±7,7% respectively.

Conclusions: Two-stage (pre- and postoperative) RT is results in better objective response. Although no significant difference in relapse-free survival and overall survival rate, postoperative RT is associated with a significantly better progression-free survival compared with two-stage (pre- and postoperative) RT (p=0,04) for patients with primary localized extremity and truncal STS stage IIB-III.

154: Perspective of Denosumab in treatment of patients with lung metastases of benign GCT on example of two clinical cases

by Anatolii Diedkov | Maximenko Bogdan | Boychuk Sergiy | Kostiuk Viktor

Abstract ID: 154

Introduction: In about 2% of cases of giant cell tumor (GCT) may lead to the lung metastases without evidence of morphological malignancy. Target treatment with RANK-L inhibitor Denosumab is widely used in case of localized disease but its potential application in case of lung metastases is not sufficiently studied.

Objective: to determine the possibility of using of denosumab in treatment of lung metastases of GCT.

Materials and methods: Two female patients with pulmonary metastasis of GCT were treated at our clinic. The patient's age was 29 and 28 years. Primary localization of tumor in 1st case was 3rd proximal phalanx of right wrist and navicular bone of left foot in the 2nd case. Period of time from primary surgery to lung metastases presentation was 0 and 34 months. Origin of metastasis was proved by VATS- biopsy. Morphological materials of the primary tumor and pulmonary lesions in both cases were rewired in several reference histology laboratories (without evidence of malignancy). Lung metastases were considered as inoperable taking into account multiple lesions. Patients received Denosumab according to the following scheme: 120 mg every month during one year. The control CT scanning has been performing every 3 months with an assessment according to the RECIST 1.1- criteria.

Results: Both patients received 12 doses of Denosumab, 1st patient is under observation 14 months, 2nd – 18 months after completion of therapy. Disease stabilization was achieved in both cases.

Conclusion: Described cases show the efficacy of Denosubab not only as a treatment in primary GCT but in it's pulmonary metastases.

155: Forequarter amputation and chest wall resection in the patient with a giant malignant peripheral nerve sheath tumor: a case report

by Filip Tudor | David Lumenta | Birgit Fell | Marko Bergovec

Abstract ID: 155

Introduction:

Neurofibromatosis type 1 (NF-1) is an autosomal dominant syndrome characterized by presence of neurofibromas. In some cases neurofibroma can transform into malignant peripheral nerve sheath tumor (MPNST). The overall incidence of MPNST is about 1.5 per million person-years. On the other hand, the incidence of MPNST is reported in up to 29% cases in patients with NF-1. The treatment of MPNST is challenging, and consists of surgical therapy; there is no effective standardized chemotherapy or radiotherapy.

Case report:

A thirty-one year old female patient with a known NF-1 was admitted to orthopedics department due to a mass on her left shoulder. At the moment of this presentation the patient had a soft tissue mass located in supraspinatus muscle, measuring 4cm x 5cm x 12cm. A partial resection was performed in other hospital, and histology confirmed MPNST.

At the moment, due to tumor localization and its size, a decision was made not to perform re-resection but to start with oncological treatment. The patient started a chemotherapy according to MAID protocol followed by trabectedin. Regardless the chemotherapy treatment, the tumor continued to grow.

Nine months after the index surgery the patient presented to our Department with a 22cm x 17,5cm x 18,5cm MPNST, destructing the lateral scapula and clavicle as well as proximal humerus, reaching supraclavicular fossa, and imprint the rib cage. Due to its size and location we performed forequarter amputation with chest wall resection. Chest wall defect was reconstructed with a three titanium plates fixed to the remnant part of the ribs, covered with a bioprosthetic mesh. A fasciocutaneous free pedicle flap from the amputated forearm was used for wound coverage. One year after the operation the patient is alive, fully independent, with no signs of a local recurrence.

156: Limb-salvage surgery for the proximal humeral malignant bone tumor – Looking for better shoulder function

by Taketoshi Yasuda | Kayo Suzuki | Kenta Watanabe | Yoshiki Washizuka | Masahiko Kanamori | Tomoatsu Kimura

Abstract ID: 156

Introduction

The proximal humerus has important anatomical features to maintain the shoulder function. The purpose of this study is to compare the shoulder function by various limb salvage surgery for malignant proximal humeral tumor and to clarify reconstruction methods for acquiring permanent good function.

Materials & Methods

Eleven patients who underwent limb salvage surgery for malignant bone tumors in the proximal humerus were enrolled from 2006 to 2017 in our hospital. Cases consisted of 8 men and 3 women with an average age of 67.2 years at the time of operation. These patients included 9 metastatic bone tumors, 1 chondrosarcoma and 1 plasmacytoma. The reconstruction method was decided by the site of bone tumor, prognosis and general condition, comprehensively. We investigated the reconstruction methods, NRS, ISOLS score, and postoperative complication

Results

The surgical procedures were resection and replacement to endoprosthesis in 4 cases (humeral head resection group, R group), resection and reconstruction by the pasteurized autograft or custom made implant in 4 (humeral head preservation group, P group), and osteosynthesis alone in 3 cases (O group). The mean preoperative NRS was 7.3, which significantly improved to 1.8, regardless of surgical procedure. Mean preoperative ISOLS score in R, P and O group were 40.8%, 29.3% and 22.7%, respectively. Mean postoperative ISOLS score in R, P and O group were 50.0%, 64.4% and 49.4%, respectively. Postoperative complications were dislocation in 1 case of R group and dislocation of the grafted bone in 2 cases of P group.

Discussion

Limb salvage surgery for malignant bone tumor in the proximal humerus is useful for improving pain regardless of surgical procedures. When the tumor is developing to the humeral head, it is necessary to choose replacement to endoprosthesis but the function is poor. On the other hand, good function can be obtained when the surgical neck can be preserved.

157: Usefulness of a novel pressurized socket type trans femoral prosthesis after above knee amputation by synovial sarcoma

By Yoshiki Washizuka | Taketoshi Yasuda | Kayo Suzuki | Kenta Watanabe | Kenichi Sano | Masahiko Kanamori | Tomoatsu Kimura

Abstract ID: 157

Introduction

In malignant tumor of the lower extremity, it may be impossible to preserve the affected limb depending on the site and size. In the case, trans femoral prosthesis is needed for self-standing and walking. The purpose of this study is to introduce the characteristics and benefits of a new trans femoral prosthesis.

Case presentation

A 49-year-old male had previously undergone inadequate resection of the left calf mass at other hospital. Histopathological examination of the resected specimen revealed synovial sarcoma, and he was introduced to our department to receive additional therapy. He was treated with adjuvant chemotherapy. However, recurrence occurred in 1 year and 3 months after initial surgery, and below knee amputation was performed. Then recurrence was observed after 6 months, and above knee amputation and radiotherapy were performed. Furthermore, chemotherapy has been performed for lung metastases. The thickness of the limb has been changed by chemotherapy or radiotherapy.

Prosthesis

He needed to adjust the trans femoral prosthesis. The characteristics of prosthesis are as follows. The knee joint has a housing mechanism for instantly preventing the knee fold and a hydraulic cylinder mechanism for lightening the swinging out. In the ankle joint, the length and hardness are adjusted by pushing the button, automatically. The most useful factor is the socket part. The compression force can be adjusted by turning the dial, and it is possible to release with one push. He is walking with a single cane while attaching prosthesis.

Discussion

In malignant tumor, chemotherapy or radiotherapy may be necessary as an adjuvant therapy after above knee amputation. Since the thickness of the affected limb is constantly changing due to both adjuvant chemotherapy and/or radiotherapy, it is difficult to adjust the fitting of the prosthesis. The new prosthesis enabled walking early with prosthesis by easy detachability, adjustability of the socket part and knee fold prevention function.

158: Comparison of the 7th and 8th edition of the AJCC TNM staging system in a series of 88 patients: the size as an effective factor predicting prognosis

by Hugo Miranda | Paula Fidalgo | Manuel Magalhães | Ana Castro | Pedro Cardoso

Abstract ID: 158

Introduction

Since January 1st 2018, the new AJCC TNM staging system became the ruling system for the staging of cancer, with the release of the 8th edition of the AJCC Cancer Staging Manual. It brought several changes in classifying soft tissue sarcomas, mainly in the T staging, with the creation of the T3 (10-15cm) and T4 (>15cm) stages and the abolishment of the superficial/deep differentiation.

Study Design

The objective of this study is to compare the previous and the current staging systems in what concerns the T staging as a factor predicting prognosis.

Methods

The population consisted of 88 patients (26% were classified as T1, 31% as T2, 23% as T3 and 20% as T4) with a diagnosis of musculo-skeletal soft tissue sarcoma treated in our hospital between 2008 and 2017 (mean follow-up time of $3,24 \pm 2,98$ years) and the data was collected through the analysis of clinical processes regarding individual characteristics (including survival) and technical features of the tumour (T, N and M staging, histological type and degree).

Results

The results have shown that the previous staging system proved to accurately predict statistically significant differences in prognosis between stages T1 and T2 ($p=0,047$). However, when analysing the new staging system, such differences between the four T stages were less significant ($p=0,075$).

Conclusion

This study has shown the previous staging system regarding the size of the primary tumour was effective to predict different prognosis. Yet, the new staging system, when applied in this sample, did not show significant differences in such terms, though it may show a tendency to do so, which can be assessed by increasing the sample size in subsequent studies.

160: Can the presence of fusion genes in circulating cell-free DNA serve as potential biomarkers for Ewing's sarcoma?

by Shintaro Iwata | Hajime Kageyama | Tsukasa Yonemoto | Makiko Itami | Akira Kawai

Objective: Circulating cell-free DNA (cfDNA) is fragmented DNA derived from tumors that circulates in the blood of patients with malignancies. With liquid biopsy, cfDNA has the potential to be used to monitor tumor burden in real time. Most reports have described that tumor specific alterations in cfDNA are mutations, although little has been reported for the detection of tumor specific gene fusions. The objective of this study was to identify whether cfDNA can be used to detect tumor specific gene fusions and whether this would reflect the tumor burden of patients with Ewing sarcoma.

Methods: Multiplex long-range genomic PCR was performed to detect patient-specific genomic breakpoints in eight patients. Real-time PCR probes for digital PCR were designed based on the genomic breakpoint of each patient. cfDNA was extracted from the serum of patients, which was drawn at multiple time-points (pre-treatment, completion of the treatment, and/or relapse). cfDNA quantification was performed by digital PCR (BioRad Qx-200).

Results: Gene fusions in the cfDNA were detected in six (75%) of eight patients with high specificity. The relative gene fusion copy ratio (gene fusion copy number/wild KRAS copy number) was highest in pre-treatment samples and decreased as the treatment progressed. Patients with relapse displayed an elevated relative gene fusion copy ratio in advance of clinical manifestation or elevation of lactase dehydrogenase.

Conclusion: The amount of cfDNA in the serum strongly correlated with the treatment stage and would be useful as an early biomarker for the patients with Ewing sarcoma.

163: First prospective observational study in diffuse-type Tenosynovial Giant Cell Tumours

by Michiel van de Sande | Sebastian Bauer | francois Guin | John Healy | Andreas Leithner | Lopez Pousa | Martin Broto | Emanuela Palmerini | Bart Schreuder | Sylvia Stacchiotti | Hans Gelderblom | Eric Staals | Julio Lopez Bastida

Objective

Tenosynovial Giant Cell Tumour (TGCT) is a rare, benign, but potentially locally aggressive and often recurrent disease. This is the first prospective registry detailing economic impact, management and burden of TGCT.

Study design

International multicenter prospective non-interventional observational registry for diffuse-TGCT, with a baseline visit at time of patient enrolment and follow up data collection points performed at 12 and 24 months.

Methods

This snapshot analyses included 88 histologically proven TGCT patients (58% female, knee 73%, mean age at enrolment 45 (SD 14)) years with complete baseline data, from six active international sites between November 2016–September 2017.

Results

56 (64%) Patients were included with primary diagnosis of TGCT, 32 (36%) with recurrent disease. Mean time from first symptoms until diagnosis was 42 (median 21) months, most reported symptom was pain (78%). Sixty-three (72%) Patients had surgery, mostly primarily open synovectomy (54%), 38 (43%) patients received systemic therapy (55% pexidartinib, 42% imatinib). Side effects occurred in 65% (N=24). During the last 12 months, a mean of 28 (median 4) days of work were missed due to TGCT. Nine% (N=8) of the patients were fully unemployed due to TGCT, 2% (N=2) partially unemployed and one (1%) patient retired prematurely. On average, clinically significant impairment on physical function at baseline was observed as compared with the reference population based on PROMIS PF score ((42(7) vs. 50(10)). Mean EQ-5D-5L at baseline was 0.75 (SD 0.19).

Conclusions

TGCT has major impact on daily living in a relatively young and working population. This disease-registry in ten sites with a two-year recruitment period and two-year follow-up per patient, aims to explore the real-world management of diffuse-TGCT.

Relevance for EMSOS

To obtain detailed insight on characteristics and management patterns of diffuse-TGCT, specifically on patient pathway to TGCT-diagnosis, insight into routine clinical care, including rate of complications due to surgery, rate of recurrence, patient reported outcomes on pain, stiffness, physical function, quality of life, daily life activity and health resource utilization.

166: Tumour endoprosthesis replacement in the proximal tibia after intra-articular knee resection in patients with sarcoma and recurrent giant cell tumour

by Jendrik Harges | Marcel-Philipp Henrichs | Georg Gosheger | Wiebke Guder | Markus Nottrott | Dimosthenis Andreou | Gregor Hauschild | Maria Eveslage | Eike Bormann | Arne Streitbuenger

Objective: This study evaluated the clinical results and complications after intraarticular resection of the proximal tibia and reconstruction with a tumour endoprosthesis in combination with a reattachment tube (MUTARS®).

Study design: retrospective observational

Methods: 98 patients (median age 18 years) with a malignant bone tumour or giant cell tumour were included. The complications were classified according to the Henderson classification. The patella position after reconstruction of the extensor mechanism was documented with the Blackburne-Peel ratio.

Results: According to the Kaplan-Meier estimator limb survival was 94,9%, 90,5% and 74,5% at one, two and ten years respectively. Periprosthetic infection was the most common reason for secondary amputation (eight patients). Prosthetic survival without any reoperation due to a Henderson II-IV failure was 82% at 2 years and 71% at 5 years postoperatively. No avulsion of the patella tendon was noted. An active extension gap over 10° was noted in six patients (range, 15-30°). Patella baja was not associated with a flexion deficit as far as 90°.

Conclusions: These results suggest that limb salvage after intraarticular resection with tumour prostheses and a refixation of the tendon to the reattachment tube can achieve good functional results in the majority of patients. Whereas mechanical complications can be treated successfully by revision surgery periprosthetic infection remains the main reason for secondary amputation.

167: A giant lipoma with extosis of the right proximal humerus (Case Report)

by Abdau Rasyid | Mujaddid Idulhaq | Ambar Mudigdo | Handry Tri Handojo

Background: Lipomas are the most frequent benign mesenchymal neoplasms. Soft tissue lipomas are categorized by anatomic location as either superficial (subcutaneous) or deep. Deep lipomas can be located in any part of the body, including the superior extremities. There has been no reliable literature about two pathological processes in one extremity. Lipomas typically reach a diameter of several centimeters and are localized in a single anatomical region. Parosteal lipoma is a rare subtype of deep lipoma that has a broad attachment to the underlying periosteum that forms an exostoses-like bone prominence.

Case Presentation: A 49-years old housewife/farmer with a painless, slow growing lump in her right shoulder region since 2 years ago, with no other symptoms, and no history of trauma. A

palpable non-tender mobile mass was present on the right shoulder region with no signs of neurovascular compression. Plain radiographs showed a well-delineated ovoid radiolucent lesion and a radiopaque lesion over the right proximal humerus. The fine needle biopsy result suggested a liposarcoma. Surgery was performed and both masses were excised. On contrary, the histological examination of the specimen confirmed a giant lipoma with pieces of adult bone tissues.

Conclusion: Deep-seated lipomas are most commonly discovered in men between the ages of 30 and 60. In our patient, the lipoma also accompanied with an exostoses-like cartilaginous mass over the proximal humerus as in parosteal lipoma, a rare subtype of deep lipomas. Nerve compressions are common in parosteal lipoma but not that we can found in our patient. Plain radiographs study of parosteal lipoma is associated with a false osteochondroma appearance, which also be found in this patient. Histological examination suggested a giant lipoma for this patient, but the possibility of two pathological processes is still in question.

176: Intramuscul Myxomas: An Uncommon Entity with Difficult Differential Diagnosis. Review of 22 Cases.

by Laura Noguera Alonso | Ana Peiro Ibañez | Laura Trullols Tarragó | Isidro Gracia Alegria

Abstract ID: 176

The intramuscular myxoma is a rare benign soft tissue tumor (0.1-0.3 / 100,000 inhabitants). Most are unique tumors, and when they are multiple they can be part of other syndromes (Mazabraud or McCune-Albright syndrome). Malignancies have not been described and local recurrence is infrequent.

The radiological and anatomopathological differential diagnosis is extensive, and includes malignant tumors of myxoid lineage.

Reviewing preoperatively misdiagnosed cases, in our series of intramuscular limb myxomas.

We performed a retrospective review of 22 cases of intramuscular myxomas treated in our center between January 2007 and February 2015.

Pre-operative diagnoses, localization, local recurrence and complications were reported. The patients have a mean age of 67.5 years, 50% being men. 77.2% are located in the thigh, 18.1% in scapular waist, and 4.5% in pelvic muscles.

The mean size at the time of diagnosis is 4.19cm (2 - 8.5cm).

Based on radiological studies, 17% were referred to our center as soft tissue sarcoma. In 43% of the cases reviewed in the committee, prior to biopsy, there were doubts about the presence of a myxoid sarcomas of intermediate-high malignancy.

Histopathologically (after tru-cut biopsy and prior to total excision) 4 cases presented diagnostic doubts with sarcomas of intermediate degree.

No local recurrence occurred, nor adjuvant treatments were necessary during follow-up.

Based on the similarity in preoperative diagnoses with other entities of worse prognosis (myxoid tumors with intermediate malignancy), it is important to make an histopathological diagnosis by closed biopsy using tru-cut.

We strongly recommend total excision to avoid misdiagnosed cases with serious consequences for the patient.

177: The advantages of the use of carbon fiber/PEEK composite implants in primary bone and soft tissue tumors

by Boffano Michele | Albertini Ugo | Boux Elena | Ferro Andrea | Marone Stefano | Pellegrino Pietro | Ratto Nicola | Rossi Maria Chiara | Asaftei Sebastian Dorin | Piana Raimondo

Abstract ID: 177

OBJECTIVE: Carbon fiber/PEEK composite implants have already been successfully used in metastatic bone disease. Radiotransparency is one of the advantages of this material. The aim of this study is to evaluate whether radiotransparency could represent an advantage in the follow up of primary bone and soft tissue tumors.

STUDY DESIGN: retrospective study

METHODS: In the period 2015-2017 in an Italian reference centre 12 patients with primary bone and soft tissue tumors have been treated (age range 9-78ys, M:F=1:1). The diagnosis were osteosarcoma (3), condrosarcoma (3), giant cell tumor (2), high grade soft tissue sarcoma (4). The anatomic region involved was pelvic bone/sacroiliac joint (1), femur (7), leg (3), thigh (1). The implant used were femoral/humeral plates (7), intramedullary nails (2 after partial corticotomy, 2 after periosteal stripping with subsequent radiotherapy), spinal system with bars and screws (1). The follow up was performed with Xray, CT, MR as usual. Follow up, the presence of Imaging artifacts, and implant complications were evaluated.

RESULTS

The follow up was regularly performed in all patients. Very limited Imaging artifacts (radiopaque screws) were observed and did not affect the quality of the images. Two local recurrences were detected (6 and 24 months) and resected with limb salvage, one small metastatic lesion close to the primary tumor was diagnosed and treated with radiofrequency ablation. No complication from the implants occurred. One plate was removed following patient's will.

CONCLUSIONS

The quality of follow up was excellent compared to traditional implants (titanium, steel,...) with the possibility to detect small local recurrence resectable with limb salvage. Prospective and multicentric studies are mandatory to confirm these results. Long term results of carbon fiber-PEEK implants in term of increase elasticity and lower complication rate are awaited.

178: A new bone graft for bone tumors: preliminary results

by Boffano Michele | Ratto Nicola | Pellegrino Pietro | Marone Stefano | Ferro Andrea | Boux Elena | Albertini Ugo | Piana Raimondo

Abstract ID: 178

OBJECTIVE Several synthetic bone grafts are now available. Each graft has its own specific properties. SmartBone[®] (IBI, S.A., Switzerland) is produced by combining natural bovine bone mineral structures with bioresorbable polymers and cell nutrients. The aim of the study is to evaluate both structural and biological short term properties and its reliability in orthopedic oncology

STUDY DESIGN retrospective study

METHODS In the period October 2016-October 2017 in an Italian Reference centre for bone and soft tissue tumors 11 patients (age range 19-68ys) with bone tumors were treated and the bone gap was filled in with Smartbone. The diagnosis were: chondrosarcoma (3), giant cell tumor (GCT,1), enchondroma (3), benign fibrous histiocytoma (1), bone cyst (3). A follow up was conducted for a minimum of 4 months (range 4-16 months) with X-ray to evaluate graft integration and eventually with CT or MRI in case of possible local recurrence. Complications (infection, recurrence, fracture, early resorption) were also investigated.

RESULTS No infection and no fractures were observed. One local recurrence in a patellar GCT occurred after 12 months. Two cases of wound dehiscence occurred requiring advanced dressing or flap covering with no further secondary complications. The periodic X- ray showed a good to excellent graft integration in all patients within 10 weeks.

CONCLUSIONS Preliminary results of grafting bone lesions with Smartbone are satisfying. Graft integration occurred with no complications or inflammatory reaction in the surrounding tissues. Smartbone has also a structural function allowing an early weight-bearing in lower limb lesions. Prospective and multicentric studies are mandatory to confirm these results.

180: Stage3 Giant Cell Tumor of Bone: Simple Guideline for Curettage or Resection and Mid- to Long-term Results.

by Prakrit Suwanpramote | Nattakul Yamprasert | Manita Tiratrakoonwitchaya | Theerapat Nakornnoi

Objective: To evaluate oncologic and functional outcome of stage 3 giant cell tumor of bone (GCTB) that managed under our simple guideline of treatment.

Study design: Retrospective study of stage 3 GCTB of appendicular bone excluding pelvis that managed under our guideline, based on location (expendable bone or not), bone stock including cortical thickness and containment, and response to anti-resorptive drugs. Minimal follow-up periods were not less than 12 months.

Methods: Thirty-four patients were included in this study, who were managed under guideline. Patients with GCTB in non-expendable bone, adequate bone stock including response to anti-resorptive agent were performed extended curettage with PMMA augmentation. Patients with GCTB in expendable bone and in non-expandable bone who had inadequate bone stock despite received anti-resorptive agent were performed wide resection. Oncologic outcomes include local recurrence, pulmonary metastasis and oncologic status. Functional outcome was assessed by MSTS score at latest follow up.

Results: Mean follow-up period was 30 months (12-93). Twenty-seven patients were treated by extended curettage (6 of 27 were received pre-operative bisphosphonate). Seven patients were performed wide resection. Four patients had local recurrences (2 in curettage group and 2 in resection group). Pulmonary metastasis occurred in one case. Average MSTS score was 25.5 or 84.9% (87.2% in curettage group and 76.2% in resection group).

Conclusion: Overall oncologic and functional outcomes were satisfied especially in curettage group. In this study, we can shift 6 from 8 patients with inadequate bone stock back to curettage group to reduced morbidity from resection. Stage 3 GCTB has varied extension of disease and no definite conclusion for optimal treatment procedure. Evaluation of location, cortical containment and thickness, response to anti-resorptive agents are important parameter to make a decision of treatment.

181: Will electrochemotherapy replace external radiotherapy in long bone metastatic disease? A case report of its combined use with osteosynthesis

by Albertini Ugo | Boffano Michele | Boux Elena | Ferro Andrea | Marone Stefano | Pellegrino Pietro | Ratto Nicola | Piana Raimondo

OBJECTIVE Electrochemotherapy (Echt) has already been successfully used in metastatic bone lesions. Whether a combined approach with Echt and minimally invasive osteosynthesis could represent an advantage in pain management and early function restore is still debated.

STUDY DESIGN case report

METHODS Lady 60 years old, clear cell renal carcinoma (pT3bN2) excised. Postoperatively in 3 months, she developed massive pulmonary embolism and diffuse metastatic bone disease. Pazopanib oral chemotherapy was administered. She was referred with bilateral pathologic humeral fracture. No function in the upper limbs was possible. Pain was uncontrolled. Life expectancy was at least 3 months according to oncologists' opinion and several available questionnaires.

RESULTS Three-months after kidney resection a bilateral minimally invasive humeral internal osteosynthesis with a photodynamic bone stabilization system was performed. In the left humerus due to the soft tissue invasion an electrochemotherapy local treatment with bleomycin was administered before the nail insertion. Total surgical time 2 hours. Unrelevant blood loss. Physical therapy started 2nd day postoperative and pain decreased rapidly. After 3 weeks the patients fed herself and was able to take care her personal hygiene. Radiologic follow up was performed with excellent evolution of the lesion after combined treatment. Patient died 6 months after orthopedic surgery.

CONCLUSIONS A combined treatment (ECHT and minimally invasive surgery) could represent an alternative to the traditional approach "surgery followed by external radiotherapy". This treatment in the sphere of palliative cares could improve pain control and determine an early function restore. The local effect of ECHT on metastatic bone lesions compared to the usual 8 Gy dose of radiotherapy is still to be evaluated. Further studies on larger case series are mandatory.

182: Does Cementation Necessary in treatment of pathologic femoral fracture in metastatic breast cancer?

by Prakrit Suwanpramote | Theerapat Nakornnoi

Abstract ID: 182

Purposed: To evaluate bone healing of pathologic fractures including life-long existence of the implants that fixed in pathologic fracture at peritrochanteric area and diaphysis of femur occurred in metastatic breast cancer treated by Intramedullary nail without cementation.

Materials and Methods: Ten patients with 11 pathologic femoral fractures in metastatic breast cancer that treated by osteosynthesis with intramedullary nail without cementation were review retrospectively. Demographic data, clinical course, history of chemotherapy, radiotherapy and other medications, including radiographic data were collected. Fracture healing and failure of implant were determined by plain radiograph at latest follow up.

Results: All 11 fractures healed and callus formations were observed. Seven of eleven fractures in 10 patients completely healed and 4 of 11 fractures are incompletely healed at latest follow up. No failure of implant was founded in this series. Average follow up time is 11

months (range 6-16). All patients were performed post-operative radiation and bisphosphonate for at least 6 months. Eight patient died from disease with average survival time 12 months after surgery. Other two patients were alive with disease with follow up time 7 and 8 months.

Conclusion: Metastatic breast cancer with pathologic fracture has potential to healed and no implant failure occurred. Osteosynthesis with intramedullary nail without cementation may be one alternate options in metastatic breast cancer, in well selected patients, for obtained biologic healing and avoid disadvantage of bone cement.

183: A surgical tip to prevent superficial cell dissemination at fungating malignant soft tissue tumor resection

by Ewald Musser | Marko Bergovec

Abstract ID: 183

OBJECTIVES: Dissemination of the tumor tissue within surgical field dramatically increases the risk of local recurrences, and as thus present a limb and life threatening situation. Fungating i.e. exulcerating soft tissue tumors, like sarcomas, melanomas or carcinomas, present a challenge in the attempt to perform wide resection. Even more, intraoperative manipulation of the fragile tumor tissue during resection could lead to contamination of the surrounding surgical field. This surgical tip procedure describes an optimization to prevent dissemination of exulcerated bleeding tumor tissue.

METHODS: The objectives are achieved by the help of swabs, incise drapes and skin staples. Absorbent swabs are used to cover tumor ulceration to soak the bleeding and secretion. Applied swabs are fixed by a sufficiently large adhesive film and seal the nearby surgical area of skin lesions. Incise drapes are mainly used for protection against septic dissemination into the surgical wound. In the presented procedure the reverse effect occurs – a distribution of tumor cells should be blocked. To prevent possible dislocations, a double row moved skin clip fixation is placed at the edge of the adhesive incise drapes. The subsequent resection can be made around or with bigger distance to the sealing zone, depending on the tumor entity.

CONCLUSION: Implementing this procedure a superficial tumor skin defect is fixed, and a breakage of malignant tissue is prevented. By using surgical swabs, drapes and skin staples, the necessity of subsequent surgical interventions with the risk of more serious soft tissue defects, functional failures and even amputations of extremities can be reduced.

184: Trends in surgical treatment of pathologic fractures of the long bones advocate the use of prognostic models to identify patients who benefit from centralised care. Based on a questionnaire among members of the Dutch Orthopaedic Society and EMSOS

by Julie Willeumier

Abstract ID: 184

Objective

To assess current trends in survival estimation and treatment preferences among national and international general and oncologic orthopaedic surgeons, and to subsequently explore whether differences between the groups can identify areas of improvement in the care of patients with pathologic fractures.

Study design

Questionnaire

Methods

All members of the Dutch Orthopaedic Society (DOS) and European Musculoskeletal Oncology Society (EMSOS) were invited to participate in a web-based questionnaire containing fifteen cases. Respondents were asked to report their estimation of survival and the most appropriate treatment in each case, taking the estimated survival in account. DOS members (n=96; response rate 10%) were categorised into two groups, depending on the frequency they treated pathologic fractures (group 1: 1-2 per six months (n=50); group 2: more than two per six months (n=46)). EMSOS members made up the third group (n=33; response rate 18%). Survival estimations from the OPTIModel were used as golden standard for survival estimation.

Results

Overall, survival estimation was accurate by more than 50% of all three groups if expected survival was short (<3 months) or long (>12 months), but the degree of correct estimation differed greatly. Cases with an intermediate expected survival (3-6 months or 6-12 months) showed a larger spread of answers among all three responding groups. Treatment preferences showed that general orthopaedic surgeons prefer intramedullary nails for actual fractures of the humerus and femur, irrespective of the expected survival. Oncologic orthopaedic surgeons more commonly recommend prosthetic reconstruction in patients with an expected long survival.

186: Modified weighted activity score based on tumorsurgeons' recommendations might give an objective tool for sports activity measurement after tumor-megaprosthetic treatment

by Gerhard M Hobusch | Christoph Hofer | Philipp Funovics | Nikolaus Lang | Reinhard Windhager

Abstract ID: 186

Objective

There is a strong desire to stay active and to play sports in sarcoma survivors. However, it is not easy to measure sports activity. The modified weighted activity score is a good tool that describes the activity levels as well as the amount of each activity level achieved. The impact of each sport is based on the recommendations of total joint replacement(TJR)- surgeons. Using this score after reconstruction with tumor-megaprotheses needs different weights according to what tumor-surgeons may recommend.

Study design

Single sports recommendations (recommended, recommended when asked for, not allowed) for 40 different sports where collected in a Qualtrics Research Core - web survey targeting EMSOS, ISOLS and MSTs members during Sep 14, 2016 – March 10, 2018.

Methods

The modified weighted activity score of 45 patients after different megaprosthetic reconstructions in the lower limb was re-calculated by multiplying the frequency of each activity by its corresponding impact points (by tumorsurgeons' opinions) and then summing these values for all activities in which the individuals participated.

Results

The median of the re-calculated modified weighted activity scores of 45 patients 5 years postoperative after different megaprosthetic reconstructions (12 proximal tibia/ 18 distal femur/ 15 proximal femur) was 5 (range 0- 66,8) compared to weights after elective TJR 3 (range 0-44) ($p < 0.0001$). The re-calculated modified weighted activity score differs between different reconstructions: proximal tibia 9(range 0-22.5), distal femur 4,7(range 0-26), proximal femur 3(range 0-66) as well as discriminates between different time points of measurement: 0.0 (1 year postoperative, 3(range 0-66, 3 years postoperative), 5(0-66, 5 years postoperative) ($p < 0.0001$).

Conclusion

This new modified weighted activity score may be a more objective tool to measure sports activity after limb-salvage surgery. By this tool orthopaedic surgeons and primary care physicians may be able to give patients recommendations for athletic activity after megaprosthetic treatment. Studies with higher patient numbers are necessary.

187: Modular-Replacement-Sports Survey (MoReSport) among EMSOS, ISOLS and MSTs Members

by Gerhard M Hobusch | Florian Keusch | Michael Joyce | Reinhard Windhager

Abstract ID: 187

Objective

Latest research about sportsactivity after musculo-skeletal tumor treatment may have elucidated different attitudes in the intensity and kind of postoperative mobility workout. Opinion research about sports after modular bone and joint replacement due to musculo-skeletal malignancies in tumor society members, by simply review attitudes of reconstructive and tumor surgeons, may help in a more uniform counsel of these patients as to sporting activity.

Study design

Web survey with 26 questions programmed in Qualtrics Research Core. Methods

Target population: Members of EMSOS, ISOLS and MSTs. Sampling frame: List of E-mails of 155, 310 and 335 members of EMSOS, ISOLS and MSTs, Field period: Sep 14, 2016 – Jan 10, 2018, E-Mail invitations.

Results

Survey was sent to EMSOS, ISOLS and MSTs members. 141 started the survey, 75 finished the entire survey (I).The mean age was 51 years(range 31-77), AAPOR RR1: 12.3%, AAPOR RR2: 21.9%, Responders came from Europe 34 (33%), North America 34 (33%), South America 14(13%) and Asia/Australia 22(21%). 52(50%) and strongly agreed with the statement that sports are an important contributor to sarcoma survivors' feelings of well- being and that there are positive effects of sports for survivors of bone sarcoma. 54 (51%) encourage sarcoma survivors to reach a regular participation in active events (UCLA 7-8). 43 (64%) were more likely to allow sports with prior experience. Surgeons more often fear complications than they in fact do witness. After proximale tibia replacement, distal femur replacement and proximale femur replacement out of 40 sports 6/8/7 sports were recommended, 12/13/12 sports were allowed if asked and 21/19/20 were not allowed.

Conclusion

This survey allows an estimate of surgeons' attitudes about sports activity after tumor reconstructions. Results could well form a basis for an international consensus statement.

188: Stress shielding around stemmed distal femoral prostheses in children

by Eric Staals | Ismail Tawfeek | Francesca Barile | Marco Colangeli | Davide Donati | Marco Manfrini

Abstract ID: 188

Objective: Bone sarcomas of the distal femur usually require megaprosthesis reconstructions with stemmed implants. In children these implants can lead to extensive bone resorption or stress shielding. The aim of this study was to determine the clinical impact of stress shielding in children with a megaprosthesis of the distal femur.

Study design: We performed a retrospective review of all megaprosthesis implants performed in children below age 13, between 2000 and 2015, with minimum follow-up of 1 year.

Methods: 46 children underwent a distal femoral replacement. Different types of megaprotheses (24 expandable vs 22 non-expandable) and different fixation techniques (20 uncemented, 20 classic cementation, 6 line-to-line cementation) were applied. Bone remodelling was measured and described on plain radiographs. Charts were reviewed for complications.

Results: Mean patient age was 9.4 years (range 5 to 12), follow-up was on average 66 months (range 16 – 163 months). In half of the cases a pattern of bone resorption was evident on radiographs. A total of 15 femoral stems were removed. In 3 cases infection was the reason for implant removal. In 5 cases the femoral stem was not loose but removed anyway because of a complete exchange of implant system. In 4 cases there was aseptic loosening due to local bone resorption, secondary to particle debris. In 3 cases there was aseptic loosening with stem migration, probably due to insufficient cement fixation. In none of the cases, stress shielding was the primary reason for stem removal.

Conclusions: Although stress shielding is a frequently seen phenomenon in children with stemmed megaprotheses, this does not seem to lead to aseptic loosening, which is more likely a consequence of particle debris and poor cementation technique.

Relevance for EMSOS: Stress shielding, often seen in children with distal femoral replacements, should not be considered a reason for implant revision.

189: Development of Patient reported outcome measurement after proximal humerus sarcoma

by Gerhard M Hobusch | Carmen Trost | Tanja Stamm | Reinhard Windhager

Abstract ID: 189

Objective

The rising number of tumor survivors demand more focus on more specific outcome data. The aim of this study is to develop a patient-reported outcome measure that (i) best reflected functioning specific to proximal humerus sarcoma (pHS) patients, (ii) was based on the commonly used instruments and (iii) could discriminate between patients with better or worse outcome.

Study design

Retrospective data analysis

Methods

Patients with pHS completed the revised musculoskeletal tumor society rating scale (MSTS; 6 items), the Oxford shoulder score (OSS; 12 items), the Toronto Extremity Salvage Score (TESS; 29 items) and the UCLA shoulder rating scale (5 items) at one time point after a minimum of 5 years after the operation. Descriptive analyses and clinical expert review revealed low discriminating items to be excluded. An exploratory pilot factor analysis was conducted to identify a set of factors which described functioning specific to patients with pHS. Spearman rank correlation coefficients were calculated and hierarchically clustered to identify potential correlation patterns ("R" - www.r-project.org).

Results

Fourteen participants with pHS (50% females; mean age 20.3±8.9 years, FU 17.5±9.1 years) were included. Nine TESS and four MSTS items constituted the final dataset. Hierarchical clustering of correlation coefficients and the pilot exploratory factor analysis revealed five similar clusters. MSTS manual dexterity (Factor 1; 0.95), MSTS hand positioning (Factor 2; 0.80), TESS 19 (Factor 3; 0.94; carrying a shopping bag or briefcase), TESS 10 (Factor 4; 0.97; brushing ones hair) and TESS 16 (Factor 5; 0.98; performing heavy household chores) were the items with the highest loadings on each factor.

Conclusion

The final items could potentially constitute a new instrument. More patients are needed to produce more accurate results. All results must be interpreted with caution due to the small number of patients and the ratio between patients and an almost equal number of items.

190: Presacral Myelolipoma, case report and literature review

by Andriandi | AHG Cleven | DF Hanff, | H. Hartgrink | PDS Dijkstra

Abstract ID: 190

Myelolipoma is a very rare, benign tumor, consisting of hematopoietic cells and mature adipose tissue. They are most commonly found in the adrenal glands; however, there have been several reported cases of extra adrenal myelolipomas and most commonly at the presacral region. Nearly all lesions are small and asymptomatic, discovered incidentally on imaging studies. We report two cases of presacral myelolipoma. The first case is a 48-year-old female with atypical back pain, found a mass in presacral region with a size of 3,3 cm. The

second case is a 59 year-old female, who presented for evaluation of hip fracture, a lesion in presacral with a size of 4,7 cm have been noticed.

Both presacral myelolipoma have been discovered incidentally and the diagnosed were confirmed by percutaneous guided fine needle aspiration biopsy, and successfully conservative treated. Based on our experience and a literature review we proposed an algorithm for management of presacral myelolipoma.

191: Sensitivity of different biopsy methods in the soft tissue and bone sarcomas diagnostics: core needle vs. incisional biopsy

by Klein, Alexander | Fell, Theresa | Knösel, Thomas | Jansson, Volkmar | Dürr, Hans Roland

Abstract ID: 191

Objective

An role of a conclusive tissue sample for the diagnostics of soft tissue and bone sarcomas is well known. There is an option of a minimally invasive method of core needle biopsy or an open incisional biopsy. The aim of our work was the evaluation of the sensitivity of biopsy methods regarding the entity and grading.

Study design and methods

A total of 365 patients with bone (BS) or soft tissue sarcoma (STS) were evaluated between 2006 - 2017. In total 415 biopsies were performed. The core needle biopsies (CNB) were performed either image-based or clinical palpatory findings, the incisional biopsy (IB) under normal operative conditions. The entity of the tumour and grade of differentiation were evaluated.

Results

Of the performed biopsies, 276 were CNB (66.5%) and 139 (33.5%) IB. A benign tumor was diagnosed in 6.9%, in 90.5% of cases a malignant tumor. Multiple biopsies was required in 12.9%. The rate of correct determined entities in the group of CNB was 98.4%. The grade of differentiation was correctly evaluated in 63.7%.The upgrading was necessary in 33,3 % of G1, the downgrading in 2,8 % of G2 or G3 sarcomas. 96% of BS and 89.1% of STS were primarily diagnosed correctly with regarding the entity. In the group of IB, the proportion of the correct diagnosis regarding of entity determination was 87%. In 81.8% of the cases, the differentiation could be evaluated correctly. In this group, the initial low-grade sarcomas were significant more frequently upgraded (30.8%). The entity was correctly diagnosed primarily in 96.4% of BS and 97.9% of STS.

Discussion

Both biopsy methods represent valid diagnostic procedures. The IB seems to be more advantageous regarding the evaluation of differentiation grade and entity of STS. The poorer result of incisional biopsies regarding the sensitivity is due to the preselection of patients in this group (bias).

192: Revision of allograft-prosthesis with new allograft-prosthesis composite in distal femur: 10 years follow-up

by Luis Carlos Gómez

Abstract ID: 192

INTRODUCTION: Limb salvage surgery for the treatment of primary bone sarcomas, has improved the patients quality of life, without modifying the disease-free survival, when compared to amputation; however, the ideal reconstruction technique is still a matter of controversy, in terms of complications, functional results, and survival.

OBJECTIVE: to evaluate functional results using an allograft-prosthesis composite in limb salvage surgery .

STUDY DESIGN: Case report

METHODS: Case report and review of the literature.

RESULTS: Allograft-prosthesis composite seems to reduce the complications of osteoarticular allografts and megaprosthesis, expecting results similar to those obtained in conventional arthroplasties. Once the allograft has integrated to host, can be considered the method to provide the best possible functional results

CONCLUSIONS: Allograft-prosthesis composite is a good option for managing primary bone sarcomas avoiding the complication of osteochondral allografts.

194: Good functional status following claviclectomy without reconstruction for benign and malignant tumors

by Sanjay Gupta

Abstract ID: 194

Background

Subtotal or total claviclectomy may be necessary for the surgical treatment of tumors of the clavicle and shoulder girdle. Reports of poor functional outcomes and high complication rates following claviclectomy after reconstruction of the bone defect exist. The goal of this study was to evaluate functional status and complications after clavicle resection without reconstruction.

Methods

A retrospective review of our prospective database identified 24 patients who underwent either subtotal or total claviclectomy for primary or metastatic tumors between 1991 and 2015. Functional status was assessed using the TESS, MSTs, and DASH scoring systems. Post-operative shoulder position, complications and the need for either rotational or free- flaps for soft tissue coverage were also analyzed.

Results

Seventeen women and seven men were included in our study group. The mean age was 43 years (range 16-85) and the most common diagnoses were osteosarcoma (n = 6), soft tissue sarcoma (n = 6), chondrosarcoma (n = 2), and metastatic disease (n = 4). Eight patients required flaps for soft tissue coverage (33%), including two free-flaps.

At a mean follow-up of 82.1 months (10-184), the mean MSTs-93 score was 84 (range 63-93), the mean TESS score was 86.5 (range 74-92), and the mean DASH score was 21.5 (range 0-47.5). Vascular injury requiring repair was the most common complication (20.8%), followed by infections requiring surgical intervention (8.3%). There were no differences in complication rates following primary or flap closure. At final analysis, 13 patients were alive without evidence of disease, four patients were alive with evidence of disease, three patients had died of disease and four died of other causes. Local tumor recurrence occurred in two patients following resection (8.3%).

Conclusion

Subtotal or total claviclectomy without skeletal reconstruction for the treatment of patients with tumors of the clavicle is associated with high level functioning and low complication rates.

201: Analysis of free vascularized graft reconstruction after bone tumor resection in pediatric population: a retrospective review

by P. Daolio | Stefano Bastoni | Fabio Giardina | Marco Innocenti | Eleonora Marini

Abstract ID: 201

Objective:

In pediatric bone tumors, the vascularized transplant of the fibula, either with or without allograft, allows for an adequate reconstruction of the bone loss and the possibility of conserving the growth potential of the segment.

Study design and Methods:

A retrospective review of patients treated 1996-2016 with fibular grafting after tumor resection at our Institution was done. The primary outcome was graft union analysis. The secondary outcomes: oncologic follow-up, evaluation of functionality (MSTs score) and the analysis of complications.

Results:

35 vascularized fibula transplants were performed: 25 associated with a massive allograft and 10 without; out of these, four including the proximal growing epiphysis of the fibula in proximal humerus cases. 20 patients diagnosed with osteosarcoma; 14 with Ewing sarcoma and 1 leiomyosarcoma. Median age at surgery was 13 (range 2-18), median follow-up (FU) was 5 years (range 2-10). The tumor located in the tibia in 15 cases, the femur in 8, the humerus in 7, the radius and ulna in 3, the pelvis in 2.

The mean and median bone fusion time was 9 months. The median MSTS score was 28. All fibula with proximal epiphysis transplants maintained their ability to grow. 28 patients were NED at last FU, 6 DOD and 1 lost at FU.

Overall complications rate was 25% (9 patients), caused by mechanical (5) or vascular (2) insufficiency, 1 wound dehiscence, and 1 common peroneal nerve temporary palsy. No patients developed an infection.

Conclusions:

Because of its biological properties, the vascularized graft allowed for fast bone fusion at the level of the osteotomy and a progressive hypertrophy and osteointegration with the allograft, when used. The fibula graft in the reconstruction of bone loss secondary to oncological excision is a trustworthy and versatile technique, that permits sparing joint surfaces avoiding prosthesis use and time related complications.

202: 29 Weeks Old Infant Congenital Fibrosarcoma of the Upper Limb: Reconstruction with a Reinnervated Free Latissimus Dorsi Flap and Tendon Transfer

by Primo Daolio | Stefano Bastoni | Marco Innocenti | Carla Baldrighi | Luca Delcroix | Eleonora Marini

Abstract ID: 202

Objective:

To illustrate a unique case of treatment in a congenital fibrosarcoma of the upper limb with chemotherapy, resection and reconstruction with a reinnervated free latissimus dorsi flap and tendon transfer in a 29 weeks old infant.

Methods:

In 2009, a prenatal (US) diagnosis of a right mass in the upper arm of a female fetus was done. At birth the infant showed at the MRI a mass extending from the middle third of the humerus to the radio-carpal joint. The incisional biopsy showed a translocation typical of congenital fibrosarcoma. She underwent chemotherapy and after three cycles the mass reduced with no axillary adenopathy. At 29 weeks she underwent surgery with orthopedic oncologist and reconstructive microsurgeons.

Results:

A radical en-bloc excision of the tumor was performed associated to the resection of muscle, periosteum of ulna and radius and radial nerve proximal to Fröhse arcade. A tendon transfer of FCR for EPL and PT for ECRL with a functional right latissimus dorsi miocutaneous free flap proximally to the epicodyle distally to EDC and a tendons neurorraphy to motor branch radial nerve was done. The clinical signs of venous congestion appeared 12 hours after, a new muscle flap transfer with the left innervated latissimus dorsi was done. Two months after surgery an initial radial nerve recovery occurred. Last follow-up (FU) at 9 years from surgery shows an excellent function, good cosmetic result, no donor site morbidity and a minimal limb length discrepancy. It is possible to see the evolution in the videos recorded at 6 months, 4 years and at last FU.

Conclusions:

There are no known reports in Literature of a free flap with reinnervation in a 29 weeks old infant for a soft tissue tumor. This case demonstrates how a multidisciplinary approach could bring to innovative results and a successful outcome treating a congenital malignant tumor.

204: Radiomics and soft tissue sarcomas, radiological innovations: A systematic review

by Annalisa Cortesi | Silvia Cammelli | Giulia Ghigi | Andrea Galuppi | Enrico Menghi | Giacomo Feliciani | Anna Tesei | Alessio Giuseppe Morganti | Antonino Romeo

Abstract ID: 204

Objective

Soft tissue sarcomas (STS) often require a multidisciplinary approach treatment including surgery, radiotherapy and chemotherapy. Radiomics attempts to quantify complex aspects of cancer images below the assumption that this information is related to tumor biology and can be very useful for tumor characterization and prediction of treatment response.

Study design

A systematic search of the bibliographic databases PubMed and Scopus library was performed. The endpoint was to identify the rationale of radiomics on Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) in STS in finding new predictive models that could personalize therapies.

Methods

We included studies published in English regarding radiomics and STS. Three studies analyze role of radiomics in MRI for a better characterization of tumor and two studies are about radiomics models in PET for the prediction of lung metastases.

Results

A total of 259 patients from 5 eligible studies were included. Different radiomic features were identified for each image according to the hypothesis that image features can quantify

information regarding intra-tumor heterogeneity highlighting tumor phenotype. These data could be theoretically useful to predict treatment efficacy and patients outcome. Two studies showed that a radiomic signature extracted from MRI improve prediction of PFS and OS over clinical features alone while one study showed a significant correlation with grading. Both studies based on PET showed a correlation between radiomic features and distant metastasis-free survival.

Conclusions

Few evidences are available on the role of radiomics in STS. Some preliminary experiences show a potential role in predicting tumor grading and patients outcome.

206: Outcomes of Simple Curettage and Impaction grafting of Allogeneic Bone Chip for Enchondromas of the Hand

by Min Wook Joo | Younho Choi

Abstract ID: 206

Objective

Although surgical management with curettage is the standard of care for symptomatic enchondromas, controversy surrounds surgical procedure, adjuvant treatment, and void management. Besides, it is also questionable whether the method or results of the surgery depend on the preoperative evaluation on the basis of the existing radiologic assessment criteria. Thus, we analyzed outcomes after management of enchondroma of the hand by simple curettage and impaction grafting of allogeneic bone chip.

Study design

Medical records of patients who underwent simple curettage and impaction grafting of allogeneic bone chip for enchondroma of the hand from 2005 to 2015 were retrospectively reviewed.

Methods

Demographic data, radiologic and operation-related informations, and clinical outcomes were investigated. Differences in clinical outcomes according to preoperative radiological evaluations and location of the lesion were statistically analyzed.

Results

There were 52 females 36 males with a median age of 32 years. Median symptom duration was 2 months. Most common locations was the 5th metacarpus. Median main length of lesions was 15.4mm. Median volume of grafted bones was 3ml. Median radiologic consolidation period was 3 months. Median duration of immobilization was 2 weeks, and median time for return to demanding physical activity was 8 weeks. Median MSTS score was 96.7 preoperatively and 100 at 3 months after surgery. Recurrence developed in one patient. Median follow-up period was 12 months. Kruskal-Wallis test showed no significant differences in time for return to demanding physical activity and radiologic consolidation according to

Takagawa Kazuoki classification, and Campanacci grade. Mann-Whitney test also demonstrated no significant differences depending on location of the lesion.

Conclusions

Preoperative radiologic criteria would have no significant influence on clinical results after surgery. Simple curettage and impaction grafting of allogeneic bone chip could be an excellent surgical option for symptomatic enchondroma of the hand, regardless of the location of lesions.

207: SMARCB1, LZTR1 and MSH6 Germline variants in Sporadic cases of Schwannomatosis

by Min Wook Joo | Byung-Joo Min

Abstract ID: 207

Objective

Schwannomatosis is a rare late-onset tumor predisposition disorder, and the third major form of neurofibromatosis. Peripheral nervous system involvement is almost the exclusive presentation in schwannomatosis. The main clinical manifestation and indication for active treatment is pain, which may be debilitating when the growing tumor compresses the nerve. About a third of schwannomatosis cases develop in families and a subset is associated with germline variants in the tumor suppressor gene SMARCB1. We performed genetic analyses on patients with schwannomatosis and their families.

Study design

This study was a retrospective and prospective cohort study of patients with histologically proven schwannomatosis, who were treated at our institution between March 2006 and June 2015; the study also included their families.

Methods

We performed genetic analyses using genomic DNA, including a SMARCB1 exome screening on 8 sporadic affected individuals, one familial affected individual and 2 unaffected descendants as well as whole exome sequencing for affected individuals without any variants in the coding regions of SMARCB1.

Results and Conclusions

Our SMARCB1 screening showed significant variants in 3 patients including familial cases. According to whole exome sequencing data, one sporadic affected individual had a mutation in LZTR1, another known genetic predisposition to familial schwannomatosis. In addition, multiple variants in the MSH6 gene were detected in 3 sporadic affected individuals. This group of sporadic cases may be a heterogeneous population containing a genetic cause more likely to be unrelated to chromosome 22. MSH6 is a strong candidate for the phenotype.

208: Malignant peripheral nerve sheath tumors: poor prognosis even after surgical resection with negative margins.

*by Hélder Fonte | Manuel Marques | Cláudia Rodrigues | Francisco Xará Leite | André Carvalho
| Ana Ribau | Vânia Oliveira | Pedro Cardoso*

Abstract ID: 208

Introduction: Malignant peripheral nerve sheath tumors (MPNSTs) are uncommon, biologically aggressive soft tissue sarcomas of neural origin that pose tremendous challenges. This paper aims to evaluate the treatment approach effectiveness and survival of patients sustaining MPNSTs.

Materials and Methods: We report four cases of MPNSTs in our institution.

Case Reports: Patient 1, 45-years-old male, with neurofibromatosis type 1 (NF1), developed a right arm mass for four months. A MPNST exhibiting a lung metastasis was diagnosed. During staging process the tumor had ulcerated. The surgical resection presented inadequate margin adjacent he started chemotherapy. A local relapse was identified and it was subjected to a trans-humeral amputation. Lung metastatic disease progressed and patient died three months later.

Patient 2, 40-years-old male with NF1, had a left thigh mass for 2 months. A sciatic MPNST was diagnosed. Resection margins were adequate. Just three months later he presented a relapse and tumor resection was followed by radiotherapy treatment. As disease progressed, patient did palliative chemotherapy and died four months after the second surgery.

Patient 3, 48-years-old female, developed a large hip tumor in 2 years. The epithelioid MPNST was resected with negative margins and adjuvant radiotherapy was performed. One year later she presents a local recurrence and re-staging exams reported metastatic disease. Patient is waiting for clinical strategy decision.

Patient 4, 24-years-old male, presented a MPNST on the third finger of the left hand and the third ray was amputated. Patient is disease free with seven years of follow-up.

Conclusion

These patients progressed with local recurrence and metastatic disease even when the surgical resection comes with negative margins. Amputation as further surgical approach is a non-success. The prognosis is poor with high rates of relapse following multimodality therapy, low response rates to adjuvant therapy, and propensity for rapid disease progression and high mortality.

211: Chondrosarcoma of the femur. Total femoral replacement with modular prosthesis.

by José Pablo Puertas García-Sandoval | Antonio Valcárcel Díaz | Jose Manuel Sánchez Archidona | Pedro Antonio Martínez Victorio | Luis Clavel Rojo

Abstract ID: 211

Introduction: Total femoral replacement with modular prosthesis is a feasible technique nowadays that can be used in cases of complete tumor involvement of the femur. This paper discusses a case where a low-grade chondrosarcoma had encompassed most of the femur.

Material and patient: A 51 year old woman with pain in the anterior upper third of her left thigh for 3 months. Full mobility of the hip and knee. On initial x-ray, an expansive lytic lesion in the upper two-thirds of the femur. CT and MRI showed an expansive lytic lesion occupying the full length of the femur. PET-CT showed a heterogeneous metabolic increase in the femur, characteristic of a low-grade lesion. Free of disease in other locations. Biopsy confirmed the diagnosis of a low-grade chondrosarcoma. **Surgical treatment:** complete resection of the femur. Reconstruction with femoral modular prosthesis. In the hip, a press-fit double mobility acetabular cup was used, and in the knee a cemented hinged knee prosthesis was implanted.

Results: One year later the patient tolerates walking without crutches and presents 0-90° knee flexion and extension. She has a score of 26 points on the MSTS scale.

Discussion: Chondrosarcoma is the second most common primary malignant bone tumor. The treatment of choice is surgery with resection of the affected compartment. Radio and chemotherapy are largely ineffective. Total femur replacement is a demanding technique which has allowed us to treat this case with a limb-sparing surgery.

212: Dysplasia epiphysealis hemimelica (Trevor-Fairbank Disease): a report of three new cases and imaging analyses

By Florencio Segura

Abstract ID: 212

INTRODUCTION: Dysplasia epiphysealis hemimelica is a rare , non-hereditary developmental bone dysplasia characterized by an osteocartilaginous tumor arising from an epiphysis. The general prevalence has been reported to be 1:1000000 and in a literature review 73 authors have reported 144 cases from 1926 to 2013.

OBJECTIVE: The objective of this presentation is to describe 3 cases of DEH with ankle localization in order to alert orthopaedic surgeons of this rare condition and analyse different imaging modalities used to monitor diagnosis and progression of the disease

MATERIAL: In the period 2013-2017 we had 3 DHE cases . All were male and they had 8 , 6 and 4 years at the initial review . Two cases were in the medial side of the distal tibia epiphysis and the third one in the lateral aspect of the right astragalus .

METHODS: A complete case/medical history and physical examination was made in each patient . X-rays, CT scans and MRI were performed and repeated each 6 months . EXT-1 and EXT-2 mutations were looked for but the results are not yet available . One patient was operated on because of pain during walking (astragalus location)

RESULTS: Pain , mass or functional impairment were the main symptoms. No history of trauma nor hereditary background could be elicited. X-rays, CT scan and MRI showed the lobulated osteocartilaginous mass and the histologic appearance of the resected specimen was identically to an osteochondroma

DISCUSSION: Trevor disease is a rare entity. No uniform consensus regarding its treatment is available but it seems that watchful observation is a good approach provided symptoms and deformity are non progressive.

CONCLUSION: We describe 3 new DEH cases registered in our region in the period 2013-2017. Different imaging modalities were useful for diagnosing and monitoring the evolution of patients.

213: Primary malignant giant cell tumor of bone (PMGCTB) treated by denosumab and chemotherapy: a Case report and review of the literature.

by Maxime Borgeaud | Noémie Lang | Thierry Rod Fleury | Alfredo Addeo

Abstract ID: 213

Objective:

To report and discuss molecular features and treatment of a PMGCTB case.

Study design:

Case report and review of the literature.

Methods:

We report a case of a patient presenting with a PMGCTB of the pelvis with multiple metastasis with a never described before high PD-L1 expression. Due to the rarity of such cases, we also performed a comprehensive literature review.

Results:

A 44 years-old man presented with hip pain and fever. A large tumor of the pelvis was identified and biopsy was performed. Histology showed an H3F3A and TP53 mutated MGCTB

with a PD-L1 60-70% expression. Next generation sequencing of 400 genes didn't show any targetable mutation. PET-CT showed multiple lung and bone metastases. A biopsy of a pulmonary lesion revealed only benign GCTB features. The patient also had a surgical treatment of a classic GCTB of the distal radius 14 years earlier, without any evidence of local recurrence, so we considered this new tumour as primary. The patient was started on ifosfamide/doxorubicin regimen and monthly denosumab.

To date 162 cases of MGCTB have been reported in the literature, with a 5 years overall survival of 33%-87%, most of them treated like osteosarcomas. However denosumab use has never been reported in this context.

Five cases harboring a TP53 mutation have been described in MGCTB, but no case was ever published with an increased expression of PD-L1.

Conclusions:

GCTB is at high risk of local recurrence but rarely become malignant (2-9%). The occurrence of metastasis is low (3-5%). Surgery remains the mainstay treatment for localized MGCTB. The role of denosumab associated to chemotherapy in metastatic cases is still unclear but looks promising. Our patient is the first case with a complete molecular and PD-L1 analysis. Given this high PD-L1 expression, treatment with an immune checkpoint inhibitor could be considered.

214: In situ cryosurgery assisted 3D Modelling planning and navigation by O arm of Desmoid Tumor Preliminary Results

by ortal segal

Abstract ID: 214

Aggressive fibromatosis, is a rare, locally invasive, non-metastasizing condition.

Reasons for treatment are; Volumetric progression, Symptoms worsening & Cosmetic disturbance.

Large en-bloc surgery is no longer regarded as the cornerstone treatment. Rate of relapse after surgery exceeds 60% in larger series. Shift to a more conservative approach, was adopted during last years. In situ cryotherapy is a minimal invasive procedure that can decrease tumor size by apoptosis.

The proper position and the number of needles is crucial in order to ideally cover and surround the tumor mass. By 3D modelling and planning this goal can be achieved. Using the O arm navigated system, real time positioning and monitoring is possible.

STUDY

4 patients with desmoid tumor with progression of tumor mass on imaging and severe functional disturbance were treated

Segmentation of the tumor and surrounding structures was performed into 3D surface models. Then by extrapolating the “kill zone” of each cryotherapy needle we placed the needle into the tumor.

Several isolated cryo needles were inserted into the tumor mass under O arm navigated guidance. During freezing cycles, a scan by the O arm was done in order to monitor the “ice ball”.

Results

All procedures were uneventful and all patients were discharged one day after the procedure. Although the O arm system is mainly designed for bone structures, we found it useful in soft tissue mass. The pre-operative planning using 3D modelling allowed us to correctly place the needles into the tumor mass in the most effective course.

All patients reported decreased pain and improvement of their general status and function. The MRI scans demonstrated a decrease of tumor size by an average of 42%.

Conclusion

In situ cryo-surgery is a safe procedure and effective in decreasing tumor mass in desmoid tumors. By 3D modelling, correct positioning of cryo needles can be optimal and more safe for the patients.

216: “Sarcoma of The Distal Tibia - Can We Improve the Results of Our Limb Salvage Procedures?”

by Daniel Kotrych | Andrzej Bohatyrewicz | P. Ziętek

Abstract ID: 216

Objective

The treatment of malignant bone tumors around the distal tibia has always been difficult due to limited healing potential. The limb salvage procedures are possible with the usage of modular oncological implants, allografts or other techniques. However, the long term results are still poor relating to survival rate of the modular implants. The aim of the study is to present the novel option of reconstruction following en bloc tumor resections in the distal tibia.

Method

The authors presented a new concept of a custom made implant based on an inverse idea of porous coating comparing with standard or modular oncological implants. The individual designs reflected anatomical shape of the resected part and had a deep, transparent EPORE® layer. The central, axial part consisted of a solid rod to resist the acting forces. Proximally, the

rod was connected with the uncemented MUTARS stem. The treatment concept for the distal transparent articular part and talus was primary desis and stable fixation with a modular porous stem. Two cases diagnosed with bone sarcomas were treated with that method at The Department of Orthopaedic Oncology of Pomeranian Medical University of Szczecin, Poland. The follow up controls were performed every four week after surgery.

Results

We achieved good functional results with no complications in that early observation period. The patients were able to put full wieght bearing after four weeks since the surgery was performed. No early infection or skin necrosis were detected.

Conclusions

The presented method showed the unique, individual possibilities of implants design that not online give mechanical stability but can potentially stimulate biology of healing. The deep EPORE® layer semms to pay a crucial role in stimulating fibroblast ingrowth from soft tissue into the implant what can reduce pathological skin movements over the implant and lower the risk of periprosthetic infection.

217: C-reactive Protein: a Independent Predictor for Dedifferentiated Chondrosarcoma

by Joannis Panotopoulos | Philipp Funovics | Gerhard Hobusch | Elena Nemecek | Madeleine Willegger | Reinhard Windhager

Abstract ID: 217

Objective: Dedifferentiated chondrosarcoma is rare a primary bone malignancy with a fatal outcome. The aim the study was to identify pretreatment serum markers as prognostic factors for dedifferentiated chondrosarcoma.

Methods: We retrospectively reviewed 33 patients with dedifferentiated chondrosarcoma treated at our department from 1977 to 2015. Kaplan-Meier curves, uni- and multivariable Cox proportional hazard model were performed to evaluate the association between the C-reactive protein and overall survival.

Results: In univariable analysis, CRP (HR 1.35; 95% CI 1.13-1.61; p=0.001), was strongly associated with overall survival. This association prevailed after adjustment for AJCC tumor stage (HR 1.31 95% CI 1.02-1.57; p=0.031) in the multivariable analysis.

Conclusions: Our data gave evidence that baseline CRP is an independent predictor for OS in patients with dedifferentiated chondrosarcoma. CRP could be exploited for the clinical prediction of this fatal disease in the future.

218: Locally aggressive lipofibromatosis-like neural tumor - a newly described entity

By Christian Viertler | Marko Bergovec | Iva Brcic | Franz Gollowitsch | Andreas Leithner | Bernadette Liegl-Atzwanger

Abstract ID: 218

Objective: First described in 2016, lipofibromatosis-like neural tumors (LPF-NT) are a new entity among superficial soft tissue lesions, displaying variable cytologic atypia, neural immunophenotype and are usually associated with Neurotrophic Receptor Tyrosine Kinase 1 (NTRK1) genetic alterations.

Case report: We report the case of a fifty-year-old male patient presenting with a subcutaneous mass of the neck region after three non-in sano resections due to a suspected recurring lipoma measuring 2,7 x 2,3 x 1,4 cm. Before further treatment, the tissue samples were reanalyzed at our center for histomorphology and immunohistochemical profile. The histopathologic evaluation of the biopsy specimen revealed a spindle cell tumor with marked nuclear atypia and infiltrative growth pattern through adjacent adipose tissue, somewhat reminiscent of dermatofibrosarcoma protuberans (DFSP). Immunohistochemical analyses revealed, in addition to a strong positivity for CD34, strong expression of S100. In contrast, SOX10 and tyrosinase were negative. Strong expression of S100 raised the possibility of a desmoplastic melanoma, however SOX10 negativity argued against this tumor, favoring the diagnosis of locally aggressive LPF-NT. After confirmation by an external reference pathologist, a wide re-resection was performed. Histological evaluation revealed residual tumor formations and negative resection margins.

Conclusions: LPF-NT should be considered in the differential diagnosis of superficial spindle cell, S100 positive tumors e.g. desmoplastic melanoma. Due to the locally aggressive and infiltrative growth pattern of this new entity, wider resections margins should be considered to avoid non-in-sano resections or local recurrence.

219: Prognostic factors and clinical outcomes in liposarcoma of the extremities

by recep selcuk eyceyurt | Burcin Kececi | Serra Kamer | Dundar Sabah

Abstract ID: 219

Objective:
the objective of this study was to determine the prognostic factors influencing the survival of patients affected by Liposarcoma with consideration for the grading, state of the resection

margin, size, metastases and local recurrence in a retrospective, single-centre analysis over 25 years.

Study Design:

Retrospective cohort study; Level of evidence, 3

Methods:

We included 87 patients (male/female = 43/44) in this study. We recorded the histologic subtype, AJCC classification, tumour margins, number of operations, complications, radiation, chemotherapy, survival, recrudescence, metastases and follow-up. Survivorship analysis was performed.

Results:

Of 87 patients, 43 males (49.4%) and 44 females (50.6%) with a median age of 49 (range, 16-80 years), 7 (8%) had metastasis at the first diagnosis and 80 (56%) had only a localized tumor. The 5-year overall survival of all the patients was 75.8%. Regarding the histological subtypes, there were 13 well-differentiated or atypical lipomatous tumours (14.9 %), 41 myxoid (47.1 %), 23 pleomorphic (26.4 %), 9 round cell (10.3 %) and 1 dedifferentiated (1.14 %), liposarcomas. Negative margins were detected in 81 cases (93.1%) after surgical resection. Local recurrence was detected in 8% of cases. There was no statistically significant correlation between local recurrence and survival ($p=0.5$) The presence of metastases at the first diagnosis and histological subtype as well as negative margins and stage are significant prognostic factors of the survival rates ($p < 0.01$).

Conclusion:

Stage, histological subtype, negative margins after surgery and metastases at the first diagnosis are independently associated with survival. We hope our investigation may facilitate a further prospective study and clinical decision-making in liposarcoma.

222: Metachronous osteosarcoma of head femur after limb salvage surgery due to osteosarcoma of the distal femur

by Aris Kurniawan | Mujaddid Idulhaq

Abstract ID: 222

Introduction: Osteosarcoma is the most common malignant bone tumor in children and adolescents. Surgery is a fundamental component of every treatment algorithm for osteosarcoma.

Case presentation: The presented case was a 16 years old female with osteosarcoma of the distal femur, that have been done the limb salvage surgery with a megaprotheses after a series of chemotherapy. One year after that the patient had a metachronous osteosarcoma

at the femoral head. The Bipolar Hemiarthroplasty was performed, and the patient able to walk again with an assistive device and the chemotherapy was continued.

Discussion: One of the option for surgical treatment for distal femur osteosarcoma is limb salvage surgery with megaprotheses. A metachronous tumor were detected following radiological examinations initiated because patients experienced localized pain after trauma. Two limb salvage surgery and series of chemotherapy was chosen in this growing child. Multifocal osteosarcoma is a rare condition with a poor prognosis. There is debate whether it represents multiple primary tumor or metastatic disease.

223: A retrospective review of failure rates of revision endoprosthetic spacers

by Rama Karri

Abstract ID: 223

Background: Patients undergoing Endoprosthetic Replacement (EPR) following resection of lower limb bone sarcomas are at a high risk of prosthetic infection. Two-staged revision is the preferred management, with the first-stage involving spacer insertion. The aims were to investigate the incidence of complications following spacer insertion and to identify possible causes of mechanical failures.

Methods: An orthopaedic oncology database was retrospectively reviewed to identify 45 patients who underwent first-stage revision for infection of lower limb EPRs since 2007. There were 3 total femurs, 11 proximal femurs, 13 distal femurs and 18 proximal tibial EPRs. Any infective or mechanical complications were noted, with radiographs being used to determine any mechanical failures: fracture, dislocation, or subluxation of the spacer.

Results: 24 patients (53%) had spacer complications: 5 reinfections and 19 mechanical failures. 14 of the 19 mechanical spacer complications arose within two weeks of implantation. 12 of the 14 (86%) total and proximal femur spacers either dislocated or fractured. 58% of all patients with a spacer <200% of the size of the defect had mechanical complications. 5 of the 7 (71%) patients with less than 10% of the spacer inserted into the residual bone had fractures.

Conclusion: The failure rate for two-stage revision EPR spacers in this cohort of patients is 53%. Total and proximal femur spacers have a very high risk of mechanical failure. Risk of mechanical failure is greatly increased if the spacer is <200% of the size of the defect or if insufficient amount of spacer is inserted into residual bone. Further investigation is warranted to determine if incorrect positioning of the spacer could increase risk of fracture/dislocation.

Implications: Intra-operative radiographs would help ascertain appropriate size and positioning of the spacer, reducing risk of mechanical complications. Repeating radiographs 2 weeks post first stage revision would also help identify complications early.

227: Fracture of knee joint endoprosthesis in children with malignant bone tumors

by Vadym Kobys / Volodymyr Konovalenko

Abstract ID: 227

Background/Objectives: Due to the growth of the child and the increase of body mass, the mechanical load on the endoprosthesis significantly increases, and extension of the prosthesis increases the arm of force on the endoprosthesis stem. Over time this leads to fracture of the femoral endoprosthesis stem and the need for reoperation to replace the endoprosthesis.

Design/Methods: During the period from 2000 to 2016, we operated 50 patients with malignant femur bone tumors aged 7 to 18 years, the average age was 11.5 years. 16 (31%) of them had a fracture of the femoral bone endoprosthesis stem in the period from 3 to 10 years after the arthroplasty. The material was titanium endoprosthesis or cobalt-chromiummolybdenum alloy. Rod diameter femoral stem was 10 to 12 mm. **Results:**All patients with a fracture of the femoral endoprosthesis stem had reimplantation of the stem, mostly with a stem of a larger diameter. There was no deterioration of limb function. In cement endoprosthesis the stems were removed without cutting the bone containing the fragments of the stem. In the cement-free prosthesis, longitudinal osteotomy was performed to extract fragments of the endoprosthesis stem.

Conclusions: When implanting knee endoprotheses in children, preference should be given to cement endoprosthesis because of the high risk of fracture endoprosthesis legs. They are much less traumatically removed when replacing endoprosthesis stems. Later, when the patient stops growing, cement-free endoprosthesis can be implanted.

228: Results of hip joint total and hemiarthroplasty in patients with extensive defects of the femur after tumor resection

by Ilkin Mikailov

Abstract ID: 228

Objectives

A retrospective analysis of the results of the use of various implants in hip replacement in patients with extensive defects of the proximal femur.

Study Design & Methods

Inclusion criteria: The resection level is more than 7 cm from the center of rotation. The complex analysis of the results in the period not less than 18 months after the operation. Primary surgical intervention.

Exclusion criteria: Death in the postoperative period in terms of up to 18 months. Impossibility to adequately assess the function of the joint due to the progression of the oncological disease. Local recurrence. Infection 108 patients operated in the department of bone oncology RNIITO them. R.R. Harmful from 2000 to 2015. The average age is 46 years (21 - 67) ♀ 34 - 63% ♂ 20 - 37%. Metastatic lesions 48; Chondrosarcomas 19; GCT 10; Osteosarcomas 15; Tumor-like lesions 16.

Femoral component - modular oncological systems, revision endoprostheses. The acetabular component: bipolar, total standard head diameter 32mm 36 mm, double mobility. The size of the resection is 7 - 26 cm (15 cm). Feet cement fixation 58 (53.7%) cementless fixation 50 (46.3%). Bipolar 34; total standard 38; total double mobility 36.

Results

Dislocation

The total number of dislocations was 9 (8,3%); bipolar heads 3(8,8%), total standard 6(15,8%), total double mobility 0.

No case of aseptic loosening of the femoral component was detected.

Functional result

Bipolar MSTS 83,5% Harris scale 76,1%; total standard MSTS 82,3% Harris scale 83,5%; total double mobility MSTS 86,7% Harris scale 85,3%.

Conclusions

The long-term functional results do not depend on the choice of the femoral component, but a positive balance is determined in favor of new technologies of endoprosthetics, such as acetabular components with double mobility. Acetabular components with double mobility significantly reduced the incidence of dislocation of the endoprosthesis in the early postoperative period and showed better functional result.

230: Distribution Patterns of Foot and Ankle Tumors

by Andreas Toepfer | Maximiliane Recker | Rüdiger von Eisenhart-Rothe

Abstract ID: 230

Objective: Bone and soft tissue masses of the foot and ankle are not particularly rare but true neoplasia has to be strictly differentiated from pseudotumorous lesions. The purpose of this study is to provide detailed information on the incidence and distribution patterns of foot and ankle tumors of a university tumor institute and propose a simple definition to facilitate comparison of future investigations.

Methods: As part of a retrospective, single-centre study, the data of patients that were treated for foot and ankle tumors between June 1997 and December 2015 in a musculoskeletal tumor

centre were analyzed regarding epidemiologic information, entity and localization. Included were all cases with a true tumor of the foot and ankle. Exclusion criteria were incomplete information on the patient or entity (e.g. histopathological diagnosis) and all pseudotumoral lesions.

Results: Out of 7487 musculoskeletal tumors, 413 cases (5,52%) of tumors of the foot and ankle in 409 patients were included (215 male and 198 female patients). The average age of the affected patients was 36 ± 18 y (min.3y, max.92y). 266 tumors involved the bone (64%), among them 231 (87%) benign and 35 (13%) malignant. There were 147 soft tissue tumors (36%), 104 (71%) were benign, 43 (29%) malignant. The most common benign osseous tumor lesions included simple bone cysts, enchondroma and osteochondroma. By far the most common malignant bone tumor was chondrosarcoma. Common benign soft tissue tumors included pigmented villo-nodular synovitis, superficial fibromatosis and schwannoma whereas the most common malignant members were synovial sarcoma and myxofibrosarcoma. Regarding anatomical localization, the hindfoot was affected most often.

Conclusions: Knowledge of incidence and distribution patterns of foot and ankle tumors will help to correctly assess unclear masses and initiate the right steps in further diagnostics and treatment. Unawareness can lead to delayed diagnosis and inadequate treatment with serious consequences for the affected patient.

233: Ossoscopy for benign osteolytic lesions of the calcaneus

by Andreas Toepfer

Abstract ID: 233

Background: Both unicameral bone cysts and intra-osseus lipoma of the calcaneus are rare entities which are mostly diagnosed due to unspecific heel pain, pathologic fracture or as incidental finding. Minimally-invasive ossoscopy with endoscopic resection of the tumor followed by grafting can potentially minimize risks of open surgery and speed up convalescence. Objective of this study is to present a simple, safe and cost-effective surgical technique for endoscopic surgical treatment of benign osteolytic lesions of the calcaneus.

Description of Technique: We present our modifications to previously described techniques of endoscopic curettage with particular focus on intraosseous lipoma. Key point for grafting is the use of a funnel-shaped ear speculum facilitating the filling of the bone cavity with allogenic cancellous bone chips.

Patients and Methods: Between June 2013 and January 2015 ten consecutive patients underwent ossoscopy of the calcaneus. There were 4 cases of intraosseus lipoma and 6 cases of unicameral bone cyst. Radiological results were analyzed using the Glutting- Classification, functional outcome was recorded with FFI and TESS.

Results: Radiographic follow-up and functional outcome showed good to excellent results. No differences in outcome was noticed between the two entities.

Conclusions: This technique is a simple and safe procedure for benign osteolytic bone lesions of the calcaneus. Compared to its alternatives, grafting with allogenic cancellous bone might prove favourable in this localization for several reasons: Osteointegration, handling, availability and costs. Our preliminary investigations show promising results although further clinical and radiographic results are needed.

234: Aneurysmal bone cyst - Our experience

by Cláudia Rodrigues | Luis Coutinho | João Rosa | Helder Fonte | Vania Oliveira | Pedro Cardoso

Abstract ID: 234

Objective

Aneurysmal bone cyst (ABC) is a benign tumor of bone that presents as a cystic, expansile lesion. Our objective is to report the cases treated in our institution.

Study design

This is a retrospective study, where we reviewed all ABC's treated in our institution since 2001, in order to analyze surgical morbidity and recurrence, looking forward taking the step for the current mini-invasive techniques, if necessary.

Methods

We included 17 cases of ABC's, all surgical treated, with a mean age of 25 years old (7-75). 15 cases occurred in the appendicular skeleton (3 in clavicles, 7 in tibia/fibula, 2 in lesser trochanter, 1 in humerus, 1 in 2th metacarpal and 1 in rib) and 2 cases in the axial skeleton (2nd lumbar vertebrae and iliac).

Results

All 17 cases were treated surgically, with aggressive curettage. In 11 cases besides the curettage, it was also used intralesion adjuvants, as phenol. In the L2 ABC, it was also necessary to perform a posterior pedicle fixation. Surgery was performed in average 1,6 months after the referral to our hospital. We didn't report any surgical complication.

We had 2 local recurrences: one ABC 9 months after the surgery and the other one in the iliac ABC 7 months after the surgery. The tibial ABC recurrence was treated with a new surgery with curettage and use of phenol, and the iliac recurrence was treated with radiofrequency thermoablation. Both cases are now free of disease.

Conclusions

New treatments as cryotherapy, radiation therapy, percutaneous intralesional injection of sclerosing agents and selective arterial embolization are in vogue.

Besides our good clinical results and low rate of recurrence, is our intention to start using these minimal invasive treatments.

238: GlassBONE use after bone tumor curettage

by nedim aytekin | vedat biçici | enes uluyardımcı | mehmet asiltürk | nihhat tosun | metin doğan

Abstract ID: 238

Bioactive bone substitute is a kind of bone graft. Allografts, autografts or synthetic bone grafts are using in filling of a defect caused by trauma, tumors or surgery. Bioglass is osteostimulative and osteoconductive.

Study design: 21 bone tumor patients treated with bioglass (glassBONE) to fill the bone defects are analyzed retrospectively.

Methods: All patients hospital records are analyzed and recalled for control ; physical examination has been done and control xrays has been taken. Patients' functional satisfaction and radiological assessment of tumor recurrence has been searched.

Results: 3 of 21 patients (9-51 years old) patientst have recurrence and no infection has been seen. Graft migration to the soft tissue seen in one patient. 18 patients have no complication.

Conclusion: Bioglass Bone Graft is a useful synthetic bone graft which has many advantages including ; low rate of infection, osteoinductive and osteoconductive effects. This is the first clinical study about GlassBONE(NORAKER) in the literature.

240: Management of childhood metastatic rhabdomyosarcoma: single Institution experience in a middle-income country

By Paripovic Lejla | Ilic Vesna | Bokun Jelena | Nikitovic Marina

Abstract ID: 240

Background/Objectives: The optimal use of current treatment strategies for childhood metastatic RMS must be planned with regard to well-established prognostic factors including the age of the patient, site and size of the primary tumour, presence of distant metastasis, pathological subtype and the predicted consequences of treatment. We here report our experience in the treatment of children suffering from metastatic soft tissue sarcomas.

Design/Methods: evaluation of 14 patients with metastatic rhabdomyosarcoma (10 girls and 4 boys), treated between 2004 and 2017, according to the CWS-2002 and CWS-2009 protocol.

Their age ranged between 4 and 18 years. The ratio of patients with rhabdomyosarcoma embryonale and rhabdomyosarcoma alveolare was the same. All patients had primary tumor in unfavorable site. Chemotherapy consisted of CEVAIE combination. One patient with bone marrow involvement was underwent high dose chemotherapy with stem cell support. Five patients had pathological nodal involvement, seven patients had two sites of metastatic disease, and two patients had bone marrow involvement. All patients were irradiated, depending on extent of disease. A majority of the patients underwent marginal resection.

Results: estimated outcome for all patients, seven patients died during chemotherapy (including patient who underwent HDT with stem cell support) because of the progression of disease and seven patients are alive with median follow up of 20 months. Three alive patients with pathological nodal involvement and four survivors with lung metastasis achieved regression of disease after chemotherapy, radiotherapy and marginal surgery.

Conclusions: The results of current treatment remain so poor and these patients need further randomized studies and more effective therapy strategies which may open many controversial issues such as duration of therapy, value of HDT with stem cell support compared to oral maintenance chemotherapy, the consequences of local therapy modalities and impact of aggressive surgical excision of metastases.

241: “Comparative non-inferiority observational study of prophylactic nailing with carbon fiber reinforced versus conventional nailing for pathological impending fractures”

by Guillermo Suazo Carrillo | Israel Rubio Saez | Eduardo Ortiz Cruz | Irene Barrientos Ruiz | L. Rodrigo Merino Rueda | Manuel Peleteiro Pensado

Abstract ID: 241

INTRODUCTION: Carbon fiber reinforced (CFR) implants have a theoretic benefit of radiotherapy optimization for its radiotransparency, but with a potential added difficulty in surgical technique.

OBJECTIVE: Aim of this study is to compare surgical parameters in two cohorts: one treated with CFR implants and the other with traditional implants.

MATERIALS AND METHODS: 14 patients (15 nails) took part in the study: 7 patients with CFR nails and 7 patients with traditional nails during the period from 2011 to 2018. The indication of nailing was an metastatic impending fracture in 11 cases (Mirels score >8 points) and 3 cases for fracture prophylaxis because of high doses of radiotherapy. Demographic data, surgical time, perioperative complication and blood loss in the first postoperative day were collected.

RESULTS: 7 CFR-PEEK nails were implanted and 8 traditional nails in 7 patients. In the first group, 3 cases were in humerus, 4 in femur. In the second group, 2 in humerus and 6 in femur.

The average age in the moment of nailing was 54 years in CFR cohort and 65 years in traditional cohort ($p=0,286$). Both groups consisted of 6 women and 1 man.

In terms of surgical time, the average time for CFR cohort was 82 minutes in contrast to 75 minutes in traditional cohort, with no statistical difference in non-parametric test ($p=0,619$). Respect to blood loss, the average quantity was 1,3 grams in CFR group compared to 1,5 grams in traditional group without statistical significance ($p=0,524$). 2 patients in the second group required blood transfusión.

No complications related to implants were observed in any group at the end of follow-up (median 4 months).

CONCLUSION: In spite of limitations, we can observe no differences in relation to surgical parameters between both treatments with a theoretic benefit in radiotherapy optimisation in CFR nailing.

242: Stabilisation of pathological humerus fractures using cement augmented plating

by William Wilson | Alan Pickup | Helen Findlay | Sanjay Gupta | Ashish Mahendra

Abstract ID: 242

Pathological lesions of bone include myeloma, lymphoma and commonly metastatic carcinoma. The humerus is the second most common long bone for metastatic tumours. These lesions result in weakened bone architecture and increased fracture risk. Patients suffer pain, loss of function and diminished quality of life, often when life expectancy is short. Fractures or impending fractures require surgical stabilisation to relieve pain and restore function for the remainder of the patient's life without the need for further surgery. Conventional management of these lesions in the humerus is intramedullary nailing, however there are issues with this technique, particularly regarding rigidity of fixation. Advances in contoured locking plates has led to the development of different stabilisation techniques. The preferred technique in this regional oncology unit is curettage of the tumour and plating, augmented with cement to fill the intramedullary canal and restore normal bone morphology.

In this retrospective analysis we evaluate the survivorship of the construct and the clinical outcomes in patients who had an established or prospective pathological humeral fracture treated with curettage and cement augmented plating, since 2010.

We identified 12 patients; 10 had metastasis and 2 myeloma. Average age at presentation 69 years (51-86), 11 with established fractures and one impending. Average time of follow up was 18 months with 5 patients deceased and 7 surviving.

There was 100% survivorship of the construct with no mechanical failures and no re-operations. There were no post-operative wound complications. Excellent early pain control

was achieved in 11 patients with one experiencing pain controlled by analgesia. Function was assessed using Toronto Extremity Salvage Score (TESS) and was satisfactory; average 79/100 (range 72-85). Cement augmented plating for pathological humerus fractures is a suitable alternative to intramedullary nailing and addresses several of the concerns with that technique. It provides immediate rigidity and allows early unrestricted function.

244: Localized Dedifferentiated Liposarcoma in the Extremities

by Eiji Nakata

Abstract ID: 244

Objective: Clinical outcomes of Dedifferentiated liposarcoma (DDLPS) are poor with a local recurrence rate of 80%, a distant metastasis rate of 30%, and 5-year overall survival rate of 44%. But these reports include patients with retroperitoneal tumors in most cases and there are very few studies which focused on the clinical outcome of primary DDLPS in the extremities. We therefore investigated the clinical outcome of primary DDLPS in the extremities.

Study design: retrospective study

Methods: We retrospectively evaluated the file records of patients with DDLPS of the extremities who received surgery in our institution between 2003 and 2015. Twelve patients (6 men and 6 women) were included in this study. The median age at diagnosis was 72 years. The site of the tumor were thigh (10), buttock (1), and forearm (1). No patient received preoperative or postoperative chemotherapy. Pre-operative radiotherapy was administered to no patient, and post-operative radiotherapy was administered to three patients. We analyzed disease specific survival (DSS), local recurrence rate, and metastasis rate. Survival rate was estimated using the Kaplan– Meier method. **Results:** For all 12 patients, 1 patient (8%) had died of disease at last follow-up. The DSS rate 5-year was 81%. Three patients (25%) developed a local recurrence. Two patients (17%) underwent re- excision and could obtain local control. Two patients developed metastasis; one to the lung and one to bone. The patient with lung metastases did not undergo resection of the disease and died of disease at 28 months after the initial surgery. The patient with bone metastases underwent resection of the disease and had been keeping disease free at last follow up.

Conclusions: Clinical results of DDLPS in the extremities were relatively excellent. In patient with local recurrence, re-excision can lead to local control.

245: Sentinel lymph node biopsy under gamma detection system in squamous cell carcinoma

by Min Wook Joo | Woo Hee Choi | Ho Jung An

Abstract ID: 245

Objective

Once clinically detectable nodal metastasis has occurred, the prognosis in squamous cell carcinoma (SCC) is poor. A dilemma, therefore, lies in the management of SCCs with no clinical or radiologic evidence of metastatic disease or a clinical NO status. There has been much debate over this matter, and no clear-cut guidelines exist to date. Sentinel lymph node biopsy (SLB) has been considered as a method to detect micro-metastasis early. We reviewed a data on our recent experiences of SLB in SCC.

Study design and Methods

Among patients with pathologically diagnosed squamous cell carcinoma in the extremity without lymph node or distant metastasis identified clinically or radiologically from March 2014 to February 2017, the medical records on cases who underwent wide excision for the primary lesion and sentinel lymph node dissection under gamma detection system after preoperative lymphoscintigraphy were reviewed.

Results

Ten patients were investigated, with the median age of 64 years. Five patients had precancerous lesions. Location of the primary lesion was the hand in 5, the foot in 3, and the leg in 2. Median main length and depth were 20.5mm and 13.5mm. Complete excision for the primary lesion was achieved in all patients. The median number of dissected nodes was 2. eight patients were continuously disease-free within the median follow-up period of 15 months. As a positive lymph node was observed in one patient, adjuvant chemotherapy was initiated early, and the patient showed no evidence of disease at 33 months after surgery. In one patient without any positive nodes, nodal metastases were observed 11 months after operation.

Conclusions

We believed that the role of SNB under gamma detection system after lymphoscintigraphy could be promising in the management of SCCs in the extremity. Meticulous care is always required in technical error from radioisotope injection to histological diagnosis.

246: Are Vitamin D and Calcium a sufficient treatment of premature bone mineral density reduction due to bone sarcoma therapy in young Ewing's sarcoma and osteosarcoma patients?

by Ulrike Michaela Pirker-Frühauf, MD | Daniela Sperl, MD | Franz Quehenberger, PhD | Barbara Obermayer, MD | Andreas Leithner, MD

Abstract ID: 246

Objective

Osteoprotective medication accompanying sarcoma treatment for Ewing's sarcoma and osteosarcoma in childhood and adolescence seems to be an important, but still underrepresented topic. Therefore, we wanted to evaluate the benefit of Vitamin D supplementation (\pm Calcium) during and after chemotherapy on our patients bone mineral density.

Study design

retrospective

Patients and Methods

We performed Z-score based densitometry and laboratory measurements in 29 patients (14 Ewing's sarcoma, 15 osteosarcoma) who received vitamin D supplementation (\pm Calcium) during and after sarcoma treatment. Our patients' mean age was 17 years \pm 5SD (range 7-26). Mean follow-up was 3 years \pm 2SD (range 1-6). Bone mineral densities and laboratory measurements of this cohort were compared with the results of 31 patients (14 Ewing's sarcoma, 17 osteosarcoma), who were treated for bone sarcoma without vitamin D supplementation. Mean age of this cohort was 22 years \pm 6SD (range 7-30), mean follow-up was 8 years \pm 5SD (range 1-18).

Results

In the lumbar spine 93% of patients under vitamin D supplementation were presenting healthy bone mineral density levels according to the WHO definition, compared to 55% in the standard cohort ($p = 0,001$).

Measurements of both femora were displaying the same trend, but without reaching significance ($p \geq 0,050$).

The median vitamin D level in the supplementation cohort was significantly higher with 24,1ng/mL compared to 15,8ng/mL in the standard cohort ($p = 0,00028$). Nevertheless, it was still below the recommended range of 30-60ng/mL.

Conclusions

Our patients benefited from vitamin D supplementation (\pm Calcium) during and after chemotherapy, especially in the lumbar spine which is described to be very sensitive to chemotherapeutic agents.

Nevertheless, higher doses - to reach vitamin D levels within the recommended range, might be needed to compensate the additional effect of immobilization in the lower limbs.

247: Pasteurized Autograft with vascularized fibular graft for Patients with Bone Sarcomas in the Proximal Humerus

by Min Wook Joo | Seonhwa Jeong | The Catholic University of Korea, Republic of Korea | The Catholic

Abstract ID: 247

Objective

It is a challenge to perform joint-preserving surgery and biological reconstruction for patients with bone sarcomas in the proximal humerus. We investigated the clinical outcomes of joint-saving resection and reconstruction using pasteurized autograft with vascularized fibular graft in the patients with bone sarcomas in the proximal humerus.

Study design and Methods

We reviewed the medical records of the patients with malignant bone tumors in the proximal humerus who underwent jointsaving resection followed by pasteurized autograft and vascularized fibular graft in this institution from 2003 to 2015.

Results

There were 4 males and 3 females, with median age of 44. On-lay and modified in-lay grafts were used in 3 and 4 patients, respectively. Screw fixation or conventional plating could not guarantee skeletal stability after reconstruction. So long as fixation devices maintain the stability, junctional union, especially in diaphyseal junction, was ultimately achieved. Bone scintigraphy, performed in 4 patients, demonstrated viability of humeral head. Median MSTs functional score was 83.3 at last follow-up. Median follow-up period was 62 months

Conclusions

Joint-preserving resection for bone sarcomas in the proximal humerus and reconstruction using pasteurized autograft and vascularized fibular graft could result in favorable junctional union and excellent functional result. Firm fixation by locking plate might be mandatory in this procedure.

252: Outcome Following Pasteurized Bone Autograft (PBA) for Treatment of Primary Bone Sarcoma

by Piya Kiatisevi, M.D.

Abstract ID: 252

Objective: To investigate functional and oncologic outcomes of patients treated with PBA and their complications.

Study Design: Retrospective

Methods: We reviewed 72 patients underwent PBA between 2011 and 2017. The mean age of patients was 23 years (6-84) and follow-up time was 31.5 months (3-76). There were 7, 45 and 19 patients with stage I, II and III by Enneking, respectively. Reconstructions were at distal femur in 26, proximal tibia in 23, proximal humerus in 6 and others in 17. The mean graft-length was 15 cm (6-32). Graft was soaked in 65° Celsius of saline solution for 30 minutes and fixed by long stem or plate or both. Articular surface was resurfaced with prosthesis. Patient outcomes and complications were reviewed.

Results: The 5-year disease-specific survival was 100%, 72.1% and 30.6% for patients with stage I, II and III, respectively. The overall MSTS score was 82% (50-97). The 5-year graft survival was 78.5%. Two grafts were removed at post-operative period because of positive margin and vascular. Complications included superficial infection in 4 patients (6%) treated with debridement, deep infection in 2 patients (3%) required revision to endoprosthesis in 1 and amputation in 1 patient. Recurrences were found in 4 patients (6%) required wide excision in 2, revision to allograft in 1 and amputation in 1. All was soft-tissue recurrence. Graft fractures were found in 3 patients (4%) required revision to allograft in 1. Aseptic loosening was found in 1 patient and non-union required bone grafting was found in 1 patient (1.5%). The incorporation time was 9 months (range, 3.5-22).

Conclusion: PBA is one of good alternative methods for limb-sparing surgery. With proper fixation and joint replacement, this method is attracting attention as a method which has good outcome, availability, provides immediate weight bearing and low cost with acceptable rate of complication.

254: Trabecular Metal Collars In Endoprosthetic Replacements: Do They Osteointegrate?

by Stephanie Spence | Omer Alanie | Ashish Mahendra | Helen Findlay | Sanjay Gupta

Abstract ID: 254

Objective

Trabecular metal (TM) is a biomaterial that is inert, strong and elastic making it ideal for osteointegration. It has been used successfully in orthopaedics for >15 years. To our knowledge no previous study has investigated bone ingrowth with TM collars in

endoprosthetic replacements (EPR) for tumour. We have used the Zimmer system with TM collar since 2010.

We aimed to assess radiological ingrowth into TM collars in tumour EPRs. We wished to identify if osteointegration was achieved and the time period for this.

Study Design/Methods

All patients undergoing an EPR for tumour were identified using our prospectively collected database. We performed a retrospective casenote review assessing oncological and functional outcomes.

Osteointegration was analysed on AP and lateral radiographs. Each collar region was divided into four. If radiolucent lines were present, no osteointegration occurred. This was then scored 0 to 4 based on numbers of integrated interfaces observed. Two orthopaedic consultants independently graded ingrowth at three months, one year and last appointment.

Results

49 patients were included. The BMI ranged from 19 to 47. 82% had femoral tumours, 6% tibial tumours and <1% pelvic tumours. 11% had tumours in another location. 49% had primary bone tumours, 8% had soft tissue sarcomas, 31% had metastatic disease and 12% had haematological malignancies. Post operatively 76% partially weight beared, 16% fully weight beared and 4% were non weight bearing. 2 patients underwent revision surgery for infection. Follow up ranged from 3 to 60 months (mean 25).

Radiographic analysis of both consultants correlated strongly (Spearman's coefficient = 0.92).

Conclusion

TM collar osteointegration improves with time. Those with no evidence of integration at 3 months are at high risk of never osteointegrating.

A larger series will aid our understanding of the TM collar role. Early results are encouraging; with low implant failure and revision rates.

256: The use of segmental antibiotic mega-spacers provide stable environments for staged reimplantation following large tumor and tumor-like defects

by Joseph Ippolito | Steven Rivero | Valdis Lelkes | Jen Thomson | Kathleen Beebe | Francis Patterson | Joseph Benevenia

Abstract ID: 256

Objective:

In patients requiring two-stage procedures, stabilization of large skeletal defects after radical debridement must be attained in order to successfully treat the infection. The purpose of this

study was to report on patient outcomes after stabilization of large defects with readily made antibiotic spacers and standard intramedullary nails.

Methods:

Between 1992 and 2017, 37 patients (16 male, 21 female) were treated for musculoskeletal infections resulting in an average skeletal defect of 20 cm. Eighteen patients had infection related to an oncologic procedure, 16 following arthroplasty, and 3 after revision surgery following fracture fixation. Following debridement, the defect was stabilized with Tobramycin and Vancomycin impregnated PMMA and intramedullary nails. Anatomic locations included the knee (25), hip (10), and humerus (2). Mean time from surgery until infection was 34.5 months. Mean follow-up was 112 months. Two patients with clinical and laboratory signs of resolved infection were not yet re-implanted at latest follow-up, and were excluded from analysis.

Results:

Most common organisms of infection were *Staphylococcus Epidermidis* (11) and *Staphylococcus Aureus* (10). Twenty-five patients underwent successful two-stage re-implantation. Thirty-one (88%) patients were successfully re-implanted with a segmental tumor endoprosthesis – 6 of these patients required an additional procedure prior to infection resolution including additional antibiotic spacer (4), irrigation and debridement (1), and polyethylene exchange (1). Three (8.5%) patients with infection ultimately required amputation. Two additional patients suffered a mechanical failure of the spacer-rod construct – one patient underwent spacer exchange and died of oncologic disease prior to revision surgery, while the other patient required one spacer exchange and was subsequently revised successfully to an endoprosthesis.

Conclusions:

Following radical debridement for infection, staged management of large segmental defects with antibiotic cement and temporary intramedullary stabilization results in an 88% success-rate of limb salvage with infection control.

Modified Masquelet Technique Using

257: Fibular Allograft Facilitates Medullary Canal reconstitution in a Large Tibial Defect After Tumor Resection: A Case Report with CT Evidence

by Valdis Lelkes | Joseph Ippolito | Michael Sirkin | Joseph Benevenia

Abstract ID: 257

Objective: Segmental defects after tumor resection can be treated with multiple reconstruction techniques. Performing a two stage masquelet technique to induce membrane formation on large defects can be challenging because of the large size requiring bone grafting.

Methods: The patient is a 16 year-old female diagnosed with an adamantinoma of the distal tibia with an 18cm segmental defect after resection. She underwent a two-stage masquelet technique to induce membrane formation, which was later bone grafted. The first stage involved the initial resection, plate fixation, as well as placement of an antibiotic cement spacer. The second stage was performed 3 months later, with incision of the membrane and removal of the cement spacer followed by bone grafting. We utilized a combination of a frozen fibula graft impacted between both tibial segments, additional autograft harvested from the iliac crest as well as femoral canal with a reamer, irrigator, and aspirator. The autograft was packed circumferentially around the fibular allograft, and the membrane was closed circumferentially around the graft (Figure 1).

Results: Serial radiographs demonstrated integration of the autograft, and CT scan at 6 months postoperatively confirmed bone union and reconstitution of the cortex (Figure 2). At 1 year postoperatively, the patient ambulates without assistive devices, is neurovascularly intact, and has ankle range of motion from -40 degrees plantarflexion, and dorsiflexion to neutral.

Conclusions: Masquelet technique in large defects with harvesting adequate bone graft from the iliac crest with additional bone graft from the femoral canal utilizing a reamer, irrigator, and aspirator is associated with good outcomes. A fibular allograft can be utilized to occupy space in the defect as well as contribute to union. Masquelet induced membrane reconstruction is a viable option for treatment of large defects of the tibia following tumor resection.

258: Use of prolene mesh for reconstruction of patellar tendon in patients undergoing resection and endoprosthesis reconstruction for proximal tibia tumors-Mid-term results in a large cohort of patients.

by Amrut Diwakar Raje | Dr Shah Alam Khan | Dr Venkatesan Sampath kumar | Vivek Tiwari

Abstract ID: 258

Objective: - Proximal tibia is one of the common sites for variety of musculoskeletal tumors. Management of these tumors remains a challenging task as the extensor mechanism has to be sacrificed. Purpose of this study was to evaluate clinical and functional outcome in patients undergoing patellar tendon reconstruction using prolene mesh while having an endoprosthesis reconstruction for proximal tibia tumors.

Study Design: - Retrospective observational study.

Methods: - Retrospective evaluation of 53 patients who underwent proximal tibia resection and endoprosthesis reconstruction using Adler's Proximal tibia endoprosthesis and patellar tendon reconstruction using Prolene mesh 30 cm x 30 cm from 2012 to 2017. The prolene mesh used was quadrupled and the remnant of the patellar tendon was sutured with one end

of this prolene mesh and the other end was passed through the patellar tendon attachment site on the proximal tibia component of the prosthesis and looped back upwards and sutured with proximal part and the gastrocnemius flap.

Results: - Out of 53 patients, 4 underwent a/k amputation for recurrence of the tumour, 5 patients had infection, 3 patients had to undergo revision surgery for implant failure and 6 patients died due to metastasis and other complications. The mean follow-up was of 38 months (range- 8 - 58). The mean extension lag was 3 degrees and mean active flexion of the knee was 108 degrees. The mean MSTS score was 78% (48- 93%).

Conclusions: - There was significantly less extension lag and good range of motion was achieved with less complications. The use of prolene mesh for reconstruction of the patellar tendon is a simple, cost effective and dependable alternative.

260: Malignancy in Giant cell tumours: a series of four cases and review of literature

by Amrut Diwakar Raje | Dr Shah Alam Khan | Dr Venkatesan Sampath Kumar | Ashish Ragase

Abstract ID: 260

Objective: - Giant cell tumour (GCT) of bone is a distinct, locally aggressive neoplasm, one of the most obscure and intensively examined tumours of bone. Malignancy in Giant Cell tumour of bone is a rare entity and is further divided into two groups namely Primary Malignant Giant Cell Tumour (PMGCT) and Secondary Malignant Giant Cell Tumour (SMGCT).

Study Design: - Retrospective observational study.

Methods: -We reviewed all cases of GCT from the All India Institute of Medical Sciences and filtered cases in which a diagnosis of giant cell tumour was related synchronously or metachronously to a diagnosis of sarcoma. We found total four cases of malignancy in GCT, retrospective evaluation of all the four cases was done for confirmation of the histopathological findings and clinical assessment was done to evaluate the outcome of the treatment offered to the patients.

Results: - Total 4 cases of malignancy in GCT were found, out which one case was of primary malignant giant cell tumour and other three were of secondary malignant giant cell tumour. All four patients underwent wide resection and endoprosthetic reconstruction as a definitive treatment. Three patients received chemotherapy according to histopathological grading. All four patients were males and the mean age of patients was 38.5 yrs. (range 25 - 47). The

primary malignant GCT case had a rapid and aggressive clinical course as compared to secondary malignant GCT cases.

Conclusions: - There is no fixed protocol for the treatment of malignancy in GCT, Primary malignant GCT are clinically aggressive and should be treated aggressively. Chemotherapy should be planned according to the histological grade. Large sample studies are required to formulate a proper protocol for the management of Malignancy in Giant Cell Tumour.

262: Osteogenic sarcoma of bone in patients older than forty years – single institute study from a tertiary cancer centre in India

by Ajay Puri | Vineeth John

Abstract ID: 262

Objectives: Osteosarcoma demonstrates bimodal peak with respect to age with lower incidence in second peak. Emergence of better supportive care and administration of multi agent chemotherapy even in older patient with better limb salvage technique has raised new interest. We present oncological outcome of primary high-grade osteosarcoma of bone in this age group of patients.

Study Design:Retrospective study

METHODS:Between January 2006 and March 2015, 44 patients (40 years or older) were treated with curative intent(non-methotrexate based chemotherapy and surgery). Patients treated elsewhere, recurrent and metastatic cases were excluded. The case file records, imaging and histopathological records, oncologic and functional status were reviewed. 31 were men and 13 were women with median age of 47 years at presentation. Nine patients had pathological fracture. Three patients(7%) were metastatic and 41 patients(93%) were non metastatic.

RESULTS:Limb salvage was done in 34 (77%) patients whereas 10 (33%) had amputation. Two patients had positive margins. Histological evaluation (available-35 patients) showed 21 (60%) had poor response and 14 (40%) had good response. The median follow up for survivors is 51 months. At the last follow up 19 patients were alive, 24 were dead and one lost to follow-up. 4 patients died due to chemotherapy complications. 2 patients had local recurrence, 10 had distant recurrence and one had both. The 5 year OVS is 47% and EFS is 39%. The OS and EFS

were not statistically different when we compared cohort with non metastatic < 40 years of age patients (706 patients) (< 40 yr - OS 53%, EFI 46%, > 40 yr OS 49%, EFI 41%).

Conclusion: Aggressively treated primary osteosarcoma in elderly can yield results comparable with adolescent group. Treatment protocol is similar to adolescent counterpart that includes chemotherapy and surgical resection of disease. Comprehensive multimodality team is of paramount importance in managing osteosarcomas in elderly patients.

264: Neutrophil-to-lymphocyte ratios (NLR) and platelet-to-lymphocyte ratios (PLR) as prognostic predictors for survival in patients with bone metastases secondary to non-small cell lung cancer.

by WA Goudriaan | QCBS Thio | PDS Dijkstra | RP Rosovsky | JH Schwab

Abstract ID: 264

Objective

The aim of our study is to investigate the prognostic value of NLR and PLR on overall survival in non-small cell lung cancer (NSCLC) patients surgically treated for bone metastases.

Study design & Methods

This retrospective study (2002-2015), from two tertiary care referral centers, included 126 patients with long bone and 105 patients with spine metastases secondary to NSCLC. Overall survival was defined as the interval between surgical treatment for (impending) fracture and death or final follow-up. Optimal cut-off values for preoperative NLR and PLR were dichotomized according to the most significant result in log-rank test. Survival curves were plotted according to the Kaplan-Meier method. The association between NLR or PLR and survival was assessed using Cox proportional hazard analyses. A p-value of <0.05 was considered statistically significant.

Results

Median overall survival for both groups was 84 days (IQR 41-221 days). The ideal cut-off value for NLR in long bone is 13.2 (HR 3.004, 95%CI:1.875-4.813; p=0.000) and for PLR 347 (HR 1.939, 95%CI:1.312-2.866; p=0.001). For spine it is 7.7 (HR 2.3908, 95%CI:1.565-3.652; p=0.000) and 519 (HR 1.958, 95%CI:1.204-3.184; p=0.007), respectively.

In both groups, long bone and spine, an elevated NLR and PLR predicted a significantly worse outcome of overall survival. Compared with the elevated ratio groups, median survival time was more than 2.7 and 1.9 times longer for the non-elevated NLR and PLR subject groups, respectively.

Conclusions

Overall survival in elevated preoperative NLR and PLR patient groups was significantly reduced when compared to patients with non-elevated preoperative ratios. Adopting these ratios in prognostic models for NSCLC patients could improve reliability.

266: Clinical Characteristics and Outcome of Infantile Fibrosarcoma: A Retrospective Single-institution Review

by Enas El Nadi | Sayed Abdel Hamid | Mona Moustafa | AlaaYounes | Gehad Ahmed | Mohamed S. Zaghloul | Naglaa ElKinaai | Tarek Rafaat | ElhamKhaled

Abstract ID: 266

Objective:

To analyze the clinical characteristics and outcome of children with infantile Fibrosarcoma (IFS) who were treated at Children's Cancer Hospital Egypt (CCHE- 57357).

Study Design

A Retrospective chart review of all pathologically confirmed IFS patients treated at CCHE-57357 from July 2011 till December 2016.

Methods

Detailed demographic, pathological, and clinical data of 24 IFS patients were collected, analyzed and correlated with treatment outcome and survival.

Results

We enrolled 24 patients with a median age 0.23 years (range 0.03-3.8), 54% were females. Extremities were the commonest primary site (58.3%), followed by head and neck (16.6%) and pelvi-abdominal sites (16.6%), one case in trunk and one case intrathoracic. The tumor size was >5cm in 15 patients, <5cm in six and undetermined in three. It was respectable without preoperative chemotherapy in four patients. Eighteen received preoperative VAC (Vincristine, Actinomycin and Cyclophosphamide) of those five received second line Ifosphamide and Adriamycin to improve respectability. Five patients received additional local radiotherapy as local control.

267: Towards an advanced 3D in vitro disease model of chordoma tumors

by Stefan Stoiber | Beate Rinner | Alexander Stallinger | Bernadette Liegl-Atzwanger | Andreas Leithner | Cornelia Kasper | Verena Charwat

Abstract ID: 267

Objective: Chordoma tumors are rare types of slowly growing bone tumors. The primary tumor originates along the axial spine and they are believed to arise of remnants of the

notochord. Over the past few years, it was a challenge to establish cell lines due to the very slow-growing of this tumor entity. However, the most common cultivation is two-dimensional (2D) and innovative three-dimensional (3D) models to express the physiological behavior of chordoma are still needed.

Study design: Therefore, the aim of this study was to design and develop a novel approach for an advanced 3D disease model using chordoma cell lines, MUG-CC1 (clival chordoma) and MUG-Chor1 (sacral chordoma), and the promising 3D bone matrix OSTEOpure™.

Methods: For the cultivation of chordoma cells on the bone matrix a tailor-made perfusion reactor system was used. The total circulation volume of each perfusion reactor chamber was 10 mL and the flow rate was consistently set to 0.6 mL/min. Additionally cells of both cell lines were cultivated in 2D and in 3D under static conditions as controls. Every second day a partial medium change of one mL for the dynamic 3D samples and a total medium change for the static samples was performed. Finally, the morphological characteristics and the viability of all samples (static 2D, static 3D and dynamic 3D) were assessed by 4 DAPI/AM/PI staining. Moreover, after embedding the samples in paraffin a hematoxylin eosin staining to confirm the morphology of typical chordoma cells, as well as brachyury staining to further characterize the obtained samples, were performed.

Results: MUG-CC1 and MUG-Chor1 chordoma cell lines are able to grow and proliferate in complex 3D environment, utilizing OSTEOpure™ as a scaffold, under static and dynamic conditions.

Conclusion: This finding potentially provides the basis for future research towards a more physiological in vitro chordoma disease model.

268: Open vs. closed image-guided biopsies in benign and malignant musculoskeletal lesions. A retrospective review of 1437 biopsies performed on 1310 patients.

By Kyriakos Papavasiliou | Antonia Bintoudi | Theodore Michail | Anastasios-Nektarios Tzavellas | Ioannis Tsitouridis | Fares Sayegh

Abstract ID: 268

Objective. Review all biopsies (closed and open) performed on patients with soft-tissue and bone tumours and evaluate the diagnostic accuracy of the closed procedure.

Study design. Retrospective case-series study.

Methods. We reviewed the case notes of all patients with musculoskeletal lesions who underwent closed or open biopsies during the last 14 years. Necessity for additional biopsy, validation of the closed biopsy's result with that of the definite pathology report following the excision of a lesion and complication and morbidity rates were registered and analyzed.

Results. Between December 2003 and October 2017, a total of 1437 biopsies were performed on 1310 patients (715 female, 585 male) suffering from 326 benign and 966 malignant (447 primary, 519 metastatic) lesions. Eighteen patients had Giant Cell Tumours. In all patients a closed biopsy under image guidance was initially performed. In 986 cases, CT-scan guidance was used; the remaining 324 were performed under US guidance. In 121 cases (9.2%) an open biopsy was deemed as necessary in order to reach a secure diagnosis. In 1063 patients, the tumour was operatively excised or underwent curettage. The final pathology report was in accordance with the initial biopsy report in 1019 cases; in the remaining 44 (4.1%) there was a discrepancy between the two reports. In 39 of these cases, a closed biopsy had been performed. There were three cases of haematomas and no infections following closed biopsies. A painful neuroma developed following a closed biopsy of a benign tumour necessitating operative excision. Seven cases of mild postoperative hematomas following open biopsies also developed. In another case an extraosseous migration of a primary aneurysmal bone cyst following CT-guided core needle biopsy was developed, which also required marginal excision.

Conclusions. Closed image-guided biopsy seems to be the gold standard method to accurately and efficiently obtain tissue for pathologic examination for both benign and malignant lesions

269: Evaluation of an e-based clinical follow- up process for patients with musculoskeletal tumors

by Philipp T. Funovics | Reinhard Windhager | Jakob Bollmann

Abstract ID: 269

Objective

Follow-up of patients represents a major tool of treatment, including documentation, quality control, patient information, research, patient engagement, education, and economic optimisation. Facing complex regulatory requirements of documentation and scientific conduct, academic institutions could generate advantages in integrating clinical healthcare, research and academic duties, by applying on-line tools for follow-up. We aimed (1) to explore patient willingness to use digital tools for follow-up after musculoskeletal cancer, (2) to assess compliance through different channels of contact in relation to demographic characteristics, (3) to evaluate obtained results.

Study Design

prospective

Methods

First, throughout a patient questionnaire we explored the willingness to use digital follow- up. Second, among patients after surgical treatment, we performed a response analysis via different channels of communication. Patients were asked to assess a medical questionnaire

on their health status. Third, questionnaires were checked for completeness to evaluate the quality of obtained results.

Results

77-81% agreed to participate in external follow-up, 77% agreed to take part in on-line surveys; the preferred link of communication was the referring surgeon/practitioner. Age and education were correlating with willingness to use e-mail or an app. The use of e-mail and smartphones implied a willingness to use an app. Contact via e-mail retrieved significantly fewer positive responses compared to mail or telephone. Personal contact (telephone) resulted in the highest response rate. Sex, age, follow-up period, and endoprosthesis had no impact. 98% of responses resulted in full completion of patient-reported outcomes which qualified them for further use.

Conclusions

The majority of patients agreed to participate in external follow-up management. The willingness to use on-line follow-up tools is dependent from age and the use of digital media. Compliance throughout digital processes seems to be largely influenced by a need for a persisting personal contact to a treating physician.

271: Lateral Collateral Ligament Fixation and Stability with Suture Anchor After Proximal Fibula Resection

by SAMET IŞIK | mazhar TOKGOZOGLU | GOKHAN AYIK | HACETTEPE | HACETTEPE | HACETTEPE

Abstract ID: 271

OBJECT

Enbloc resection may be required for the treatment of proximal fibular tumors. In this case, knee instability may develop in the patient as lateral collateral ligament attachment site is removed with proximal fibula. Bone tunneling, staple fixation-like methods have been proposed in the literature to prevent this condition. The aim of this study was to evaluate the outcome of patients with lateral collateral ligament stabilized by suture anchors in the tibial metaphysis.

METHODS

Patients who underwent proximal fibular resection between 2007-2016 in our hospital were evaluated. Nineteen patients were retrospectively screened and their knee stability and function were assessed. Patient who underwent Malaver Type I or II resection according to the tumor type, then lateral collateral ligament were fixed with suture anchor to the tibial metaphyses with the knee flexed at 30 degrees. Patients were followed postoperatively with angle adjustable knee brace. The first three weeks allowed a range of motion of 0-30 degrees.

RESULT

15 of the patients were female and 4 were male. The mean age was 28,8 and the mean follow-up was 5,2 years. Among the patients evaluated, five osteosarcomas, eight low grade chondrosarcomas, two giant cell tumors, one aneurysmal bone cyst, one ewing's sarcoma, one osteochondromatosis and one intraosseous lipoma; two patients were identified as ex. When the functional results of nineteen patients were evaluated, it was seen that the patients had stable knee joint and the patients had good functional outcomes. At the 0 and 30 degree knee examinations, it was seen that there was no lateral opening.

CONCLUSIONS

LCL fixation with suture anchor is an effective and easily applicable method to prevent knee instabilities.

272: Towards a better consensual use of USP6 FISH for the diagnosis of Aneurysmal Bone Cyst. The French Bone Sarcoma network RESOS experience.

by Bouvier Corinne | Macagno Nicolas | Dassa Sarah | Tristani Hugo | Larousserie Frédérique | Audard Virginie | Aubert Sébastien | Gomez-Brouchet Anne | Galant Christine

Abstract ID: 272

Objectives:

Aneurysmal Bone Cyst (ABC) is now considered to be a neoplasm following the discovery of recurrent chromosomal translocations resulting in the fusion of Ubiquitin Specific Peptidase 6 (USP6) gene with different partners. The detection of USP6 rearrangements by Fluorescent in situ hybridization (FISH) is routinely available to confirm the diagnosis of ABC. This study aims to evaluating USP6 FISH testing in the pathology departments of RESOS.

Study design and Methods:

USP6 FISH data for 2017 were collected from 6 departments of pathology of RESOS. The number of assays performed, the number of interpretable results, the indication, the positivity cut-offs used, the type of pathology record and the consequence for the final pathological diagnosis were analyzed.

Results:

82 FISH analyses searching for USP6 rearrangement were performed. For 14 cases the technique failed mostly because of inadequate fixation and/or decalcification. For 43 cases, a rearrangement was detected but the cut offs of positivity ranged from 5% to 20%, preventing us assessing the sensitivity and specificity of the FISH for the diagnosis of ABC. The indications were variable and could be influenced by the age of the patient and/or radiological data. In some centers, FISH was systematically performed for every giant-cell rich lesion, whereas some centers use it only to confirm the diagnosis of ABC. In the histological records, cellularity of the specimen and the percentage of rearranged cells were not always mentioned. However, in most departments FISH results were discussed to provide an "integrated" diagnosis.

Conclusion:

Improving pre-analytical testing phase as well as establishing standard cut off for positivity are determining factors toward a better consensual use of USP6 FISH as a valuable tool for the diagnosis of ABC.

273: Primary Leiomyosarcoma of Bone: A case series of 6 patients

by Dr Manish Pruthi | Dr Himanshu Rohela | Dr Sunil Pasricha

Abstract ID: 273

Introduction

Primary leiomyosarcoma of bone is an exceedingly rare entity accounting for <0.7% of all primary bone tumours. It is one of the variants of the spindle cell sarcomas of the bone consisting of significant smooth muscle component but lacks malignant osteoid or chondroid matrix. A definitive diagnosis is based on biopsy and subsequent pathologic and immunohistochemistry review for markers such as desmin, smooth muscle action (SMA) and h-caldesmon. Surgery forms the mainstay of treatment. Role of chemotherapy is debatable. Limb-salvage in the form of wide surgical resection and reconstruction should be attempted wherever feasible to obtain a good outcome.

Methods

Retrospective analysis from our database identified 6 cases of leiomyosarcoma of bone operated from May 2013 to April 2016.

Results

There were 5 males and 1 female with a mean age of 36years and a mean tumour size of 9.42cms. The most common site involved was the tibia (n=4) followed by distal femur (n=2). Limb salvage surgery was done in all the 6 cases. Reconstruction with endoprosthesis was performed in 5 cases and with fibular grafting in one case with intercalary resection. Adjuvant chemotherapy was administered to 3 patients and adjuvant radiotherapy to 1 patient. Two patients developed local complications. Local recurrence was not seen in any patient, but 2 patients developed distant metastases. Mean follow up till date is of 36 months (Range 24 to 54 months). All patients were alive till last the follow-up.

Conclusion

Leiomyosarcoma of bone is a rare primary malignant bone tumour and also presents a diagnostic challenge. Despite having being reported previously to have a high incidence of metastases and prognosis deemed dismal, early detection and appropriate management can lead to a better survival and limb function.

275: Extra skeletal myxoid hondrosarcoma: a monocentric retrospective study.

by Louis-Romee Le Nail | Jan Balko | Vaiyapuri Sumathi | Tomohiro Fujiwara | Jonathan Stevenson | Lee Jeys | Michael Parry

Abstract ID: 275

Background

Extraskeletal myxoid chondrosarcoma (EMC) is a rare mesenchymal, malignant soft tissue tumor characterized by a specific chromosomal translocation. The aim of this study was to analyze the clinical and pathological features of this rare sarcoma, with a focus on the effect of chemotherapy and radiotherapy and the treatment of metastatic disease.

Material & Methods

The study comprised 34 patients (25 men, 9 women), with a mean age of 57 years, diagnosed and treated at a single tertiary referral centre between 1989 and 2017. Patients presented with a painless lump, most commonly in the buttock or lower limb (68%), and arising within the deep compartments (94%).

Results

The mean follow up was 102 months (2-272 months). 2 patients (6%) presented with metastatic disease. All patients underwent surgical resection. Limb salvage was the definitive surgical procedure in 30 patients with 4 patients requiring amputation. Twenty patients had adjuvant treatment with 17 receiving radiotherapy and 3 receiving chemotherapy. The mean event free survival was 71 months (0,7-267 months). The 5 and 10 years overall survival rates were respectively 89 and 68%. Metastases were mainly to the lung and lymph nodes. The mean survival with metastases was 54 months (3-110). Risks factors for local recurrence were inadvertent excision and inadequate margins. Risks factors for the development of metastases were increasing tumor size (11,9 vs 7,7 cm).

Discussion & Conclusion

EMC has previously been described as a slow growing, borderline malignancy. However, it should be considered a high-grade disease associated with late recurrence and metastasis despite apparently adequate local control. The management of ECM should therefore be performed in units who understand and have experience of the disease. Early referral of a suspicious mass should always be considered as prognosis appears to be inversely correlated to the size of the tumour.

276: Locally aggressive Giant Cell Tumour of the distal fibula in a 36-year-old female patient, successfully treated with curettage and anatomic reconstruction of the distal malleolus with PMMA. A case report.

by Kyriakos Papavasiliou | Theodore Michail | Anastasios-Nektarios Tzavellas | Fares Sayegh

Abstract ID: 276

Objective. To report the case of a patient with a locally aggressive Giant Cell Tumour (GCT) of the distal fibula who was successfully treated with curettage and reconstruction of the lateral malleolus with the use of PMMA.

Case report. A 36-year-old female patient with a painful swelling at her right ankle was referred to our department for evaluation and treatment. The patient reported gradual onset of pain and gradually increasing local swelling, without any history of trauma. Local imaging studies (radiographs, CT- and MRI- scans) revealed a large lytic lesion at the distal fibula. CT-guided core-needle biopsy confirmed the diagnosis of a GCT of the bone. The patient was operated on a few weeks later. Through a typical mid-fibular lateral ankle “J” incision, the lesion underwent extended curettage. Intraoperatively, the frontal and lateral cortices and a significant part of the medial cortex of the fibula were found to be overtaken by the tumour, while the tibio-fibular syndesmosis was intact. With the use of PMMA and “press-fit” technique, the distal part of the fibula was anatomically reconstructed in order to have the 3-D characteristics of the lateral malleolus. Stability of the PMMA-made “malleolus” was facilitated with the induction of drills in the trabecular part of the medullar cavity of the proximal part of the fibula. A short cast was applied postoperatively and the patient began gradually increasing partial weight-bearing after the 6th postoperative week. On the latest follow-up visit 12 months postoperatively, she was capable of full weight bearing, she did not report any pain and there were no signs of local recurrence.

Conclusions. Local treatment, with anatomic reconstruction of the lateral malleolus, seems to have been adequate for the treatment of an aggressive GCT of the distal fibula. Further follow-up will evaluate long-term efficacy of this method.

278: “RADICAL” intralesional curettage – a step beyond extended curettage! – A novel, highly effective method to treat Giant cell tumors of bone – retrospective analysis of 242 patients with long term follow up"

by Mandip Chandravadan Shah, Chetan Anchan

Introduction:

In Giant cell tumor (GCT) of bone, though intralesional surgery is considered standard of care, high local recurrence rates have been reported after curettage. Resection is safer option but leads to disability and future issues. We analyzed oncological outcome of more extensive “Radical” intralesional curettage for GCT along with systemic Zoledronic acid injections.

Methods:

Of 242 evaluable GCT patients (148 males, 94 females, median age 27 years) ,180 patients underwent radical intra-lesional curettage meaning by en-bloc excision of non articular soft cortices, high speed burring, phenol – alcohol irrigation and spray mode electrocauterization. Postoperatively 210/242 patients received 6 injections of 4 mg zoledronate. Reconstruction was done with bone graft / cement / both. 62 patients not suitable for curettage underwent enbloc segmental resections.

Results:

62% of the GCTs were localized around the knee. There were 94 recurrent cases. 21 patients had pathological fractures. 124 had grade III GCT. After curettage, the reconstruction was done using only cement in 136, only bone graft in 24 and both in 20 cases. Implants were used in 45 patients. At mean follow-up 71 months, recurrence happened in 2 patients in resection group (3%) and in 9 patients in curettage group (5%) ($P > 0.01$). Recurrence rate was 2.7% in primary and 7.4% in recurrent cases ($P > 0.01$); 20.8% in bone grafted patients and 2.5% in cementing group ($P < 0.001$). Administration of zoledronate reduced local recurrence and metastasis rates significantly ($p < 0.001$). 6 patients (2.4%) developed metastasis.

Conclusion:

Combination of radical intralesional surgery and zoledronate injections consistently gives excellent local control in GCTs. Cavity filling with cement helps reduce the recurrence rates further. Zoledronate seems to have significant effect evident by reduction in local recurrence and negligible metastatic rates in our study. We strongly recommend this treatment for GCTs.

284: Oncological & Functional Outcome of Limb Salvage Surgery done for Patients with very large Nonmetastatic high grade Osteosarcoma

by Mandip Chandravadan Shah, Chetan Anchan

Introduction & aims:

Late presentations with large volume tumor is not uncommon in India. However, amputation is not well accepted by many of these patients. We analysed the oncological safety and functional outcome of limb salvage surgery done in these very large but non-metastatic high grade osteosarcoma patients.

Method:

Between 2010 and 2015, in 34 nonmetastatic osteosarcoma patients (18 males, 16 females, median age 17 years), amputation was the obvious choice due to massive size of tumor but salvage was done as patients did not accept an amputation. Minimum tumor size was 12 cm in at least 2 dimensions. Salvage seemed technically possible. Reconstruction which would allow the patient Immediate function was chosen. All patients underwent neoadjuvant chemotherapy. All completed treatment. Surgical morbidity, oncological outcome and functional results were analysed. Data of all 34 patients was available.

Results:

Commonest tumor location was distal femur (n-11). Reconstruction was done using megaprosthesis in 18, nail - cement spacer in 8, rotationplasty in 2, fibula/ulna translation in 2 and none in 4 cases. 7 superficial necrosis and 2 nerve palsies were the only complications. Tumor free margins could be achieved in 33 patients. Follow up ranged from 36 – 92 months. 27 patients have died of metastatic disease (20 lung, 3 bone, 3 lung + bone, 1 brain). 6 local recurrences were observed. Average time to weight bearing was 4 days in prosthesis / spacer/ fibulectomies. Average MSTS score was 23 for lower limb patients. 7 patients are disease.

Conclusions:

Patients with large tumor volume are at very high risk of systemic relapse and have a poor prognosis. Very low surgical morbidity, acceptable local recurrence rate and decent functional outcome in our series justify the attempt for limb salvage in large high grade non- metastatic osteosarcoma.

285: Escaping an orthopedic quagmire - the orthopedic oncology lifeline!! – A Retrospective analysis of 44 cases.

by Mandip Chandravadan Shah, Chetan Anchan

Abstract ID: 285

Aims: It is routine in Orthopaedic Oncology to conduct massive skeletal resections and reconstruct the resultant defect in the best possible way. We have evaluated application of such radical resection and reconstruction techniques to non-oncologic orthopedic situations where there seemed to be no other promising solution.

Methods: Orthopedic oncosurgery principles were applied for treating resistant non-unions (10), infected non-unions (6), primary non-reconstructable trauma (3), large segmental defects (5), periprosthetic fractures (11), failed arthroplasties (3) and resistant osteomyelitis / myositis (6). Desired end point was to avoid amputation and give the patient a stable mobile reconstruction without any infection. We analyzed whether the aimed end point was achieved or not in 44 such patients.

Results: There were 34 males and 10 females (Mean age = 52). Megaprosthesis reconstruction (n =26; 20 knee, 3 hip, 2 elbow, 1 total femur) was mainstay of reconstruction in clean cases. In cases with bone –soft tissue infections (n = 10), en bloc resection of infected mass (following principles of sarcoma surgery), High speed burring, phenol - alcohol wash were done. Combination of customized plates, massive bone grafting and variety of flaps was used to reconstruct a segmental defect (n = 5). 2 patients underwent Rotationplasty. All patients with megaprosthesis arthroplasty became immediately mobile. Long term control from infection could be achieved in 10/12 patients. Segmental gap could be successfully reconstructed in 4/5 patients. The desired end point could be reached in 39/44 patients (88.6%). Amputation could be avoided in 27/30 potential patients. Average MSTS functional score was 22/30 in this study.

Conclusion: Ortho-Oncosurgery principles offer very predictable reconstruction options successful most times as evident from very high rates of achieving desired end point in this series. These modalities should be kept in mind as viable options, before suggesting unpredictable and/or complex procedures, or recommending an amputation.

288: Extracorporeal radiotherapy and reimplantation for bone sarcoma - oncological and functional outcome

by Mandip Chandravadan Shah, Chetan Anchan, Kinjal Jani

Abstract ID: 288

BACKGROUND:

We analysed oncological and functional outcomes of Extracorporeal radiotherapy(ECRT) and reimplantation done for bone sarcomas.

PATIENTS AND METHODS:

27 patients (14 osteosarcoma, 10 Ewing's sarcoma, 3 others; mean age 13 years) were treated with ECRT between 2010 and 2016. Femur was commonest bone (18) followed by tibia (6) and humerus (3). 26 had a metadiaphyseal while 2 had osteoarticular resections. A single dose of 50 Gy was delivered to the resected bone segments. The irradiated bones were reimplanted immediately as a biological graft. Construct was stabilized with long locking plates. Osteoarticular ECRT was coupled with joint replacement. Patients were treated with chemotherapy as per standard protocol.

RESULTS:

The mean resected length of bone was 17 cm (9 to 26). A total of 31 patients were available at a mean follow-up of 34 months (24 to 74). The mean time to union for all osteotomy sites was 6 months (2 to 17): metaphyseal osteotomy sites united quicker than diaphyseal osteotomy sites (3.8 months (3 to 6) versus 9.5 months (4 to 17)). 3 nonunions needed bone

grafting. 1 deep infection necessitated removal of the ECRT segment. There was 1 local recurrence in soft-tissue away from irradiated graft. At the time of final follow-up, 19 patients were free of disease, one was alive with disease and 7 had died of disease. The mean Musculoskeletal Tumor Society Score at the last follow-up was 26 (18 to 30).

CONCLUSIONS:

The radiated bone acts as a size matches allograft and has very good union rates. The complication rates are very low. Extracorporeal irradiation is an oncologically safe and biological reconstruction technique for limb salvage in sarcomas and has good functional results. It should be recommended to all the suitable patients.

289: Extraskelatal Myxoid Chondrosarcoma: A study of clinicopathologic features and survival analysis in 22 new cases

by Chandhanarat Chandhanayingyong

Abstract ID: 289

Background: Extraskelatal myxoid chondrosarcoma (EMC) is a poorly defined sarcoma of uncertain cellular origin, composed of mixed mesenchymal and neurogenic origins without distinct chondroid phenotypes. EMC is extremely rare tumor. Despite its questionable pathogenesis, the clinical outcome are rarely understood. This study is aimed to evaluate the outcome and identify predictors of survival in EMC patients.

Study design: case series

Methods: The clinicopathological characteristics and treatment outcomes of EMC patients who were treated between 1992-2016 were retrospectively examined.

Results: A retrospective review of 22 patients. The median age was 56 years (range; 37-78). Mean follow-up time was 6.3 years (range; 0.75-20.7). EMCs were located in the lower extremities (16 cases), trunk (4 cases), and upper extremities (2 cases). The longest dimension was 12 cm in average (range; 2-28cm). There were 18 classical and 3 high-grade solid-cellular subtypes and 1 high-grade spindle cell. Resection specimens showed 15 negative margins (R0) and 7 positive margins (R1&2). Local recurrence rate was 27% (6/22). Metastases involved the lung (8 cases), bone (2 cases), muscles (2 cases), and lymphatic system (2 cases). The overall survival rates at five, ten and fifteen years were 83.9%, 69.9% and 52.4% respectively. Among the clinical and pathological factors a solid- cellular variant was associated with poor survival ($p=0.009$)

Conclusions: EMC showed high rate of local recurrence and distant metastases. Patients had prolonged survival after metastasis, but eventually died of tumor related cause. These features distinguish EMC from low-grade sarcomas.

291: Secondary sarcomas associated with bone infarct – The Birmingham experience

by Jan Balko | Tomohiro Fujiwara | Louis-Romee Le Nail | Micheal Thomas | Jonathan Stevenson | Lee Jeys | Rajesh Botchu | Michael Parry | Sumathi Vaiyapuri

Abstract ID: 291

OBJECTIVE: Majority of primary bone sarcomas arise de novo, but some develop in association with bone infarction and are only sparsely reported in the literature. The objective of this study was to investigate the clinic-pathological spectrum of 13 cases of secondary sarcoma associated with bone infarct collected at a single tertiary referral centre at the Royal Orthopaedic Hospital, Birmingham between 1997 and 2017.

STUDY DESIGN: Observational analytical study with retrospective cohort.

METHODS: A retrospective search of our database was carried out for cases of bone infarct-associated sarcomas. The reports of 163 patients with osteonecrosis were retrospectively reviewed and clinical and imaging data were recorded to determine if the underlying bone infarction predisposed the sarcoma. The precise histological subtype of the tumour was determined based on the WHO classification of bone tumours. We excluded sarcomas and bone infarcts without obvious interconnection, radiotherapy induced osteonecrosis and post-therapeutical tumour necrosis only.

RESULT: We report 13 patients diagnosed with secondary sarcoma arising in association with bone infarct. 8 cases represented high-grade conventional osteosarcomas with various differentiations and 4 cases represented chondrosarcomas, 2 of which showed foci of dedifferentiation. The clinical features (mean age, sex, symptoms, anatomical site, response to treatment, and prognosis) of sarcomas in our cohort correspond to former studies, which prove osteosarcoma to be the most common bone infarct-associated sarcoma according to up-to-date diagnostic criteria and terminology. Out of the 5 patients (38 %) who died of the disease, 4 (80 %) were diagnosed with osteosarcoma.

CONCLUSION: Secondary sarcoma associated with bone infarct has a poor prognosis compared to other primary bone sarcomas. The most common histological subtype in our cohort was osteosarcoma (62 %), followed by chondrosarcoma (31 %). Precise histological diagnosis is essential for appropriate management and predicting the outcome.

292: Upper extremity limb salvage with allograft tendón reconstruction in patient with forearm sarcoma

by José Pablo Puertas García-Sandoval | Antonio Valcárcel Díaz | Alberto Giménez Ros | Alba Izquierdo Robledano | Juan García Navarro

Abstract ID: 292

INTRODUCTION

Synovial sarcoma represents 8-9% of soft tissue sarcomas. It presents three anatomopathological subtypes; the monophasic, with great tendency to relapse; the biphasic and the poorly differentiated. The main treatment is extensive surgery and adjuvant radiotherapy.

Material

We present the case of a 27-yo man with a tumor on dorsal right forearm.

On physical examination, the patient presents with a painful mass, adhering to deep planes and affecting the third, fourth and fifth extensor compartments.

Ultrasound: deep solid tumor to the extensors with calcifications. The MRI defined the tumor as a polylobulated mass of 2.7x2.3x1.2 cm. Pathological anatomy confirmed the diagnosis of monophasic synovial sarcoma

Thus, it was decided to perform a surgical treatment that included the en bloc removal of the tumor and reconstruction of the extensor tendons (extensor pollicis longus, extensor digitorum comunis, extensor indicis and extensor digit minimis) with hemialografts of semitendinosus and internal rectus. In addition, the extensor retinaculum was reconstructed with allograft too. Finally, in order to make the closure, a propeller flap was made.

Results

After surgery, the patient was immobilized with a splint. Subsequently he received radioaterapia with a dose of 66 Gy. Six months after surgery, the patient has complete extension of fingers and hand. After one year of follow-up, the patient is free of disease.

Discussion

Soft tissue sarcomas sometimes present a challenge between limb preservation or amputation.

In this case with involvement of extensor tendons of the hand, it was decided to perform a block resection and reconstruction with hemitendinous allograft of semitendinous and internal rectus.

The use of tendon allografts helps us to reconstruct those tedninous defects after resection of sarcomas, allowing the use of local radiotherapy to complete the treatment.

294: Neoadjuvant or adjuvant irradiation and chemotherapy in the surgical treatment of malignant fibrous histiocytoma?

by Murat Hiz | Suat Ulutas | Aybars Kivrak | Fazilet Dincbas | Hande Turna | Nil Comunoglu

Abstract ID: 294

The effect of systemic and local additional treatment methods of irradiation and chemotherapy in the surgical management of fibrous histiocytoma was analyzed regarding local tumor control, Local recurrence, complications and survival in a group of 23 patients with MFH 13 patients received neoadjuvant 10 patient received adjuvant ChxT (Adriamycin and Ifosfamide) and irradiation (10x350 cGy) with local resection.

23 patients (11 females, 12 males) with a mean age of 63,7, were threated in our institute between 1989-2015. Mean follow up was 64 months. Mean tumor volume was 1114 cm³ in the neoadjuvant group, 885cm³ in the adjuvant group. Locations were 11 (7 thigh, 2 cruris, 1 hip, 1 knee) lower extremity and 2(1 axilla, 1 elbow) upper extremity in the neoadjuvant group, 7(5 thigh, 1 knee, 1 cruris) lower extremity, 3(2 forearm, 1 axilla) upper extremity in adjuvant group. Both groups had similar tumor volume and locations. 18 soft tissue MFH were primary and 5(2 in neoadjuvant group, 3 in adjuvant groups) recurrent tumors. 21 patients had wide 2 patients had marginal resections. Regarding local recurrence 2(%15) patients developed local recurrence in neoadjuvant group, 3(%30) patients developed local recurrence in the adjuvant group. Survival in the neoadjuvant patients group was 11(%84) NED, 2 DOD and in the adjuvant patients group 8(%80) NED, 1 AWD, 1 DOD. Regarding wound healing 2 delayed wound healing in neoadjuvant group was observed. Treated by meticulous wound care. 1 wound necrosis and 2 infections in the adjuvant group observed.

Regarding the local recurrence survival and complications neoadjuvant chemotherapy and irradiation with wide excision is a better choice in the treatment of malignant fibrous histiocytoma.

295: Recurrence after surgical treatment for the Benign Vascular Tumors of Soft Tissue: Statistical and Machine Learning Analyses

by Min Wook Joo | Min Seob Kim | Seonhwa Jeong

Abstract ID: 295

Objective

Management of benign vascular tumors of soft tissue is a multidisciplinary field that combines surgical, medical, and interventional specialties. Successful treatment requires and in-depth understanding of the classification scheme, natural history, available modalities, and prognosis. Recurrence after surgical excision is high although the lesions are biologically

benign. Besides, they sometimes recur multiple times. The objective of this study was to evaluate risk factors for recurrence after surgical treatment in the benign vascular tumors of soft tissue and establish a management strategy.

Study design

Medical records of patients who underwent excision for benign vascular tumors from 2002 to 2017 were retrospectively reviewed. We included intramuscular angioma, venous hemangioma, arteriovenous malformation/hemangioma, and angiomatosis on the basis of the latest edition of WHO classification.

Methods

Potential risk factors for recurrence such as age, gender, symptom duration, related syndromes, multiplicity, angiomatosis, location and depth, main length, and surgical margin were assessed by logistic regression and machine learning analysis using support vector machine (SVM) algorithm.

Results

There were 139 females 101 males with a median age of 28.5 years. Median symptom duration was 24 months. Nineteen patients had angiomatoses, and eight had multiple lesions. There were no related syndromes. Median main length was 3.15 cm. Recurrence developed in 24 patients. Median follow-up was 93 months. Multivariate analysis following Univariate analysis showed that age, angiomatosis, and depth of the lesion were significant predictive factors for recurrence. The overall accuracy of the linear SVM classifier was 96.67%. The sensitivity and specificity of the model were 91.67% and 97.22%. The area under the curve was 0.9965. Surgical margin and depth of lesions were the most informative features in the model.

Conclusions

As it is difficult to achieve free surgical margin, it would be better to consider combined treatment or other alternative strategy in benign vascular tumors involving multiple tissue planes, or crossing multiple muscles.

297: Diaphyseal prosthesis as an option for the treatment of single metastasis in tibial diaphysis to avoid amputation

by José Pablo Puertas García-Sandoval | Antonio Valcárcel Díaz

Abstract ID: 297

Introduction

The treatment of single bone metastases, if there is a control of the primary tumor, may be resection surgery. There are cases in which, due to its location, this is difficult or it requires sacrificing or fitting joints with an unacceptable result.

Material

We present the case of a 63-year-old patient who presented with a unique metastasis of distal tibia and was treated with en bloc resection and reconstruction with a diaphyseal prosthesis.

Resultados

he patient was incorporated at 48 hours with partial load, the analgesic control is fundamental for the incorporation of the patient and ensure a very practical analgesic for the first 48 hours. He was discharged at 72 hours, walking with external tutors the first week. Two weeks later, she only needed an external tutor and at five weeks she walked without help.

Discussion

Present the treatment of metastasis of the middle third of the tibia through the implantation of intercalary megaprosthesis. This technique allows the reconstruction of the defect created after the en bloc resection of the metastasis. And by not involving the proximal (femoro-tibial) or distal (tibio-talar) joint, it allows a rapid functional recovery.

298: Clinical experience in interventional radiology: 37 patients implanted with an innovative device for the prophylactic treatment of impending pathological hip fracture

by DESCHAMPS Frédéric | LAREDO Jean-Denis | PELLERIN Olivier | MASTIER Charles | LELEUP Grégoire | SZPALSKI Marek | CORNELIS François

Abstract ID: 298

Objective

To further evaluate the medical device Y-STRUT® (Hyprevention, Pessac, France), designed to provide prophylactic reinforcement of the proximal femur in metastatic patients.

Study Design

Two national multicenter studies were conducted: the clinical investigation HIPPON designed as a single-arm, prospective, first-in-man study and the observational post-market study HIPPON100, retrospective and prospective.

Methods

HIPPON was completed with the first 10 patients implanted with the studied device with a 1-year follow-up. Then HIPPON100 was initiated to include the following 100 patients, with a 2-year follow-up. From March 2016, 27 patients were implanted in this still ongoing study. In HIPPON study (n=10), all the patients enrolled (mean 62 yo, 67% male) presented a pertrochanteric lesion shown on imaging with an average Mirels score of 9.42 (8-11). The procedures were performed by interventional radiologists in 97±28min on average, with 9.2±3.1ml of cement injected. Hospitalization duration was 2.3±1.4 days. Six patients deceased from cancer progression. Wound healing was achieved in all patients at 6 months, with no case of wound infection, bleeding, leakage, or inflammation. Initial data shows a pain level diminution and an increase in functional OHS-12 score.

Results

In HIPPON100 study (n=27), results were similar: the patients enrolled (mean 59yo, 52% male) had similar pertrochanteric lesions and an average Mirels score of 8.6 (8-9). The procedure duration was 86±32min on average, with 13.2±4.1ml of cement injected. Hospitalization duration was 2.4±2.3 days. Two patients deceased from cancer progression. No fracture occurred after a median follow-up of 295days. Results also showed that chemotherapy may not to be stopped before implantation and radiotherapy could be done after the intervention.

Conclusions

This innovative device and its associated minimal invasive procedure appear to be a promising consolidation technique for oncologic patients with poor performance status. Further inclusions should confirm these clinical benefits.

299: Prognostic factors for revision or failure of endoprosthetic reconstructions for extremity tumour surgery: A systematic review

by Dr. Patrick Thornley | Dr. Matias Vicente Goma-Camps | Dr. Austin MacDonald | Dr. Michelle Ghert | Dr. Roberto Vélez

Abstract ID: 299

Objective: We sought to determine what types of studies have reported prognostic factors for failure in endoprosthetic reconstructions for extremity tumour surgery. Secondary objectives included primary modes of failure for endoprosthetic reconstruction in primary extremity bone sarcomas.

Study Design: Systematic review

Methods: We systematically searched MEDLINE, Embase, and the Cochrane Library for all trials published up to April 15, 2017 using MeSH and Emtree headings with free text combinations. Triplicate review included all trials reporting outcomes on endoprosthetic reconstructions of primary extremity bone tumours, with reported endoprosthesis survivals (measured by time to infection/revision/amputation/recurrence), per the Henderson Classification of failure mode for tumour endoprostheses. We assessed the overall quality of the evidence according to the Methodological Index for Non-Randomized Studies (MINORS) approach. The study protocol was registered through PROSPERO.

Results: Our search yielded 47 studies meeting inclusion criteria, from an initial return of 835 studies. No randomized controlled trials were identified. The bulk of included studies 43/47 (91.5%) were retrospective case series with 2,707 total patients and mean average follow-up of 79.5 months. Osteosarcoma was the most common malignancy 1308/2640 (49.5%), with the distal femur 1313/2344 (55.9%) the most common reconstruction site. By the Henderson classification of endoprosthetic failure, mechanical failure (soft tissue failure/aseptic loosening/structural failure) was reported in 628/2707 (23.2%) of patients. Non-mechanical failure (infection/tumour progression) was reported in 334/2707 (12.3%) of patients. Across

included studies, the average MINORS score was 11.2 (ideal score of 16 for non-comparative studies and 24 for comparative studies).

Conclusions: Current evidence on survival rates of endoprostheses in this population is of poor quality. Large multi-centre registries and prospective studies, like the INTEREST study group initiative, are required to best determine methods to mitigate both mechanical and non-mechanical failures as well as to clarify risk factors for failure in these reconstructions.

300: The relationship of the postoperative infection and survival of the musculoskeletal tumor patients

by Nevzat Dabak | Ferhat Say | Sina Coşkun | Hasan Göçer

Abstract ID: 300

Objective: To evaluate the postoperative surgical site infection effects on local recurrence, metastasis and survival of the patients diagnosed with malign bone or soft tissue tumor.

Study design: Retrospective study

Methods: This study includes 255 patients who were diagnosed malign bone or soft tissue tumor and operated between January 2006-April 2015. Metastatic bone tumor patients (n:62) were excluded. Patients (n:15) who have surgical site infection during postoperative one year were compared with non-infected patients (n:178).

Results: At median follow-up of 8 years one patient (6%) was died in the infection group. Local recurrence was determined in three of patients (20%). 44 patients were died in the non-infected group. Local recurrence was determined in 42 of patients (23%) (15 bone, 27 soft tissue). Five-year survival rate was 94% in the infection group and 75% in the non- infected group.

Conclusion: Surgical site infection can increase survival of the musculoskeletal tumor patients. However, further studies with more patients are required for a more clear result.

302: Survival and prognostic factors in patients with metastatic bone disease of the upper extremity

by Taweekok Wianuyotin | Winai Sirichativapee

Abstract ID: 302

Objective

To evaluate the clinical outcomes and identify which prognostic factors influence the clinical outcomes in patients with metastatic bone disease of the upper extremity at a tertiary university hospital in Thailand.

Study design

Retrospective study

Methods

Patients with metastatic bone disease of the upper extremity between 2008 and 2015 were reviewed from the database of the Musculoskeletal Oncology Unit, Khon Kaen University, Thailand.

Results

Of 102 patients, 48 males (47.1%) and 54 females (52.9%) with a mean age of 59.95 ± 10.18 (range, 28-82 years), 59 (57.8%) presenting with pathologic fracture. No history of cancer was found in 78 (76.5%) patients. The mean onset of metastatic bone disease after the first diagnosis of primary cancer was 4.74 ± 14.07 months (0-84 months). Lung (29.4%) was the most common primary cancer followed by liver (17.6%) and breast (12.7%). Humerus (64.7%), clavicle (13.7%) and scapula (12.7%) were the common site of bone metastasis in the upper extremity. The treatments were excision in 8 cases (7.8%), PMMA after curettage and internal fixation with intramedullary nailing in 33 cases (32.4%), plate and screw in 8 cases (7.8%), endoprosthesis in 2 cases (2%). Eighty-two (80.4%) died from disease with a median cumulative survival was 4.53 ± 1.32 months. The significant adverse factor was the age of the patients ($P < 0.05$, $HR=1.032$ (95% CI 1.009 - 1.055))

Conclusions and relevance for EMSOS

Metastatic bone disease of the upper extremity is still a disease with a poor prognosis. Most of the patients were presented without history of cancer. The age of the patients was the only prognostic factor that influenced the overall survival. This data may provide clues to improving management in patients with metastatic bone disease of the upper extremity.

303: The estimation of bone cyst volume using the Cavalieri principle on computed tomography images

by Ferhat Say | Murat Gölpınar | Cem Yalın Kılınc | Bünyamin Şahin

Abstract ID: 303

Objective: To evaluate the volume of bone cyst using the planimetry method of the Cavalieri principle.

Study Design: Retrospektive study

Methods. A retrospective analysis was carried out on data from 25 computed tomography (CT) images of patients with bone cyst. The volume of the cysts was calculated by two

independent observers using the planimetry method. The procedures were repeated one month later by each observer.

Results. The overall mean volume of the bone cyst was $29.25 \pm 25.86 \text{ cm}^3$. The mean bone cyst volumes calculated by the first observer for the first and second sessions were $29.18 \pm 26.14 \text{ cm}^3$ and $29.27 \pm 26.19 \text{ cm}^3$, respectively. The mean bone cyst volumes calculated by the second observer for the first and second sessions were $29.32 \pm 26.36 \text{ cm}^3$ and $29.23 \pm 26.36 \text{ cm}^3$, respectively. Statistical analysis showed no difference and high agreement between the first and second measurements of both observers. The Bland-Altman plots showed strong intra-observer and inter-observer concordance in the measurement of the bone cyst volume. The mean total time necessary to obtain the cyst volume by the two observers was 5.27 ± 2.30 minute.

Conclusion. The bone cyst of the patients can be objectively evaluated using the planimetry method of the Cavalieri principle on CT. This method showed high inter-observer and intra-observer agreement. This volume measurement can be used to evaluate cyst remodeling, including complete healing and cyst recurrence.

304: Solitary bone metastases – wide resection and its reconstruction

by Coelho dos Santos, André | Cardoso, Pedro

Abstract ID: 304

The skeleton is one of the most frequent sites of metastization. The treatment of these metastases is different according to their site and number. The approach to solitary bone metastases has changed along the years and a radical surgical treatment is nowadays advised for selected patients. Several studies showed a better quality of life and survival rate with this approach. A good prognosis is required when considering a radical surgery for the patient.

The authors performed a retrospective analysis of a group of 11 patients, with varied primary cancers and metastasis sites, proposed for wide resection of a solitary bone metastasis between September 2005 and August 2017. This study focuses on resection margins, type of reconstruction, functional score, tumour-free interval and survival. All patients were followed for several months, since diagnostic of the metastasis.

All the surgical pieces were analysed by a pathologist to confirm a tumour-free margin. A functional evaluation, using the MSTS score, was performed before and after the surgery and, when possible, a endoprosthetic replacement was placed.

Wide margins were achieved in all patients except for two. Prosthetic reconstructions were performed in six patients and a biologic reconstruction was the choice for one patient. Total lumbar vertebrectomy and a below-knee amputation were done in two other patients. The MSTS score increased from $10,09 \pm 6,5$ before surgery to $20,91 \pm 4,59$ after surgery. The mean

tumour-free interval was 19,91 months and the mean follow-up was 40,27 months. All patients were alive one-year post-surgery.

Due to the variance between histologic types, the authors cannot say the metastasis resection had any effect in the survival, as stated by literature. However, it is possible to assume a positive impact in the tumour-free interval and, more objectively, that this approach had an enormous improvement in function and quality of life in this group of patients.

306: Immediate vs staged plastic reconstruction following soft tissue resection. Functional evaluation and beneficial results of staged procedure in large superficial soft tissue sarcoma.

by Sophie Mottard

Abstract ID: 306

Topic:

Immediate vs staged reconstruction following resection of soft tissue sarcoma. Functional evaluation and benefits of staged procedure in large superficial soft tissue sarcoma.

Objective:

In many superficial sarcomas, margins may be difficult to predict, even with advanced imaging. Staging of the coverage procedure allows for definitive margin evaluation before local or free flap closure. This avoids the risk of contamination of the flap or the area adjacent to the resection. NPWT (negative pressure wound therapy) allows for a safe and simple wound care between the staged procedures. We hypothesized that this approach is safe and leads to decrease in morbidity, including local recurrence.

Study design:

We retrospectively reviewed 154 soft tissue sarcoma resections from 2013-2017 with a prospective data base.

Methods:

154 patients were included in this study (mean FU 26.3 months) of which 73 (47%) patients needed soft tissue reconstruction. Data including TESS, MSTS, infection, necrosis, margin, local recurrences, radiotherapy treatments and reoperation was collected. Soft tissue reconstructions were classified as immediate (58%) or delayed (42%).

Results:

Patients with staged procedures were mostly affected by large superficial STS (5-16 cm). Both groups had equivalent TESS and MSTS functional score at 1 year. NPWT (mean 15 days) was ambulatory. The most frequent reconstruction procedure for the staged group was rotation

flaps 11/31 and free flaps 6/31. A tendency to decreased complication rates was observed in the staged (23%) vs immediate (42%) but did not reach statistical significance.

Conclusions:

Preliminary results suggest a lower complication rate and equivalent functional results with staged procedures of soft tissue sarcoma.

307: The use of proximal femoral allograft in orthopaedic oncology at Siriraj Hospital

by Worasit Suthutvoravut

Abstract ID: 307

Introduction

Proximal femoral allografts have been used in orthopaedic oncology for decades. It offers mechanical properties similar to the patient's bone and allows reconstruction of sizeable deficits. In addition, it allows re-attachment of the hip abductors to preserve the function of the hip and gait. This study is conducted to evaluate the outcome and longevity of the proximal femoral allograft in orthopedic oncologic surgery.

Material and Methods

We retrospectively report the use of an osteochondral allograft and allo-prosthetic composite for severe proximal femoral bone loss from tumor resection. Between 2005 and 2015, 7 patients with a mean age of 38.8 years (31 to 46) underwent this technique.

Result

Mean follow-up of 5.3 years (1.8 to 7), 4 patients were alive, 2 had died and one was lost to follow-up. Pathology of the tumor were osteosarcoma (3), chondrosarcoma (2), MFH (1) and fibrosarcoma (1). Causes of failure were nonunion and infection. Tumor recurrence occurred in 2 cases.

Conclusion

APC was used for reconstruction after massive resection of the bone tumor to improve range of motion and abduction function. Union of graft junction determine the functional outcome.

308: Surveillance After Extremity Tumor Surgery (SAFETY) Patient Survey: A Patient-Centered Approach to the Protocol Development of an International Randomized Controlled Trial (RCT)

by Patricia Schneider | Bo Xuan Lin | Anthony Bozzo | Michelle Ghert

Abstract ID: 308

Background

Between 40 and 50% of all patients will develop a local or distant recurrence following treatment for a primary sarcoma. Earlier detection of a less advanced disease recurrence may prolong survival; therefore, intensive post-operative surveillance, especially of the lungs, is routine practice. However, the adverse effects are also noteworthy, including healthcare costs, the financial/emotional burden on patients, and unnecessary radiation exposure. A RCT to identify the optimal post-operative surveillance strategy that balances gains in survival, costs, and quality of life is warranted, but will require widespread surgeon and patient support. To inform the feasibility for such a RCT, this study aims to assess international patient willingness to be involved in such a study.

Method

A 57-item patient questionnaire was developed and pilot tested for validity and re-test reliability prior to administration. This unique questionnaire characterizes patient demographics, opinions and preferences with respect to cancer research and treatment, and willingness to participate in a study that randomizes to a particular post-operative follow-up regimen. The questionnaire has been administered to all eligible patients who presented at participating sarcoma clinics in Hamilton, ON; Montreal, QC; Iowa City, IA; and Barcelona, Spain.

Results

At the time of abstract submission, 65% of participants had indicated that they would be willing to participate in a RCT evaluating post-operative surveillance strategies. Five additional sites in Canada, the USA, and the Netherlands are in active start-up.

Conclusion

Given the lack of evidence on best surveillance practices for disease recurrence in extremity sarcoma patients, a RCT comparing post-operative follow-up regimens is needed. Thus far, the number of respondents indicates that the target number of survey participants can be achieved once further sites open to enrolment. At present, the responses suggest that such an international RCT is feasible with respect to patient willingness to participate. EMSOS investigators interested in the patient survey are encouraged to participate.

310: Atypical Osteoid Osteoma Cases Presented with Atypical Location of the Nidus

by Nevzat DABAK | Sina COŞKUN | Ferhat SAY | Hasan GÖÇER

Abstract ID: 310

Objective: Osteoid osteoma is a bone producing musculoskeletal system tumor typically seen in younger patients. Nidus detection, night pain and aspirin response are usually sufficient for the diagnosis. Despite the typical clinical history, the nidus localization may be a problem for the clinician because the nidus is not always visible on plain radiographs. The purpose of this report is to emphasize the difficulties in the diagnosis of osteoid osteoma due to the atypical location of the nidus.

Study design: Retrospective.

Methods: Between January 2004 and January 2018, osteoid osteoma cases were determined by examining the database of 3014 patients evaluated in the multidisciplinary tumor council. Sociodemographic and clinical data of the patients were studied.

Results: A total of 57 cases of osteoid osteoma were detected. 57% of these patients were male and 43% were female. When age distribution was examined, osteoid osteoma was most commonly observed in the 10-19 age range (22 cases). The proximal femur was the most common site (15 cases). Six cases were reevaluated in the multidisciplinary tumor council and it was observed that osteoid osteoma diagnosis was confirmed by thin-section computed tomography, which was not detected at the first stage evaluation due to intramedullary location. Clinical suspicion and typical medical history led the physician to the diagnosis of osteoid osteoma. After the diagnosis, their treatment are arranged according to osteoid osteoma treatment protocols.

Conclusion: Despite the typical clinical history of osteoid osteoma in some cases, atypical nidus placement makes the diagnosis difficult for the clinician. It should be kept in mind that in case of a patient with typical clinical signs of osteoid osteoma, if there's no visualisation of the nidus on plain radiographs, thin-section computed tomography facilitates the detection of nidus and nidus may show intramedullary presentation.

311: Clavicle tumors

by Srinivas Komma

Abstract ID: 311

Approximately 2% to 5% of all fractures in adults and 10% to 15% in children involve the clavicle. The incidence of this type of fracture in the adolescent and adult population is reportedly 29 to 64 per 100,000 person's annually.¹ Fractures of the clavicle also show a bimodal age distribution. Young male patients who are aged less than 30 years and elderly patients aged over 70 years appear to be two distinct age groups at higher risk for clavicle fractures.

Clavicle fractures are almost always the result of trauma (often a direct blow to the shoulder) and occur most often in the young male population. Evaluation begins with a thorough history and physical examination and typically progresses to plain radiographs identifying the fracture site and pattern. These fractures have been classified by Allman into groups I (mid-shaft), II (lateral), and III (medial); this classification, along with fracture characteristics (displacement and comminution) helps in determining the strategy for management.³ Traditionally, nonsurgical management has been favored as the initial treatment modality for most clavicle fractures because of the high nonunion rates reported after operative treatment.⁴ Recent evidence suggests that specific subsets of patients may be at high risk for nonunion, shoulder dysfunction, or residual pain after nonsurgical management.^{5,6} In this subset of patients, acute surgical intervention may minimize suboptimal outcomes. Also, surgical intervention may be required in cases of neurovascular compromise or significant fracture displacement. In children and adolescents, these injuries mostly consist of physeal separations, which have a large healing potential and can therefore be managed conservatively.

313: The Prognostic Factors of Ambulatory Status of Metastatic Bone Tumor of the Femur Treated with Intramedullary Device Fixation

by Worasit Suthutvoravut

Abstract ID: 313

Introduction

Pathological fractures decrease the quality of life and increase mortality rates. Pain and decreased functional ambulation are major presenting symptom and decreased quality of life. Internal fixation with intramedullary nailing is the treatment of choice for pathologic fracture at femur. Although several studies look into prognosis following the development of metastatic lesion and after the fracture. This study analyzes the variables affecting prognosis for ambulatory status of metastatic bone tumor of femur treated with intramedullary device fixation

Materials and Method

Retrospective chart review of 30 patients treated at Siriraj Hospital, Mahidol University between January 2007 to December 2013. The variables of interest include gender, primary cancer, fracture type, location, size of lesion, other bone metastasis, contralateral femur metastasis, pre- and postoperative pain score, functional ambulatory status

Results

30 patients were completely performed intramedullary fixation. Breast and lung cancer are the most common of primary cancer. 12 patients (40%) can ambulate with assist device within 5 days. One case was died before discharge.

Conclusion

There are many factors that effect the post-operative ambulation status. Ages, size of lesion post-operative pain and staging were the important prognostic factors to predict ambulatory status of the patients.

314: The Modified 'Harrington Plus' method for reconstruction of pathological fractures of the acetabulum

by D'jon Lopez | Andrew Carrothers

Abstract ID: 314

Objective

Pathological fractures, in the context of metastatic disease, can be surgically challenging. This is particularly true of those involving the acetabulum. Advancement in oncological care means that the prognosis and survivorship of patients with metastatic disease is improving. A robust, reliable method of reconstruction that allows early weight-bearing is therefore vital in the management of these patients. Our aim in creating our technique, was therefore to create a reliable surgical strategy that would allow this vulnerable group of patients to mobilise immediately post-operatively.

Background

Harrington originally described his reconstruction technique for advanced metastatic disease in the acetabulum in 1981. He suggested reinforcing the acetabulum with 2 groups of threaded pins that converge in the supra-acetabular region. The pins are then cemented together with an acetabular support ring (Figure1). This technique was further modified by Grimer, who suggested the use of three pins inserted from the iliac crest to pass in front of, behind and medial to the acetabulum. We wish to describe a modification of the Grimer method, in severe cases of hemi-pelvic metastatic disease. The use of the Stryker Supra-pectineal plate provides additional support particularly to the quadrilateral plate of the acetabulum (Figure 2). This functions as a buttress of the medial wall of the acetabulum and negates the need for cement or a steel mesh. An acetabular component of a Total Hip Replacement can then be directly cemented into this construct. This is a biomechanically sound reconstruction that allows immediate weight-bearing and a full return to function.

Relevance

The surgical aim in metastatic bone disease should be to allow immediate full weight- bearing,

to reduce post-operative morbidity and restore quality of life. The reconstruction should be robust and offer good longevity. Our method confers the aforementioned advantages- as Harrington reconstructions typically fail by medialisation of the construct

316: Reconstruction of Distal and Mid Tibia Tumors

by Vijay Titus

Abstract ID: 316

Bony tumours of the Mid and Distal Tibia are uncommon ones and literature on them is sparse with no agreement on the ideal surgical treatment . After tumour excision, reconstruction is can be done by Megaprosthesis (either or Non Hinged)or fusion (by Ilizarov or Double Fibula either vascularized or not) . Two incisions(one smaller to avoid skin necrosis) were used only in two patients . From 2014 to 2016 we had 17 tumors from 19 to 54 yrs . There were 7 Mid Tibia , 10 Distal Tibial Tumors . There were 4 OsteoSarcoma,4 EwingsSarcoma and 6 GCT in these . There were 6 Megaprosthesis, 2 Ilizarov lengthening and 8 Double Fibular Grafts (three of these had customized small Plate and the rest were fixed with screws and treated with Plaster initially and later braces .One Fibula was put Intramedullarily into the Tibia . Margins were positive in two patients .All Malignant Tumors had pre and Post op Chemotherapy .All patients used crutches for 3- 5 months . Bony union was acheived 2 months earlier in Vascularized group . It was protected with a Brace for 12 weeks.

There were 5 Local Rotation Flaps done primarily for wound cover . There were no nerve palsies ,No local recurrence , 2 cases had superficial infection which healed with daily dressings and 1 cases of skin necrosis needed skin resuturing . One case had a fall a Graft fracture which was plated and went on to union.

All patients were Followed up for at least 2 years . They were assessed by MSTs score and the Megaprosthesis group had better score of 85% vs 79%.

Lower Tibial Tumor reconstruction has low complications and gives good functional results.

317: Conversion of Primary Aneurysmal Bone cyst into osteogenic sarcoma following treatment with intralesional alcohol injection- A case report

by Ashish Kumar Ragase | Venkatesan Sampath Kumar | Shah Alam Khan

Abstract ID: 317

OBJECTIVE AND RELEVANCE

This case report highlights one of the major concern of treatment modality of benign bone lesions that is sarcomatous conversion.

ABSTRACT

Primary aneurysmal bone cyst (ABC) is a rare benign tumor with minimal potential for malignant transformation. There are case reports showing the conversion of primary ABC to osteogenic sarcoma without any prior treatment and more often after treatment with radiation therapy. Since last decade, treatment of primary aneurysmal bone cyst (ABC) has seen a paradigm shift from an invasive surgical procedure of curettage and bone grafting to minimally invasive techniques such as intralesional injections of sclerosing agents.

Literature reports this method to be safe with low recurrence rate and minimal complications. So far conversion of a primary ABC into osteogenic sarcoma after complete healing by an intralesional sclerosing agent (alcohol) had not been reported in the literature to best of our knowledge. We are presenting a case of 30-year-old female treated our institute (All India Institute of Medical Sciences, New Delhi, India) who had histological proven primary ABC of the distal end of tibia 10 years back, she received 10 injections of 3% polidocanol intralesionally and had complete healing clinically and radiologically. 10 years later her symptoms recurred and histological examinations revealed osteogenic sarcoma, which was excised and bone grafting with ankle arthrodesis was done.

By this finding, we can conclude that intralesional alcohol injections may not inhibit the inherent potential of malignant transformation of primary ABC. Whether intralesional alcohol injections per se increase the risk of malignant transformation is doubtful which warrants further long-term follow-up studies.

320: Talus-localized chondroblastoma

by Ferhat Say | Sina Coşkun | Sancar Barış

Abstract ID: 320

Objective: Chondroblastoma is a rare benign tumor originating from cartilage and is located in the epiphyses of long bones such as humerus, tibia and femur. Talus localization is rare. It is aimed to present a patient who has an ankle pain and finally diagnosed as chondroblastoma in the talus.

Study Design: Case report

Methods: A 21-year-old male patient was evaluated for a left ankle pain that started approximately five months ago. Anamnesis revealed that the pain started after a football match and he admitted a doctor and prescribed the non-steroid anti-inflammatory drug but

the complaints continued. On physical examination, there was no obvious sign except for minimal edema and tenderness in the left ankle anterolateral region. A sclerotic lesion was observed in the medial side of the talus in the lateral radiograph and in the medial lytic margins in the anterior segment. Computed Tomography and Magnetic Resonance Imaging showed that the lesion was 2x1.5 cm in size and that the inside of the lesion was in fluid intensities. Curettage was performed with an anterior approach to the ankle and grafted with autograft taken from the iliac bone.

Results: Pathologic evaluation was resulted chondroblastoma and secondary aneurysmal bone cyst. At the first year follow-up, there was no complaints of the patient, no recurrence or metastasis.

Conclusion: Chondroblastoma diagnosis should be considered in the differential diagnosis of talus-localized lesions. Curettage and autografting results is successful in the treatment of talus localized chondroblastoma.

323: Early Results of Custom-Made Endoprosthetic Reconstruction of the Distal Tibia after Bone Tumor Resection.

by Joseph Benevenia | Panayiotis D. Megaloikonomos | George Makris | Samuel Benevenia | Alexander Willis | Thekla Antoniadou | Andreas F. Mavrogenis | Panayiotis J. Papagelopoulos

Abstract ID: 323

Objective: To present the clinical outcome of patients treated with bone tumor resection of the distal tibia and reconstruction with custom-made endoprostheses.

Study design: Retrospective observational study.

Methods: We present the clinical outcome of 3 patients (1 male, 17 years; 2 females, 42 and 66 years) that were treated with distal tibia resection and reconstruction for bone tumors. Histology included osteosarcoma (male), recurrent giant cell tumor (GCT) of bone and endometrial cancer metastasis (females). The first patient presented with osteosarcoma (OGS) of the distal tibia. He received neoadjuvant chemotherapy. Subsequently, en bloc tumor resection was conducted and a cement spacer was provisionally applied to the resected region. After postoperative chemotherapy completion, reconstruction was done using a distal tibia endoprosthesis and ankle arthroplasty. The female patients were treated with tumor resection and reconstruction in one-stage procedure. In all cases neurovascular structures were preserved, and reconstruction was achieved with a custom-made distal tibia endoprosthesis and total ankle arthroplasty. Complications were recorded and the functional outcome was assessed; recording range of ankle motion and MSTS score at the last follow-up. Follow-up was 8, 7 and 6 months respectively.

Results: Until the last follow-up one patient developed local tumor progression (endometrial Ca) which caused dislocation requiring open reduction. No patient experienced infection. No cases of aseptic loosening, or implant breakage were documented, and revision surgery was not required in any patient. The OGS patient presented 5o dorsiflexion, 20o plantarflexion and MSTs=25/30; the GCT patient presented 0o dorsiflexion, 20o plantar flexion and MSTs=27/30; the patient with metastasis presented 10o dorsiflexion, 15o plantarflexion and MSTs=14/30. Conclusions: In patients with tumors of the distal tibia, providing that the oncological outcome is not compromised, limb-salvage surgery may be a viable treatment option. Distal tibia resection and custom-made endoprosthetic reconstruction, in such selected patients, is expected to provide favorable functional outcome.

324: Sarcomas in Li-Fraumeni Syndrome – The Birmingham Experience

by Ella-Grace Kirton | Guy Morris | Jan Balko | Michael Thomas | Rajesh Botchu | Jonathan Stevenson | Lee Jeys | Michael Parry | Sumathi Vaiyapuri

Abstract ID: 324

Objective

To document the incidence, subtypes and outcomes of patients with Li-Fraumeni syndrome presenting to our referral unit over a 30 year period.

Study design

A retrospective observational study.

Methods

A retrospective analysis of our oncology database of over 35,000 oncology patients was performed. The search included all patients referred for investigation and management of a soft tissue or bone sarcoma with Li-Fraumeni Syndrome.

Results

18 patients were initially identified with Li-Fraumeni syndrome of which 4 later received a non-oncological diagnosis. The remaining 14 all had a histological diagnosis of sarcoma. Of these, 3 were recurrent tumours. 15 individual tumours were identified including one patient who had 2 separate tumour diagnoses. The sarcomata were composed of leiomyosarcomas (5), osteosarcomas (4), liposarcomas (2), undifferentiated pleomorphic sarcoma (2), a spindle cell sarcoma and a Ewing sarcoma. Of the patients with sarcomas 7 were male and 7 females. Median age at diagnosis was 34 (range 30-45). Patients in the 30-45 age range had the highest number of sarcoma diagnoses (6), followed by 0-17 (4) and 18-29 and >45 (each with 3). The most common site for soft tissue tumours was the thigh (4) and bone sarcomas were most common in the thigh or shin (2 each).

Conclusions

We identified a higher proportion of soft tissue sarcomas and fewer osteosarcomas than expected in the published literature. Additionally, there is an absence of rhabdomyosarcomas; despite previously reported as the most common sarcoma subtype in patients with TP53 mutations. Given the low prevalence of the condition and its variable penetration, the risk of developing specific cancer subtypes is not yet well understood. This study provides additional demographic and tumour data to the current literature on the subject. To our knowledge this is the first case series to break down sarcomas in patients with Li-Fraumeni syndrome by tumour location.

327: The Short-Term Effect Of High Dose Proton Radiation On Healthy Bone; A Computed Tomography Study

by Olivier van Wulfften Palthe

Abstract ID: 327

Objective: To assess differences in bone strength of bone uninvolved with tumor pre- and post high dose radiotherapy and reassess the need and possibility of lumbo-sacral reconstruction.

Methods: All 56 patients who underwent pre-operative high dose radiotherapy (50.40 Gray[Gy]) for sacral chordoma between January 2009 and March 2015 were screened. For 20 (36%) patients both the radiation planning CT scan and surgical planning CT scan (post radiation) were available. We used Hounsfield units (HU) as a surrogate for bone strength. Volumetric HU were measured outside of the radiation field (L1 and L2), and in an area bone of that was uninvolved with tumor and within the radiation field. To validate our method we also compared the HU in L1 relative to L2 pre-radiation and post-radiation.

Results: 20 patients were included. The S3 sacral vertebra was involved in 8 (40%) of the patients and S2 was involved in 6(30%) of the patients. The mean dose of protons delivered was 22.05 Gy (sd: 15.60 Gy) and the mean photons dose was 28.35 Gy (sd: 15.60 Gy). The mean HU increased with 24.8 units (sd: 15) in L1 and 23.9 units (sd: 17) in L2, while the mean HU inside the radiation field decreased with 30.1 units (sd: 33). The ratio of HU of L1 relative to L2 was 0.998 (sd: 0.045) pre-radiotherapy and 1.00 (sd: 0.042) post-radiotherapy ($p = 0.171$). The ratio of HU of measurements outside the radiation field (L1) relative to the measurement within the radiation field was 1.24 (sd: 0.61) pre-radiotherapy and 1.57 (sd: 0.37) post-radiotherapy ($p < 0.001$), indicating a significant decrease in HU of bone after radiotherapy.

Conclusion: We found that high dose radiation decreases bone strength of healthy bone when treating patients for sacral chordoma. The decreased bone strength could be considered when assessing if the overall mechanical.

329: Biologic Diaphyseal Reconstruction with Free Vascularized Fibula Graft and Structural Allograft after Tumor Resection to the Lower Limb

by Panayiotis D. Megaloikonomos | Vasileios A. Kontogeorgakos | Leonidas Dimopoulos | Thekla Antoniadou | Vasileios G. Igoumenou | Dimitrios A. Flevas | Andreas F. Mavrogenis | Panayiotis J. Papagelopoulos

Abstract ID: 329

Objective: To present the clinical outcome of patients with diaphyseal tumors of the femur and tibia, treated with tumor resection and hybrid reconstruction with autologous free vascularized fibula graft and structural bone allograft.

Study Design: Retrospective case series.

Methods: We present the clinical outcome of 11 patients (mean age, 31 years; range, 15-44 years) who received reconstruction with autologous free vascularized fibula and massive bone allograft after tumor resection to the lower limb. Histology included adamantinoma in 3 patients, osteosarcoma in 5, Ewing's sarcoma in 2 and fibrosarcoma in 1 patient. The tumor was located at the femoral diaphysis in 6 and at the tibial diaphysis in 5 patients. The vascularised fibula graft was placed in the allograft (inlay) in 6 and on the allograft (onlay). The mean length of the reconstructed bone defect was 16 cm (range, 12-21cm). In all patients osteosynthesis with a long plate was applied. Bone healing and complications were recorded. The mean follow-up was 2.5 years (range, 2-4 years).

Results: Uneventful bone healing was recorded in 9 patients. In patients with reconstruction of the femur, mean healing time was 10 months (range, 9-11 months). In patients with tibial defects healing was achieved in 8 months (range, 7-10 months). One patient presented aseptic nonunion, that was successfully treated with revision surgery and autologous bone graft. Another patient presented septic nonunion. He was treated with surgical debridement; the graft was retained and finally healed. One patient experienced local soft-tissue recurrence, and he was treated with local tumor resection.

Conclusions: Reconstruction with autologous free vascularized fibula graft and structural bone allograft is a reliable reconstruction option for diaphyseal bone defects to the lower limb. As compared with the tibia, reconstruction of the femur is expected to present delayed healing time. Prolonged partial weight-bearing is necessary; however, complication rates seem to be acceptable.

331: An unusual localization of osteoid osteoma-distal phalanx of the second foot finger

by Hikmet Çinka | Sina Coşkun | Mesut Öztürk | Ferhat Say | Sancar Barış

Objective: Osteoid osteoma is small benign tumor, usually very painful, made of osteoid and woven bone. Commonly localization are appendicular skeleton, proximal femur and long bones. Cases on the phalanxes of the foot finger are very rare. Poor clinical signs and atypical location make diagnosis difficult and delayed. Sometimes it is confused with an infection. It is aimed to present a patient who has a second foot finger pain and finally diagnosed as osteoid osteoma on the distal phalanx of the second foot finger.

Study Design: Case report

Methods: A 20-year-old male patient was evaluated for a second foot finger pain that started approximately four months ago. Anamnesis revealed that the pain increases during the night. On physical examination, hypertrophy of the distal phalanx of the 2nd finger is seen. Increased radiodensity was observed in the distal phalanx of the second finger on the anteroposterior radiograph of the foot. Computed Tomography and Magnetic Resonance Imaging showed that sclerosis on distal phalanx and edema around the distal phalanx respectively. Closed biopsy and culture was performed. Culture was negative, and biopsy was resulted reactive new bone formation. Excisional biopsy and curettage was performed.

Results: Pathologic evaluation was resulted as osteoid osteoma. At the nine months follow-up, there was no complaints of the patient and no recurrence.

Conclusion: Osteoid osteoma diagnosis should be considered in the differential diagnosis of foot pain. Atypical presentation of osteoid osteoma should keep in mind in the differential diagnosis of infection.

333: Primary Tendon Transfers after Soft Tissue Sarcoma Resection at the Posterior Arm Involving the Radial Nerve

by Vasileios A. Kontogeorgakos | Panayiotis D. Megaloikonomos | Thekla Antoniadou | Vasileios G. Igoumenou | Leonidas Dimopoulos | Olga D Savvidou | Andreas F. Mavrogenis | Panayiotis J. Papagelopoulos

Objectives: To present the clinical outcome of four patients treated with tendon transfers for radial nerve defect after resection of soft tissue sarcoma at the posterior region of the arm.

Study Design: Retrospective case series.

Methods: We present the outcome of four patients (mean age, 41 years; range, 22-54 years) that were treated for soft tissue sarcoma of the posterior region of the arm. Three patients had pleomorphic sarcoma and one patient clear cell sarcoma. Two patients received

preoperative chemotherapy and 3 preoperative radiation therapy. In order to achieve negative surgical margins, tumor resection included part of the radial nerve (length range, 6-8cm) in all cases. In 2 patients, part of the humerus was also resected; stabilization was achieved with a plate in one patient and with an intramedullary nail in the other patient. After tumor resection, Boyes tendon transfers were performed in all patients. At the last follow-up, the functional outcome was assessed evaluating the range of wrist and fingers motion and the DASH score. Mean follow-up was 2 years.

Results: No major postoperative complications were observed in any of the patients. No patient developed local tumor recurrence; however, one patient developed regional axillary node metastasis. At last follow-up, sensation at the region of the first interdigital space was documented in all patients, while they presented 40° mean wrist extension, 30° mean wrist flexion and full extension of the fingers. The mean DASH score was 36.5 (range, 28-51).

Conclusions: The goal of soft tissue sarcoma treatment is the achievement of tumor-free surgical margins. Thus, in patients with soft tissue sarcomas at the posterior arm, partial resection of the radial nerve, in the context of en bloc tumor resection, may be inevitable. Tendon transfers may successfully restore the functional loss, while sensation of the hand, considering radial nerve distribution, is restored from surrounding nerve endings.

338: Lower Infection Rate with Silver-Coated Endoprostheses after Tumor Resection and Reconstruction of the Proximal Femur

by Panayiotis D. Megaloikonomos | Leonidas Dimopoulos | Thekla Antoniadou | Ioannis P. Galanopoulos | Vasileios A. Kontogeorgakos | Olga D. Savvidou | Andreas F. Mavrogenis | Panayiotis J. Papagelopoulos

Abstract ID: 338

Objective: The silver coating of oncologic endoprostheses has been postulated to decrease infection and reinfection rate due to its property to release silver ions. The aim of this study was to compare the infection rate between silver-coated and non-coated endoprostheses after tumor resection and reconstruction of the proximal femur.

Study Design: Retrospective comparative study.

Methods: We studied 69 patients (29 men, 40 women) with a mean age of 56.2 years (range, 26-78 years) who were admitted and treated to our institution for primary or metastatic tumors of the proximal femur. Thirty-two patients were treated with non-coated megaprostheses, and 28 patients with silver-coated megaprostheses. Mean patients' follow-up was 5.5 years (range, 2-10 years).

Results: The overall infection rate was 6.6%. In the non-coated group, the infection rate was 9.3 % (3 patients) vs. 3.5% (1 patient) in the silver-coated group. All infections were presented within 6 months after surgery. Pathogens included *Staphylococcus aureus* (1 patient), *Staphylococcus epidermidis* (2 patients) and *Staphylococcus capitis* (1 patient). All patients that experienced infection were successfully treated with a two-stage revision and reimplantation of silver-coated endoprosthesis.

Conclusions: The use of silver-coated endoprostheses consists a reliable reconstruction option for the proximal femur after tumor resection. This study showed that they may reduce the risk of postoperative infection compared to conventional non-coated implants.

339: Is the PRECICE® Implant Useful for Treating Late Complications of Frozen Hotdog Reconstruction?

by Bugra Alpan | Natig Valiyev | Osman Emre Aycan | Mustafa Sungur | Harzem Ozge

Abstract ID: 339

Although combined use of liquid-nitrogen-treated tumor-bearing bone segment and vascularized fibula graft is an effective biological reconstruction method in the skeletally immature patient, limb length discrepancy (LLD) and bone healing problems may be observed. PRECICE nail is a magnetic motorized intramedullary device, which has gained recent popularity for limb lengthening purposes. In this paper, we present our experience with PRECICE nail for the treatment of late complications of frozen hotdog reconstruction.

Four patients (M/F: 3/1), who had undergone treatment for stage IIB distal femur osteosarcoma with frozen hotdog method, were included in the study. Mean age was 10,8 (9-13) years at the time primary limb salvage intervention. Mean length of resected segment was 195 (150-250) mm. After a mean follow-up of 63 (34-110) months, a mean LLD of 7,0 (4,0-10,0) cm was observed. Three patients demonstrated excellent bone healing according to ISOLS radiographic criteria. The remaining patient had chronic nonunion subsequent to graft fracture. PRECICE antegrade femur nails with various dimensions were used for treatment of these complications. Three patients underwent a mean lengthening of 41,7 (38-48) mm. The distraction rate was 1 mm/day and the consolidation index was 1,83 months/cm. Bone healing was achieved with 3 mm acute distraction and watchful waiting over a 5-month period in the nonunion case, for which lengthening is being planned. No implant-related complication occurred. However, distal locking screw had to be revised in one patient due to osteolysis and one patient underwent nail removal and closed plate fixation due to fracture at the distal tip of the nail after consolidation.

PRECICE nail is remarkably useful for the management of late complications of frozen hotdog method. Meticulous preoperative planning and close follow-up is essential during distraction and consolidation due to challenging morphological and biological changes related to recycled bone and hypertrophied fibula.

340: Extremity chondrosarcomas with lymph node metastasis: A series of 4 cases

by Dr Vineet kurisunkal | Dr Ashish Gulia | Dr Ajay Puri

Abstract ID: 340

Introduction: Primary bone sarcomas mainly metastasise through the haematogenous route and rarely metastasize to lymph nodes due to paucity of lymphatics in bone. Few reports of nodal metastasis in osteosarcoma are described however it is extremely rare in chondrosarcomas. Here we describe 4 cases treated at our institute & evaluated for probable reasons of nodal metastasis

Methods: Retrospective analysis using surgical audit data base and pathology data base

Results: All 4 patients presented to outpatient department in primary sitting. Nodes were detected intraoperatively in 1 patient, on imaging in 2 patients and on clinical examination in 1 patient. 3 patients had grade 2 tumour and 1 patient had grade 3 disease. 1 patient with scapular disease had pulmonary metastasis at presentation. 1 patient with pelvic disease had lymph node clearance at the time of the primary surgery. The other 2 patients had undergone lymph node clearance as an additional procedure. One of the patients had presented with a pathological fracture hence was converted into a forequarter amputation with axillary node clearance. 2 patients have died due to the disease, 2 patients developed LR & were managed appropriately. All cases had large soft tissue component with infiltration of adjacent muscles and cortical breach. Intraoperative tumor spillage, presence of a pathological fracture, or a previously operated field could be possible risk factors for lymph node metastasis.

Conclusion: The exact impact on disease prognosis of the lymph node metastasis can't be commented upon due to limited follow up. The rarity of occurrence of lymph node metastasis in chondrosarcoma & paucity of literature highlights the need for a global multicentric collaboration in an attempt to pool knowledge regarding overall prognosis in these patients.

341: Fibroma of tendon sheath of the infrapatellar fat pad in the knee

by Sina Coşkun | Ferhat Say | Sancar Barış

Abstract ID: 341

Objective: Fibroma of tendon sheath is an uncommon benign fibrous nodule occurring near tendinous structures. In literature, fibroma of tendon sheath in the knee has been described. However fibroma of tendon sheath found in Hoffa's fat pad of the knee is extremely rare. It is aimed to present a patient who has knee pain and finally diagnosed as fibroma of tendon sheath of the infrapatellar fat pad.

Study Design: Case report

Methods: A 37 year-old woman patient was evaluated for a right knee pain that started approximately a few months ago. Anamnesis revealed that the pain increases with activity and also during the rest. On physical examination, nothing was obvious except a little restricted motion. Magnetic Resonance Imaging showed that a mass on the hoffa fat pad with low signal intensity on T1-weighted images and high signal intensity on T2 -weighted images. Complete excision was performed.

Results: Pathologic evaluation was resulted as fibroma of tendon sheath of the infrapatellar fat pad. At the one and half year follow-up, there was no complaints of the patient and no recurrence.

Conclusion: Fibroma of the tendon sheath should be included in the differential diagnosis of a soft tissue mass around the knee.

342: Carbon/PEEK implants in orthopaedic oncology

by Christoph Laux | Sandro Hodel | Mazda Farshad | Daniel A. Müller

Abstract ID: 342

Objective:

Whereas primary bone tumors are rare, the bone is a frequent site of metastases of a variety of tumors. Radiation therapy is an important element in musculoskeletal oncology, especially when encountering multiple or osteolytic lesions. Often, a surgical stabilization with implants is required. However, metallic implants not only make the CT-based planning of a subsequent radiation therapy more difficult, but might also have an uncontrolled dose modulating effect in adjuvant radiotherapy. In addition, follow-up imaging and the diagnosis of local recurrences is often obscured by metallic artefacts. Radiolucent implants consisting of carbon/polyether ether ketone (PEEK) therefore facilitate adjuvant radiation therapy and follow-up imaging of bone lesions. The purpose was to present clinical cases with application of carbon/PEEK implants in orthopaedic tumor surgery.

Study design:

Case series.

Methods:

We report a single-center experience of three patients with surgical stabilisation of osteolytic bone lesions using carbon/PEEK implants. Detailed information about the clinical

presentation, preoperative considerations, intraoperative surgical procedures and postoperative results is provided for each case.

Results:

One spinal lesion (T12 vertebral body), one lesion of the upper extremity (humerus) and one of the lower extremity (tibia) were surgically stabilized. With a mean follow-up of 9 months (range 3 – 22 months), no adverse events were observed. Two patients received adjuvant radiotherapy. Follow-up imaging was obtained in all patients.

Conclusion:

The clinical applicability of carbon/PEEK implants in orthopaedic tumor surgery is safe and associated with major benefits. However, some limitations as to material properties and current implant availability need to be considered.

347: Inverse proximal humerus prosthesis for replacement of large segmental tumour resections

by Anna Rachbauer, MD | Arne Streitbürger, MD, Ass. Prof. | Jendrik Harges, MD, MBA, Ass. Prof. | Georg Gosheger, MD, Prof.

Abstract ID: 347

Purpose: Following segmental resection of the proximal humerus the replacement by traditional prostheses has shown loss of shoulder function to a high extent. This might be attributable to the resection of bony attachments of the muscles of proximal humerus. In cuff tear arthropathy inverse shoulder prostheses have shown considerable improvement of active range of motion. The purpose of this study was to find out whether the use of a modular inverse proximal humerus prosthesis (IPHP) for proximal humerus resection can improve shoulder function.

Methods: 41 patients with inverse proximal humerus prostheses using MUTARS (Implantcastâ) system were retrospectively evaluated at a mean follow-up of 38 months (2-176). Shoulder function was assessed using MSTS-score (0-30) and active range of motion (ROM) measured.

Results: 41 patients (median 51 yr, 13-84) were treated for tumours (sarcoma of bone n=20, metastasis n=19, giant cell tumor n=1) and one patient for intractable osteomyelitis by resection of proximal humerus and replacement by IPHP. Median length of resection was 160 mm (70-245), median duration of surgery was 167 min (101-338). Four patients suffered from recurrent dislocations that mandated revision surgery in one. MSTS-score at last follow-up was 24 (16-30), ROM: mean active abduction 65°, mean active anteversion 65°. When axillary nerve was severed (n=2) shoulder function was poor.

Conclusion for EMSOS: IPHP leads to a good shoulder function and allows considerable active range of motion when axillary nerve is preserved.

348: Complete biologic reconstruction with vascularized fibular graft and external fixation for a pediatric Ewing sarcoma of the humerus with preservation of growth plates.

by Andrea Sallent | Marius Aguirre | Daniel Pacha | Roberto Velez

Abstract ID: 348

Objective: report a successful surgical excision of Ewing sarcoma of the left humerus and reconstruction using an allograft with vascularized fibular graft (VFG) and external circular fixation.

Study Design: case report

Methods: A 3-year-old boy was admitted to our center after detecting a growing mass on his left arm for the past month. X-rays showed a permeative lytic lesion over the humeral diaphysis with periosteal reaction. MRI revealed a heterogeneous bone lesion with poorly defined margins and soft-tissue reaction with gadolinium contrast uptake. The lesion was 35 and 58 mm away from the proximal and distal physis, respectively. The images were highly suggestive of Ewing's sarcoma of the left humerus, confirmed by bone biopsy. The patient underwent surgical excision of a metastatic pulmonary nodule and neoadjuvant chemotherapy. In 2016, an en-bloc resection of the Ewing's sarcoma was performed, using a fibular structural allograft with a right VFG for reconstruction. An external circular fixator was used for stabilization, being the only viable method to avoid damaging the physis with either plates or pins due to the proximity. Negative margins were obtained and complete bone healing for both the structural allograft and VFG occurred 6 months postoperatively, removing then the external fixator. Postoperatively, pulmonary radiotherapy was administered given the past history of metastases.

Results: Currently, the patient is a 5-year-old boy with complete ROM of the affected shoulder, with no signs of local or distant disease. X-rays reveal complete bone healing of a full biologic reconstruction with evidence of active growth from both physis.

Conclusions: The external fixator stabilized the reconstruction despite the proximity of the resection to the growth plate. Contrary to the use of structural allografts where the association with internal fixation is mandatory due to their lack of elasticity, the use of a VFG enabled a full biologic reconstruction.

349: 'Umbrella Construct' –An Innovative Technique for Locally Aggressive Benign Bone Tumors of Proximal Humerus

by Dr Ashish Gulia | Dr Ajay Puri | Dr VIneet John Kurisunkal | Dr Srinath

Abstract ID: 349

Objective: Salvaging locally aggressive benign bone tumors of proximal humerus is a challenge. Resection is associated with high morbidity hence function preserving intra-lesional curettage is preferred. We present a novel reconstruction technique – U“ mbrella construct” where a femoral head and a strut allograft are used to reconstruct the cavity.

Study design: Retrospective analysis

Methods: All cases operated between January 2009 to December 2016 were retrieved from a prospectively maintained surgical database. Cases reconstructed with other modalities were excluded. All cases were reconstructed using femoral head allografts and strut allografts and fixed with either k wires or screws. Graft incorporation time, functional (MSTS) and oncological outcomes were evaluated.

Results: Out of 56 operated cases of aggressive benign proximal humerus lesions, a total of 12 cases underwent curettage followed by reconstruction with Umbrella Construct. This included 10 giant cell tumors (Campanacci Grade 3 – 10 cases, Grade 2 – 1 case) and 1 case of chondroblastoma, 2 cases received loading doses of denosumab followed by curettage. The median follow-up duration was 37 months (18 to 87 months). 3 patients (27%) had local recurrence. The construct was revised to a prosthesis in 2 while the 1 underwent excision of soft tissue recurrence. 1 patient had surgical site gaping which healed with secondary intention. The mean allograft incorporation time was 12 months . 1 patient had a graft fracture which was managed conservatively due to minimal displacement of the construct. The mean MSTS score was 27 with 11 out of 12 patients returning back to pre-operative activity levels.

Conclusions: Current midterm results support that Umbrella Construct is an effective biological reconstruction modality for proximal humerus reconstruction in benign aggressive tumors.

352: Functional outcome and achieved margins in limb salvage with tumoral prosthesis.

by Ana Ribau | Francisco Xará Leite | Tiago Amorim Barbosa | Pedro Cardoso | Vânia Oliveira

Objective: The study aims to retrospectively analyse the global results of limb salvage procedures with tumoral prosthesis in a single center, between 2000- 2017.

Methods: Evaluation of functional outcome and margins in 33 patients with bone tumors submitted to limb salvage procedures with tumoral prosthesis. Functional outcome was based on the musculoskeletal tumor society scoring system (MSTS), at preoperative stage and 3 months after surgery. To evaluate resection margins the TNM residual tumor (R) classification was used. Of all thirty-three patients, there were 18 men (54,5%) and 15 women (45,5%), with a median age of 40 years (from 19 to 82 years). The tumor was found in the lower limb in 20 patients (61%), and in the upper limb in 7 patients (21%) and in pelvis in 6 patients (18%). The most common diagnosis was osteosarcoma in 17 patients (52%), followed by chondrosarcoma in 9 patients (27%) and Ewing in 3 patients (9%).

Results: The mean of MSTS score at preoperative stage was 15 (51%) and 23 (77%) three months after surgery. The score's average increase was 26%, however three patients presented functional decay. The resection margins were R0 in 29 patients (88 %), R1 in 4 patients (12 %), and no patient with R2.

Discussion: Surgical management of large bone tumors is challenging. The two main aims are the complete resection, respecting basic principle of oncology, and preservation of limb function. The 4 cases with R1, microscopic positive margin, were intentional in order to preserve function and considering adjuvant therapies.

Conclusions: Considering that all the patients are from a single center, despite the small sample, the limb salvage with tumor joint prosthesis leads to satisfactory functional outcomes, and it seems that it does not compromise the resection margins.

353: Leg Length Discrepancy after Endoprosthetic Reconstruction for Proximal Femur Tumor

by Viktor Labmayr | Marko Bergovec | Jörg Friesenbichler | Andreas Leithner

Objective: Leg length discrepancy (LLD) after hip arthroplasty can lead to hip pain and limping and is a major source of patient dissatisfaction. Patients with proximal femur tumors might have other expectations towards surgery outcome than patients with hip arthritis. We wanted

to find out whether LLD after endoprosthetic reconstruction of the proximal femur following tumor resection would lead to complaints in our patients.

Study design: A retrospective single institution analysis.

Methods: We included all patients with proximal femur tumor who had undergone reconstruction at our department between 2011 and 2015. Reconstruction was achieved either by hemiarthroplasty or tumor endoprosthesis due to primary or metastatic proximal femoral tumors. Further inclusion criteria were: adult patients, radiological documentation and postoperative visits. We identified 45 patients in our database, but only 35 patients matched all criteria. Leg length was measured on plane radiographs of the pelvis and thigh, using acetabular roof, greater and lesser trochanter, and lateral femur condyle as reference points. LLD \leq 10 mm was considered not significant.

Results: The median patient age was 70 years (26-94 years). Four patients had primary, and 31 patients had metastatic tumors. A total of 13 tumor endoprostheses (nine GMRS, four MUTARS) and 22 hemiarthroplasties were implanted. The median LLD was 8 mm (range: 1 to 27 mm). Fourteen patients (40%) showed LLD greater than 10 mm, three of them complained of hip pain. All patients with tumor endoprosthesis had positive Trendelenburg sign, but only one (LLD 18 mm) subjectively complained about limping.

Conclusion: LLD following proximal femur tumor endoprosthetic reconstruction was not linked to complaints in the majority of our patients. Larger studies including more patients with various hip tumors and reconstruction modalities are needed to study the impact of LLD on patient satisfaction after tumor hip surgery.

355: Malignant lipomatous tumours in children and young adults: a case series from the Royal Orthopaedic Hospital (ROH), Birmingham.

by Dr Michael Thomas | Dr Jan Balko | Mr Rajesh Botchu | Mr Jonathan Stevenson | Mr Lee Jeys | Mr Michael Parry | Dr Vaiyapuri Sumathi

Abstract ID: 355

Objective: We aim to investigate the clinicopathological spectrum of malignant lipomatous tumours affecting children and “young adults”.

Design: Retrospective data analysis.

Methods: Based on the WHO age classification we have selected patients of 30 years or younger as representative of children and “young adults”.

From the histopathology database of the ROH, Birmingham a retrospective search was conducted to identify all primary malignant lipomatous tumours on record. The search identified 593 cases comprised of atypical lipomatous tumours/well-differentiated liposarcoma (ATL/WDLS) [297, 50.1%]; de-differentiated liposarcoma (DDL) [56, 9.4%]; myxoid liposarcoma (MLS) [178, 30.0%] and pleomorphic liposarcoma (PLS) [62, 10.5%]. The median age was 59.4 years. The search was then focused on those occurring in patients aged 30 years or younger.

Results: Of the 593 cases 19 (3.2%) occurred in patients under 30 years (9 males; 10 females). The most common subtype in this age group was MLS ([11], 57.9%), followed by ATL/WDLS ([7], 36.9%). One PL was identified. Of the 11 MLS, 5 showed round cell differentiation ranging from 2-25%. Molecular analysis performed on 4 MLS all showed DDIT3 gene rearrangement and 2 ATL/WDLS showed MDM2 amplification. Most were treated via surgical excision, one MLS required post-operative radiotherapy due to its marginal excision and location. One MLS with 25% round cell component metastasized 6 years post-excision. One pharyngeal ATL/WDLS had recurred one year post-operatively. The patient with PLS died before treatment.

Conclusions: In our case series malignant lipomatous tumours are extremely uncommon in children and young adults accounting for 3.2% of all liposarcomas. The most common subtype in this age group is MLS in contrast with the general adult population in which ATL/WDLS are most prevalent. The MLS with the highest round cell component showed the most aggressive behavior. Most are successfully treated with surgical excision and few require peri-operative radiotherapy.

356: The role of arthroscopy in the intraarticular tumour treatment

by Ana Oljaca | Marko Bergovec | Gerald Gruber | prof. Andreas Leither

Abstract ID: 356

Objective: Arthroscopy is a widely accepted surgical method used as a diagnostic technique and treatment option for a variety of orthopedic conditions. However, the role of arthroscopy in the management of orthopedic oncology is not well defined. Arthroscopy could be a practical solution for removal of benign intraarticular tumours, although indications are not clear. The possible risks of using arthroscopy in radiologically unclear or histologically unconfirmed lesions remain unknown. The aim of our study is to review indications and report possible risks of using arthroscopy in intraarticular tumour treatment.

Methods: A PubMed search was performed combining the MeSH terms (Arthroscop*) and all term variations of tumours from the World Health Organisation Classification of Tumours of Soft Tissue and Bone from 2002. In total 4651 papers were identified. Duplicates, non-orthopaedic studies, and studies not written in the English or German language were

excluded, leaving 952 articles for further analysis. We screened all abstracts for details concerning tumour types, the joints involved, and postoperative outcomes, in regard to complications, recurrence, or malignancy.

Results: Of the studies involved, knee was discussed in more than 50%, followed by hip, shoulder and the ankle. Pigmented villo-nodular synovitis (PVNS) was the predominant tumour type, followed by synovial chondromatosis, cysts and osteoid osteomas. Complications and malignancy were discussed in 92 papers.

Conclusions: Arthroscopy has proven to be a safe treatment method for nodular PVNS, synovial chondromatosis, osteoid osteoma, and lipoma, where the arthroscopy was a single operation considered to be curative. There is a high recurrence rate in cases of diffuse form PVNS. A significant number of cases have reported complications after a detection of malignancy, multiple re-operations, as well as in one case, embolic tumour dissemination. A great caution and expertise in tumours is needed before starting the arthroscopy in unclear lesions.

364: Non-metastatic chondrosarcomas. Is surgery alone effective?

by Habib NOURI | Aicha HCHAICHI | Ali BEN HASSINE | Hakim KHERFANI | Mondher MESTIRI

Abstract ID: 364

Objective:

We aim to evaluate critically the outcome of non-metastatic CS treated surgically, in order to determine prognostic factors on both local control and survival rate.

Study design and method:

We report a series of 65 CS of bone non-metastatic at presentation which were treated by surgery only and reviewed with a mean FU of 61.7 months. Forty five lesions (69.2%) interested the appendicular skeleton and 20 (30.8%) were axial. there were 23 grade I CS (35.4%), 25 grade II (38.5%), 14 grade III (21.6%), one dedifferentiated CS (1.5%) and 2 mesenchymal CS (3%). Grade I lesions (35.4%) were considered as low grade and the other histological subtypes (64.6%) as high grades. Surgical margins were intralesional (IL) in 15 cases (23.1%), marginal (M) in 12 cases (18.5%), large (L) in 30 cases (46.2%) and radical (R) in 8 cases (12.3%).

Results:

The overall survival was 56.9%. The 5- and 10 Years Survival Rates (YSR) were respectively 63.1% and 58.3%. Histological grade of malignancy and surgical margins were the most predictors of survival. The 5YSR was 91.3% for low grade lesions and 47.5% for high grade ones ($p=0.005$). When adequate surgical margins were achieved, the 5YSR was 76.8% vs 42% ($p=0.003$).

Conclusion:

Our study confirmed that surgical margins are the most prognostic factor for local control of chondrosarcoma. However, even with adequate margins, surgery can cure only 70% of high grade lesions. This highlights the need of developing systematic treatment for high grade chondrosarcoma to improve their prognosis.

365: Individual identification of responders to adjuvant radiotherapy in a cohort of patients operated for a soft-tissue sarcoma of the extremity and trunk with negative margins. A useful tool for shared decision making.

by David Biau | Peter Ferguson | Anthony Griffin | Charles Catton | Peter Chung | Raphael Porcher | Jay Wunder

Abstract ID: 365

Objective:

To estimate the proportion of responders to adjuvant radiotherapy; to estimate individual probabilities of being a responder to adjuvant radiation; to find variables associated with response to adjuvant radiation.

Study design:

Single center retrospective comparative cohort analysis

Methods:

Patients with a primary, localized, STS of the extremity or trunk resected with negative margins were included. Atypical lipomatous tumors, myxoid liposarcomas and DFSP were excluded. Patients are classified in one of three groups: healthy patients, responders, and recurrent. Healthy patients are those who will not recur whether they receive radiation or not; recurrent patients are those who will recur with or without adjuvant radiotherapy; responders are patients who will recur if they are not given radiotherapy but will not recur if they are given adjuvant radiotherapy. The identification of responders is based on the principal stratification framework and propensity score analysis.

Results:

1057 patients were included of which 704 (67%) received (neo)adjuvant radiotherapy and 353 (33%) did not. The cumulative 10-year local recurrence rate was 9.6% (95% CI: 7.2% to 12.4%) overall, 7.8% in the “(neo)adjuvant radiotherapy” group and 14.1% in the “no radiotherapy” group.

Overall 8.3% patients were classified as responders, 84.4% as healthy, and 7.3% as recurrent. Overall 75% of the patients had 10% or less chance of being a responder. Patients were more likely to respond to radiotherapy if they presented with a small tumor of intermediate grade. Patients considered to be at high risk of local recurrence (i.e. high grade, deep and >5cm tumors) showed little chance of response to (neo)adjuvant radiotherapy.

Conclusion:

Less than 10% of patients operated on for a localized extremity STS with negative margins will respond to (neo)adjuvant radiation. Using individual prediction of patient response data could help in decreasing the use of adjuvant radiotherapy without threatening the quality of local control outcomes.

366: Pelvic Resections in Tumor Patients. 50 years Sytenko Institute Experience.

by Vyrva Oleg | Golovina Yanina | Shevchenko Igor | Malik Roman

Abstract ID: 366

Objective: Pelvic resection is a technique that involves surgical resection of portions of the pelvic girdle. The main indication for these procedures is primary malignant tumors of the pelvis, but in rare cases they are indicated for metastatic lesions. The anatomy of the hip and pelvis is complex and challenges even the most experienced surgeon.

Study design: The main purpose of this study was to analyze pelvic resection patient in Sytenko Institute from 1963 till 2017. It was group of 239 patients with pelvic tumours. 186 patients were operated at modern era in 2004-2017. Options for pelvic resection vary greatly depending on the histology of the tumor and the location of the lesion. Preoperative planning is crucial to define the extent of the tumor, plan the surgical margins, and identify the location of the vital structures.

Methods: The most number of patients were with Chondroblastic Tumors and secondary metastatic lesions. Gender distribution was male 131 (55%) and female 108 (45%). Mean age – $37,2 \pm 18,9$ (7-80) years.

Results: Wound infection and flap necrosis are the most common complications (20% to 50%). The TESS and MSTs are the most commonly used instruments in our study. Unfortunately we have not have statistically veracious results in all 239 patients of Sytenko Institute group because long period (more than 50 years) follow-up and no significant archive data.

Conclusion: Hemipelvectomies are usually left unreconstructed, but reconstructing the pelvic ring may afford some benefits. Overall, the procedure is technically demanding and requires a thorough knowledge of pelvic anatomy and proximity of vital structures to minimize complications. Reconstruction is dictated by the extent of the resection and the remaining structures. Surgical technique is dictated by histology of the tumor and location of the lesion. A multidisciplinary team is required.

368: Bladder infringement by a pelvic chondrosarcoma: A case report.

by Laura Izquierdo | Salvador Ausina

Abstract ID: 368

Chondrosarcomas are malignant bone tumors with pure hyaline cartilage differentiation which often settle in the pelvic ring. There are different behavior patterns according to the subtype; however, symptoms are usually mild, ranging from several months to years in duration, and consist of persistent, dull, aching pain or palpable masses as a rule. The aim of our study is to present a rare case report of a pelvic chondrosarcoma with bladder spread in which the first sign was a 4 years history of macroscopic intermittent hematuria related to exercise or efforts. There were no distant metastasis. A multidisciplinary-based approach was carried out, mainly regarding to the assessment, surgery planning as well as in the surgery room. It consisted in en bloc resection of bladder and pelvic ramus (including the chondrosarcoma with macroscopic wide margins) and cutaneous bilateral ureterostomy (done by Urology Department and Orthopedic Surgery Department) and pelvic floor reconstruction using a mesh by General and Digestive Surgery Department. Currently, after a year from the surgery, the patient is asymptomatic. Chondrosarcomas are radio and chemoresistant tumors whose main treatment is surgery resection, with wide margins when is possible. Sometimes their treatment is complex, as they often involve the pelvic ring. A multidisciplinary approach is mandatory in these cases.

370: Limb salvage after tumour resection - challenges and complications of endoprosthetic reconstruction

by Francisco Xará Leite | Ana Ribau | André Carvalho | Hélder Fonte | Vânia Oliveira | Pedro Cardoso

Abstract ID: 370

OBJECTIVE: To evaluate complications, risk factors and outcome of endoprosthetic reconstruction after tumour resection.

STUDY DESIGN: Retrospective study of all primary endoprostheses performed in our department in the last 10 years, location, adjuvant treatments and complications, with minimum follow-up (FU) of 12 months.

METHODS: Twenty-four patients (mean age 38, 19-82) were included, totalling 24 implants, of which 12 were silver-coated. The 2014 modified Henderson Classification for mode of failure of tumour endoprosthetic reconstruction was used.

RESULTS: Of the 24 implants (mean FU 36 months), 8 failed (33%), resulting in 7 revision surgeries and 1 amputation. Most common cause of failure was type2 (3, 12.5%). Infection was the most frequent overall complication (16.7%), however resulted in only 2 failures (type4, 8.3%). Four patients died (mean 24 months after primary surgery) due to disease progression, which was also the cause for amputation. Nevertheless, the other 12 primary implants (50%) were complication-free at last visit, with successful treatments among them of 2 acute infections through early surgical aggressive debridement and targeted antibiotics. Patients aged 30 or less (11) presented 2 failures – 1 type2 and 1 type4 – while the older population (13) had 6 – 1 type1, 2 type2, 1 type4 and 2 type5. This difference, although not significant ($p>0.05$), strongly suggests a higher likelihood of failure with older patients. Additionally, tumours around the hip appear to allow significantly less reliable wide resections when compared to knee tumours (local relapse 50% vs 7%, $p<0.05$), and mortality is higher (50% vs 21%, $p>0.05$).

We found no relation between chemotherapy and complications. Also, this limited sample was not able to show silver-coating superiority.

CONCLUSION: If disease progression – a complication not directly related to the implant or surgical technique – is excluded, our results show that endoprosthetic reconstruction after tumour resection provides fairly good results, especially in a younger population.

371: What is the fate of donor site in vascularized fibula used in “Frozen Hot-Dog” biological reconstruction?

by Harzem Özger | Osman Emre Aycan | Buğra Alpan | Natig Valiyev

Abstract ID: 371

The use of free vascularized fibular graft (FVFG) is a common biological reconstruction method in large defects created by musculoskeletal tumor resections. The “Frozen Hot-Dog Method” requires the combined use of recycled bone segment in liquid nitrogen and FVFG. The purpose of our study is to evaluate the donor site morbidities and define the requirements to avoid complications in our index biological reconstruction method.

The clinical and radiologic data of 66 patients who received "Frozen Hot-Dog" biological reconstruction in our clinic between 1995 and 2016. The mean age in was 14.9(3.2-44). The patients were evaluated for donor site incision type(straight/lazy-S), flexor hallucis longus(FHL) contracture, drop foot, ankle valgus deformity and their development time. Donor site morbidity is scored regarding scar tissue, functional loss, wound healing, iatrogenic trauma and pain. FVFG-length, age/residual fibula index (A/RFI), ankleROM and muscular-strength were noted.

The lazy-S incision is preferred in 54.6% and mean FVFG-length was 19.4cm(9-29). Donor site complications encountered in 25.8% patients being FHL contractures in 11, ankle valgus in 8 and drop foot in 1. FHL contractures were evident from the first follow-up but ankle valgus developed at mean 15.6 months(2-30). Cosmetic-complaints were mild scar in 17 patients, dysfunction(evident at examination-only)in 3, functional defect in 1, wound complication over 15 days in 9, iatrogenic sensory defect in 3 and temporary pain in a patient. The mean plantar flexion was 49.3°(40°-50°), dorsiflexion was 18.6°(-20°-20°) and mean muscular strength was 4.9/5. Ankle valgus was evident in 5/20 patients of A/RFI<16 within mean 19.2 months and in 3/46 patients of A/RFI≥16 within mean 13 months.

The donor site morbidities are acceptable when compared to literature. Ankle valgus is asymptomatic but mostly related with resected FVFG length.(p<0.05) Valgus progression seems faster in A/RFI≥16 group. Developing limb length discrepancy can be another factor in ankle valgus at A/RFI<16 group.

372: The role of Evicel® (fibrin sealant) in surgical excision of soft tissue tumours

By Benjamin Davies

Abstract ID: 372

Objective

To assess the effectiveness of the use of Evicel® in the surgical excision of soft tissue tumours.

Introduction

Previous studies have shown the effectiveness of Evicel in tumour surgery, but this study aims to assess the specific effectiveness in soft tissue tumour excisions, and analyse whether there is any specific factors to guide when its use is beneficial.

Methods

The notes of patients who received Evicel intra-operatively during the excision of soft tissue tumours over a 3-year period (2013-2016) were retrospectively reviewed for key elements regarding blood loss (size of tumour excised, Hb drop, drain output, length of stay for drain, requirement for transfusion, return to theatre, wound complications).

These were compared to data from a random selection of soft tissue tumours over the same period, where Evicel was not used.

Results

76 soft tissue tumour excisions using Evicel were compared to 95 soft tissue excisions without the use of Evicel.

The use of Evicel in excisions of all soft tissue lesions analysed was unconvincing, however more detailed analysis of the data found a clear benefit for the use of Evicel in larger (>300 cm³) versus smaller (<300 cm³) soft tissue volume resections. Patients who received Evicel after excision of a soft tissue tumour >300cm³ had reduced post-operative blood transfusion requirements, 4.7% (2/43) versus 30% (11/37) where no Evicel was used. There was approximately 300 mL lower drain output but no difference in the length of stay in situ for the drain. Hb drop was lower with Evicel use than without (16.5 vs 22.8 g/L).

Conclusions

Evicel is effective in reducing need for post-operative blood transfusion and drain output in excision of soft tissue tumours with a volume greater than 300 cm³. There is no clear improvement in the measured factors for tumours <300m³.

373: Early results after treatment of soft tissue sarcomas with combined preoperative and intraoperative radiotherapy

by Kurze, Christophe | Kollar, Attila | Ionescu, Codruta | Klenke, Frank M.

Abstract ID: 373

Preoperative radiotherapy (PRT) achieves improved local control of extremity soft tissue sarcoma (STS) but is associated with postoperative complications. Additional intraoperative radiotherapy (IORT) may further improve local control. This study aimed at investigating local complications and oncological outcome after combined therapy of STS with PRT and IORT.

27 patients (m=15, f=12, age 65±19 years) with extremity STS (G1 (myxoid liposarcoma) n=2, G2 n=7, G3 n=18) were retrospectively reviewed (mean follow-up of 21 (6-49) months). PRT (50 Gy) was delivered with a linear accelerator in rapid arc technique. For IORT, high-dose-rate brachytherapy (10 Gy) was applied directly to the tumor bed after tumor removal. Tumor resections were wide (n=5), marginal (n=20), and intralesional (n=2). Follow-up examinations took place after 2, 6, and 12 weeks and in 3 months intervals thereafter. All complications were recorded. Major complications were defined as complications requiring surgical intervention.

All STS were locally advanced (T2a n=2, T2b n=25). R0 resections were accomplished in 25/27 cases. 23 patients showed no evidence of disease, 2 were alive with disease, and 2 died of the disease. Overall, local control was achieved in 26/27 cases. Minor complications occurred in 13 cases (grade 1 skin reaction (n=10), grade 2 reaction (n=2), non-surgically treated pathologic fracture (n=1). 11 major complications were observed (deep infection (n=5), wound healing disorder (n=3), docking-site non-union (n=1), pathologic fracture (n=1), seroma

(n=1)).

Similar to the application of PRT alone, the combination of PRT and IORT includes an increased risk of local complications as compared to adjuvant RT. However, the present short-term results also demonstrate excellent local control despite a high rate of marginal resections in locally advanced tumors. In cases where wide resections would be associated with significant morbidity and loss of function, the combination of PRT and IORT helps to preserve a functional limb without compromising local control.

375: Machine Learning for Spinal Chordoma Survival Prediction

by Aditya Karhade | Quirina Thio | Joseph Schwab | Santiago Lozano-Calderon

Abstract ID: 375

Objective: Although machine learning has transformed fields ranging from finance to aeronautics, there are few studies exploring the utility of machine learning in musculoskeletal oncology. The purpose of this study was to investigate the ability of computationally intensive machine learning models to predict survival for patients diagnosed with spinal chordoma.

Study design: Retrospective analysis.

Methods: The Surveillance, Epidemiology, and End Results (SEER) database was used to identify patients with an International Classification of Disease for Oncology morphological diagnosis of spinal chordoma. Machine learning models were used to predict five-year survival. The SEER data was partitioned into an 80:20 split of training and testing data and model calibration was assessed with the c-statistic.

Results: From 1988 to 2013, there were 665 patients diagnosed with spinal chordoma in the SEER database. Of these patients, 61.5% were male, 25.4% had tumors greater than 8 cm at diagnosis, 49.5% had locally invasive tumors, 42.4% of patients underwent radiation, and 73.5% underwent surgery. One, three, five, and ten year overall survival for the population were 90.2%, 75.7%, 61.3%, and 28.2%. For five-year survival prediction, the decision jungle model performed the best with a c-statistic of 0.81; the performance of boosted decision tree models had a c-statistic of 0.75 and the performance of averaged perceptron models had a c-statistic of 0.79.

Conclusion: This twenty-five-year analysis of a national multi-institutional database of spinal chordoma patients demonstrated that computationally intensive machine learning models can be successfully deployed for accurate survival prediction in musculoskeletal oncology. Future studies can seek to translate these models into readily accessible tools for practicing health professionals.

376: Can Machine Learning Models Accurately Predict Overall Survival in Chondrosarcoma patients?

by Quirina Thio | Aditya Karhade | Joseph Schwab | Santiago Lozano – Caldeoron

Abstract ID: 376

Objective. Several studies have identified prognostic factors for patients with chondrosarcoma with statistical modeling but there are few studies investigating the utility and accuracy of computationally intensive methods such as machine learning. The purpose of this study was to determine the value of machine learning algorithms in predicting 5-year survival in patients with chondrosarcoma.

Study design. Retrospective

Methods. Patients 18 years and older with a histologically proven diagnosis of chondrosarcoma were extracted from the Surveillance, Epidemiology, and End Results Registry (SEER) from 1988-2013. Study variables included age, race, sex, year of diagnosis, size, histologic type, tumor extension, location, and treatment type. Various machine learning models were used to predict 5-year survival. We used 80% of the cohort as the training set and 20% as the testing set. Model calibration was assessed with the area under the receiver-operating curve (AUC).

Results. Overall, 1473 patients with a diagnosis of chondrosarcoma were identified. Mean age at diagnosis was 51.8 (SD 16.8), 54.2% of the patients were male, mean tumor size was 7.8 cm (SD 5.4), 93.6% received surgery, and 11.5% underwent radiotherapy. Survival at three years was 81.9%, at five years 76.3% and at ten years 39.9%. The boosted decision tree model had the best performance with an AUC of 0.82. The performance of averaged perceptron model had an AUC of 0.81 and the performance of jungle decision model had an AUC of 0.79.

Conclusions: In this study we successfully developed machine-learning models to predict 5-year survival in patients with a diagnosis of chondrosarcoma. Future studies can seek to improve these models and deploy them in the clinical setting.

377: Influence of adjuvant therapies on massive allograft complications in the lower extremities

by P.T.J. Sanders | M.P.A. Bus | J.F. Spierings | J.I. Albergro | L.A. Aponte Tinao | P.D.S. Dijkstra

Objective

It is generally assumed that radiotherapy and chemotherapy increases the risk of allograft complications such as non-union, fracture and infection. However, solid evidence to substantiate these assumptions is lacking, and the exact effect size is unknown. Therefore, we analysed the risk of adjuvant therapies on allograft complications in massive allografts of the lower extremities, with a minimum follow-up of ten years.

Methods

We reviewed 311 patients (169 males, 54%) who underwent massive allograft reconstruction for a primary bone tumour of the femur (n=206, 66%) or tibia (n=105, 34%) between 1980 and 2006, in two referral centres. Graft types included osteoarticular (n=130, 42%), intercalary (n=128, 41%) and allograft-prosthetic-composite (n=53, 17%) reconstructions. Two patients (1%) received neo-adjuvant radiotherapy, 11 (4%) adjuvant radiotherapy, 212 (68%) neo-adjuvant chemotherapy and 212 (68%) adjuvant chemotherapy. Analyses were performed using time dependent multivariate Cox regression.

Results

Adjuvant radiotherapy significantly increased the risk of non-union (HR3.3 95%CI 1.02-11.00 p=0.05; 3/11, 27% vs 29/300, 10%). Radiotherapy did not influence the risk of allograft fractures (HR1.7 95%CI 0.53-5.38 p=0.38; 3/11, 27% vs 56/300, 19%). With localization and allograft type as covariables, adjuvant chemotherapy significantly increased the risk of allograft fractures (HR2.2 95%CI 1.20-4.03 p=0.01; 45/212, 21% vs 14/99, 14%). Adjuvant chemotherapy did not influence the risk of non-union (HR1.2 95%CI 0.55-2.44 p=0.71; 22/212, 10% vs 10/99, 10%) or infection (HR1.6 95%CI 0.67-3.64 p=0.31; 22/212, 10% vs 7/99, 7%).

Conclusions

In a large cohort of patients with allograft reconstructions, we found an increased risk of complications when adjuvant therapies were used. Based on these findings, we believe that the use of allografts should be reconsidered in patients who need radiotherapy, because of the increased risk of non-union and the associated risk of reconstruction failure. Furthermore, one should be cautious for an increased risk of fractures in patients who receive adjuvant chemotherapy.

379: Accuracy of the sure-cut biopsy: a comparison of the core needle histology analysis and definitive specimen histology report - a literature review

by Renato Igrec | Marko Bergovec | Bernadette Liegl-Atzwanger | Christian Viertler | Andreas Leithner

Objective: a literature review of diagnostic accuracy of the sure-cut biopsy in relation to the final histological diagnosis.

Study design: a literature review.

Methods: We performed a literature search of human studies in the English language from 01/01/1990 to 31/12/2016 using PubMed electronic search using the words “sure-cut” or “tru-cut” or “core-needle” together with “biopsy” and variants of soft tissue sarcoma.

Results: This search revealed in total 255 articles. After reading the titles and the abstracts, we excluded 190 studies not matching our study, leaving 65 publications to analyze. : A total of 4065 patients were included in the final analysis. The total diagnostic accuracy of core needle biopsy in soft tissue sarcomas was 83.8%.

Conclusions: Core needle biopsy is reliable, minimally invasive and secure technique with high diagnostic accuracy in diagnosis of soft tissue sarcomas. Considering the results, the use of core needle biopsy in oncologic orthopedics in diagnosing STS is recommended.

380: The effect of surveillance on survival after sarcoma surgery: Analysis of a large Canadian administrative database

by Anthony Bozzo

Abstract ID: 380

Objective:

The optimal surveillance strategy for extremity sarcoma remains unknown and current guidelines are not informed by high quality evidence. It is unknown if high intensity surveillance offers any survival advantage compared to low intensity surveillance. Our objective was to use a large provincial administrative database to determine surveillance patterns in Ontario following extremity sarcoma surgery and identify any associations with patient survival.

Methods:

The Institute for Clinical Evaluative Sciences (ICES) maintains a prospectively collected administrative database of all extremity sarcoma cases operated in Ontario from 2002-2016. A total of 10,103 patients are available for analysis. Patient demographics, tumor characteristics, comorbidity and mortality data were analyzed. We report on the current follow-up practices for Ontario sarcoma patients and analysis of Kaplan-Meier survival curves for high intensity and low intensity surveillance groups. We define high intensity follow-up as 6 or more visits within the first 2 years after surgery, and low intensity follow-up as 5 or fewer visits.

Results:

A total of 3712 Ontario Sarcoma patients were eligible for survival analysis commencing at the landmark point, two years after surgery. No survival differences were seen between patients followed more or less frequently in our large cohort, with equal 5, 10 and 15-year survival rates. The distribution of stage of disease and sarcoma subtype were similar between the groups. No differences in overall survival were seen between patients from different income quintiles, rural vs urban patients, males or females. The average Ontario sarcoma patient underwent 2.51 CT scans in the two years following sarcoma surgery.

Conclusion:

Our analysis of a very large cohort of sarcoma patients reveals equal survival in patients undergoing high intensity or low intensity surveillance. The findings from this study will also inform the development of an international randomized clinical trial (SAFETY Trial) comparing high vs low intensity surveillance.

381: Prosthetic reconstruction after major pelvic resections

by Luís Lopes Coutinho | Cláudia Rodrigues | João Rosa | Helder Fonte | Vânia Oliveira | Pedro Cardoso

Abstract ID: 381

Introduction: Hemipelvic reconstruction with endoprosthesis after tumor resection is a major orthopaedic surgery challenge. It can save the limb and life of the patient with reasonable functional outcomes. The aim of the authors is to present the experience of our department in hemipelvic or iliac resection and reconstruction.

Methods: Six pelvic reconstructions were performed in the last 4 years: 2 after total hemipelvectomy and 4 after type II (acetabular) resection. The primary tumors were 2 Ewing Sarcomas, 1 leiomyosarcoma, 1 radio-induced sarcoma and 2 chondrosarcomas. MUTARS Custom made prosthesis was used in the hemipelvectomy cases and MUTARS LUMIC prosthesis in the acetabular resection cases.

Results: Patients submitted to surgery in the last 4 years were followed till the present, with a maximum follow up of 4 years and a minimum of 3 months. There is one case of local relapse and there is 2 death cases due to disease progression (1 year after the surgery). Two cases needed reoperation: a case of prosthesis instability (prosthesis revision 1 month after the first surgery) and acute superficial infection (debridement was performed) and a case of prosthesis infection (first debridement and then prosthesis extraction was performed). The overall functional outcome was satisfactory.

Conclusions: In our experience, despite the local and systemic aggressive behavior of pelvic tumors, the total resection and the limb salvage procedure with hemipelvis or acetabular reconstruction is, most importantly, life extending for the patient. Although the high risk for complications and the subsequent need of revision, the reconstruction gives the patient a better quality of life with acceptable functional outcome.

382: There is a need for a standardized pathology report in malignant bone tumor surgery: about the French OS2006 study

by Eric Mascard, Bob Valery Ocean, François Gouin, Laurence Brugières, Anne Gomez-Brouchet, Marie Cécile Le Deley

Abstract ID: 382

Surprisingly, we reported previously no correlation in multivariate analysis between margins and local control after osteosarcoma resection in the OS 2006 study. Tumor size, response to chemotherapy and margins were found to be dependant factors. An other explanation would be the heterogeneity of pathology reports in 48 participating centres. We aimed to check if the information given “between the lines” of the pathology reports was sufficient to allow confirmation (or requalification) of recorded margins.

337 patients enrolled in the French OS2006 study for an osteosarcoma who underwent surgery of the primary tumour were included. Patients in which the pathology report was not available were excluded.

The authors blindly reviewed pathology reports checking for response to chemotherapy, minimal margin in millimetre into bone and soft tissues, type of residual tumor at the margin according to the French FNCLCC (R0, R1abc, R2). These newly interpreted data were compared to those collected in the study. The statistical analysis was performed using SAS 9.4.

The estimated 5-year cumulative incidence of local relapse was 7.5% (5.2-10.4%). 25 patients had a local recurrence. In these, 21 were supposed to have a so-called radical or wide resection (in which 5 were re-qualified R1 and 6 in which margins could not be rated).

We found significant differences between our analysis and the data collected in OS2006. The 5-year cumulative incidence of local relapse after radical or wide resection was 0.06 and 0.15 in patients with a marginal or intra-lesional resection (hazard ratio 2.49 (1.15-5.4)). Among 337 cases, complete information was available in only 99 pathology reports.

Quality of recorded data in multi-centric studies is debatable. This study emphasized the need for a reproducible pathology report. Inadequate rating of surgical margins could lead to inappropriate conclusions about complementary local treatment after surgery. The authors propose a standardized pathology report.

383: Challenges of hemipelvectomy with reconstruction in primary pelvic tumors

By Bruno Pombo | Vania Oliveira | Pedro Cardoso

Hemipelvectomy is a rare procedure to treat young patients with primary pelvic tumors. An internal approach permits to save the limb and to reconstruct the hip joint with an endoprosthesis. However, these procedures have significant complications such as infection, nerve injuries, dislocations and fractures. The objective of this study is to present two cases after hemipelvectomy and hemipelvic reconstruction using computer-aided custom-made endoprosthesis with different clinical evolutions. A retrospective study was done. The first clinical case, a 49 years-old female, with a primary leiomyosarcoma of left pelvic bone [(y)pT0]. After neoadjuvant chemotherapy, she has proposed to a hemipelvectomy with reconstruction of the hemipelvis with a custom-made prosthesis supported proximally on alar region of sacrum. In the post-operative time she had developed a minor dehiscence of suture. After 5 months of follow-up, she has the surgical wound cicatrized and can walk with external support. The second case, a 51 years-old female, has a history of pelvic radiotherapy to treat a cervix tumor. After 10 years, she has developed a radio induced fibroblastic variant osteosarcoma [pT3bN0 R1]. It was proposed to the same surgical treatment. After the surgery, it was detected a bladder laceration and pelvic infection. She was submitted to a surgical debridement and antibiotic therapy directed to multidrug- resistant *Klebsiella pneumoniae* and *Candida albicans*. After 21/2 months, with persistence of chronic infection it was removed all prosthetic material keeping antibiotic therapy. Hemipelvic resections are associated to a high risk of complications. The proximal support of this endoprosthesis on alar region of sacrum is uncertain. An extension of proximal fixation to lumbar spine could improve the mechanical stability of this prosthesis. It is unclear if pelvic infections should not be treated with an early extraction of prosthetic material particularly in anatomic regions with reduced vascularization.

384: Outcome of Knee Revision Prosthesis using Metaphyseal Sleeves in Patients with Severe Bone Loss

by Mathias Glehr | Sebastian Klim | Florian Amerstorfer | Gerald Gruber | Gerwin Berhardt | Patrick Sadoghi | Andreas Leithner

Objective: Extended bone loss is a severe problem in the field of orthopedic tumor surgery. The use of porous coated metaphyseal sleeves is a promising treatment option for extended bone defects. Therefore, the aim of our study was to determine the durability as well as the clinical and radiological middle term outcome of metaphyseal sleeve fixation in revision-TKA surgery.

Methods: We were able to conduct a clinical and radiological follow-up examination in 92 Patients (94 Knees). This examination contained the survey of ROM, SZS, KSS, WOMAC, SF-36, stem tip pain as well as a radiographic assessment to determine if successful osseointegration has been achieved.

Results: The overall aseptic loosening rate amounted to 0%, in 6 issues (7,69%) we detected an insufficient osseointegration according to the criteria determined by Engh et al.. Of these 6, no one had to be scheduled for re-revision. Stem tip pain was found in 6 issues (4 tibial (4,35%), 2 femoral (2,33%)).

Conclusion: We did not encounter any cases of aseptic loosening. No significant difference in AORI bone defect types regarding the clinical and radiological outcome was found. We can confirm the promising short term results of previous studies as well as the good middle term results recently published.

385: Next generation sequencing and immunohistochemical study in adamantinoma and osteofibrous dysplasia.

By A Gomez-Brouchet, C Syrykh, M Bousquet, L Galmiche, S Aubert, I Pommepuy, B Marie, P Brousset

Abstract ID: 385

Objective: Osteofibrous dysplasia (OFD) and adamantinoma (AD) divided in classic AD and OFD-like AD, are rare primary fibro-osseous bone tumours with variable epithelial component. All these lesions mostly arise in the tibia of young individuals, and have clinical, radiological, histopathological and cytogenetic similarities, with increasing aggressiveness from OFD to classic AD. Microscopically, diagnostic criteria may be lacking due to the heterogeneity of the tumours, leading to inappropriate therapeutic management. Here we try to clarify the histopathological and biologic relationship between these tumours through immunohistochemical and next generation sequencing (NGS) analysis.

Methods: Six AD (4 OFD-like and 2 classic AD) and 1 OFD were collected from centres of the French Sarcoma Group (GSF-GETO) and were compared with 2 ameloblastomas (odontogenic tumours mimicking classic AD). Immunostainings were performed with AE1/AE3, calretinin, cytokeratin 5/6/8/18/14, E-cadherin and BRAF V600E antibodies. We carried out RNA sequencing (RNAseq) in all tumours. Whole exome sequencing results of 2 OFD-like AD were also analysed and matched with normal tissues.

Results: By immunohistochemistry, no differences were found between AD and OFD. Both showed AE1/AE3 and cytokeratin 5/6/14 expression. Only ameloblastomas were positive for cytokeratine 8/18, E-cadherin and BRAFV600E. Hierarchical clustering analysis of the transcriptional profiles showed that OFD and AD were more closely related to each other than to ameloblastomas. Furthermore, six recurrent mutated genes A(RMC8, CACNA1G, DIP2A, DUSP5, LAMA2 and USP42), associated to oncogenesis were specifically identified in AD and OFD by RNAseq and whole-exome studies). By RNAseq, two other mutated genes related to cancers (KCNRG and UTP20) were detected in 3 cases of AD and/or OFD.

Conclusion: by NGS, we have found recurrent mutations not yet described in OFD and AD that highlighted their close overlapping and provide promising new perspectives to better stratify patients.

388:"Are percutaneous procedures for benign cystic lesions of the extremities safe for all? An Adverse prognostic factors analysis."

by Adriana Hernandez | Guy Morris | Jonathan Gregory | Adesegun Abudu | Andrea Sambri | Ricardo Medellin

Abstract ID: 388

Investigate the outcomes of patients presenting with simple and aneurysmal bone cysts managed with percutaneous curettage (curopsy). Identify the adverse prognostic factors associated with management of these lesions.

Retrospective observational study.

Our institution's oncological database was interrogated, all patients presenting over a five year period with bone cysts, managed with percutaneous curettage (curopsy) were identified. Along with demographic information; location of the lesion, size and outcome following intervention was recorded. Outcomes included on-going pain and further surgery.

239 patients were identified. There majority were male (128/239), mean age of 14.2 years. Mean follow up was 31.27 months. Aneurysmal bone cysts were most common (151 vs 88). Location analysis revealed most were localised in the lower limb (49.3%), upper limb (25%), small bones of the foot / hand being the least common (8% and 5% respectively). Complications occurred in 70 patients (29%), the most common being fracture. Mean time until revision surgery was 11.6 months (0-71). Recurrence was observed in 27 patients, mean of 23.3 months (1-68) , 3 of these patients required amputation.

Radiological healing after the primary procedure was observed in 165 patients (69%). Mean time to healing was 4.4 months (1-137). Pain reduction in the first 6 weeks correlated with radiological healing ($p < 0.001$). A 50% reduction in lesion size during the first 6 weeks was a negative predictor of recurrence ($p < 0.001$) and the need for a revision procedure ($p = .02$).

Conclusion:

Percutaneous procedures are suitable for benign cystic lesions. Caution should be taken in patients with adverse prognostic factors such as a lesion in the proximal femur, proximal tibia and proximal humerus. Patients with delayed healing (> 12 weeks) and persistent pain had a high rate of progression to revision procedure.

390: Metastasis in cuboid bone as first finding in lung cancer: a case report

by Lopez Muñoz, Cristian | Francisco Jose | Jimenez Ortega, Placido | Doñate Perez, Francisco | Sanz Hernandez, Jaime | Martinez Arnaiz, Javier | Gaspar Aparicio, Natalia | Ros Ample, Teresa | García Martín, Victor

Abstract ID: 390

Objective:

The appearance of metastases in the course of a neoplastic disease is a frequent occurrence. In case of bone involvement as first manifestation, location could be useful, helping to locate the primary tumor. However in very few cases metastatic location can become unusual and not related to its origin. We present a case of lung squamous cell carcinoma that began with a unique metastasis in cuboid bone. The interest of the case lies in the form of clinical presentation of lung squamous cell carcinoma and rare location in foot bones.

Study design & Methods:

We present a 59-year-old male patient with lung cancer history in complete remission who came to Emergency Service department due to pain, tumor and functional impotence in the right foot 2 months old. No history of previous trauma. Physical examination showed a generalized swelling of forefoot and pain that didn't allow deambulation.

Results:

Magnetic Resonance was performed, been diagnosed as tumor in the cuboid bone with thinning and breakage of cortical and small extension to vicinity. Soft tissue mass surrounding from second to third metatarsal was observed without bone marrow involvement. There was an important thickening and edema of subcutaneous tissue in foot and leg visualized dorsally. Histopathologic examination was done, confirming the diagnosis of squamous cell carcinoma metastasis.

Conclusions:

Bone metastases are usually the reflection of disseminated disease at distance, so patients must be studied very carefully in search for metastasis in other locations. In our case we knew the history of lung cancer and thanks to that we were able to effectively guide the diagnosis. Despite this, it is unusual to find a single bone lesion in the cuboid bone as the first manifestation of the tumor disease. We didn't find any publicated case on literature, so we think this could be paradigm this type of illness.

391: "Undifferentiated pleomorphic sarcoma: the role of Core-Needle Aspiration Biopsy for the Primary Diagnosis"

by Manuel Fernandes Marques | Bruno Pombro | Luis Coutinho | Claudia Rodrigues | Hélder Fonte | Vania Oliveira | Pedro Cardoso

Objective: To evaluate the accuracy of pre-operative core needle biopsy in identifying and grading undifferentiated pleomorphic sarcomas.

Study design: We retrospectively analysed clinicopathologic features on 6 patients treated for undifferentiated pleomorphic sarcoma of the lower extremity that underwent core needle biopsies (CNB) for pre-operative diagnosis and evaluated its correlation with the final histopathologic diagnosis of the surgical specimen.

Methods: Archived cytologic material and reports of patients with undifferentiated pleomorphic sarcoma were retrieved and CNB results with final resection results were compared. Cases were re-reviewed and data were analyzed.

Results: We were able to collect 6 cases, of which 3 were female and 3 males, mean age of 55,67 years [40–77]. All CNB were done on the primary tumor (and in all the pathologists were able to classify the tumor as a high grade malignant pleomorphic sarcoma, in 3 CNB they were not able to define the final histologic characterization. Cytohistologic correlation for all categories showed 100% concordance.

Conclusions and relevance for EMSOS: CNB is a reliable modality for evaluating undifferentiated pleomorphic sarcomas, with high histologic concordance rate with the final specimen even in tumors that lack differentiation features and are known to be a diagnosis of exclusion, being an accurate pre-operative identification system that allows for the right diagnosis and correct treatment.

395: 18FDG PET-CT provides additional information influencing clinical management – A retrospective review of 1,109 FDG-PET-CT scans performed in sarcoma at a single regional institution

by Tom Cosker

Background: Our experience at a single institution of the use of PET CT in sarcoma was investigated and its use as a decision making tool evaluated.

Methods: 1109 PET CT scans were undertaken in our institution for sarcoma and the results analysed. This is the largest single centre study to date of which we are aware in sarcoma.

Results: We found that in more than 20% of patients PET CT conferred an added benefit when compared to conventional imaging. In 219 cases PET CT provided additional, clinically useful

data when compared to conventional imaging (NB this did not mean simply picking up additional metastases). This included occult disease, indeterminate lesions on CT/MRI and a number of cases in which the surgical resection was changed because of the PET CT findings. Its use was particularly helpful in neural tumours in helping determine whether lesions could be left alone or are potentially malignant.

Conclusion: PET CT confers additional value in sarcoma when compared to conventional imaging i.e. CT/MRI. The results of this large single site study are presented in detail.

396: Results Of Radiofrequency Ablation In Spinal Osteoid Osteoma.

by Burkhard Lehner | Christoph Rehnitz | Georg Omlor

Abstract ID: 396

Background

Osteoid Osteoma is a benign bone neoplasm mainly located in the diaphyseal areas of long bone. 10% however are located in the spine, mainly in the lumbar and thoracic posterior element. Therapy is required due to nocturnal pain independent of the physical load. Diagnosis is confirmed by multi-slice computed tomography (CT), magnetic resonance imaging (MRI) and skeletal scintigraphy scans.

Objectives

Although CT-guided radiofrequency ablation is accepted as the gold standard treatment option for osteoid osteoma in the extremities, this technique is limited in spinal applications due to the risk of thermal damage to adjacent neurovascular structures.

Study Design & Methods

In 11 patients with typical spinal pain osteoid osteoma of the spine was diagnosed by CT scan, MRI and scintigraphy. The Tumor was located in the dorsal aspect of the vertebra in all cases. To avoid thermal damage to neural structures exact planning and instillation of air as a thermal barrier was necessary.

Results

CT-guided radiofrequency ablation of spinal osteoid osteoma using instillation of air in order to build a thermal isolation to the spinal cord was performed in all patients. In all cases pain was reduced significantly showing the fast effect of the therapy. There were no side effects, especially no neural deficits following the procedure. No recurrences were observed. In cases with typical symptoms and imaging, open biopsies were not needed.

Conclusions

CT-guided radiofrequency ablation of spinal osteoid osteoma is a new and very effective treatment which can avoid extended open surgery. Special techniques however have to be applied to save neural structures.

397: Malawer Limb Salvage Surgery For The Treatment Of Scapular Chondrosarcoma; Two Case Report And Rewiev Of The Literature

by Mahmut Nedim Aytekin | Bülent Bektaşer | Huban Sibel Orhun Yavuz | Temel Oğuz | Nihat Tosun

Abstract ID: 397

Chondrosarcoma is a common malignant bone tumor, which accounts for 20% of all malignant bone tumors. It often occurs in the long bones, but the incidence of scapular chondrosarcoma is rare.(1) Malawer has been classified technique of resection and description of a surgical classification for the tumor of the shoulder girdle.(2)Here we report two case of scapular chondrosarcoma which has been treated by Malawer's Limb Salvage technic.

Case 1: A giant low grade chondrosarcoma arising from scapula exists for more than ten years in a 63 years old female patient has been treated successfully. Size of the tumor was 20x16.5x10 cm according to MRI report but the length was 24.5 cm according to pathological report. Wide resection has been performed by preserving the shoulder joint.

Case 2. A WHO Grade 2 chondrosarcoma of arising from scapula which has also soft tissue part has been successfully diagnosed by trucut biopsy and wide resection performed by limb salvage surgery.

Functional results are so good in both cases especially for the second case. Here we report two rare case report of the chondrosarcoma of the scapula and review the literature to remind this technique.

398: Fibrodisplasia Ossificans Progressiva; A dont touch Disease

by Mahmut Nedim Aytekin | Harzem Özger

Abstract ID: 398

Fibrodysplasia ossificans progressiva (FOP) is a disorder in which muscle tissue and connective tissue such as tendons and ligaments are gradually replaced by bone (ossified), forming bone outside the skeleton (extra-skeletal or heterotopic bone) that constrains movement. Its very rare in the Literature. Here we present a case report who is 32 years old male. Aim of this paper is to remind that disease is not suitable for operations.

399: Giant Aggressive Aneurismal Bone Cyst of the Proximal Humerus unresponsive to Denosumab

by Mahmut Nedim Aytekin | Celil Alemdar | Serhat Elçi | Serhat Akçaalan | Metin Doğan

Abstract ID: 399

In this report we would like to present a case unresponsive to denosumab. A 22 years old woman has a giant aggressive lesion diagnosed as Aneurismal bone cyst on her left proximal humerus. Denosumab treatment has been tried for 23 months. In the beginning symptoms are revealed but at the end pain comes to an intolerable point. Wide resection and tumor resection arthroplasty has been done because the cortex becomes so thin and fragile intraoperatively.

450: Perivascular adipose tissue controls insulin-stimulated perfusion and glucose uptake in muscle through adipomuscular microvascular anastomoses

by Turaihi, Alexander H MD; Serné, Erik H, MD PhD; Molthoff, Carla FM PhD; Koning, Jasper J PhD; Niessen, Hans W MD PhD; Goumans, Marie Jose TH PhD; Jimenez, Connie J PhD; van Poelgeest, Erik M MD; Yudkin, John S MD PhD; Smulders, Yvo M MD PhD; van Hinsbergh, Victor WM PhD; Eringa, Etto C PhD

Abstract ID: 450

Insulin-mediated microvascular recruitment (IMVR) regulates delivery of insulin and glucose to insulin-sensitive tissues. We have previously proposed that perivascular adipose tissue (PVAT) controls glucose metabolism and vascular function through outside-to-inside communication and through vessel-to-vessel, or “vasocrine” signaling. Here, we studied this hypothesis in mice by examining effects of removal of local intramuscular PVAT on muscle blood flow and glucose metabolism. Using the hyperinsulinemic, euglycemic clamp (HEC) in combination with positron emission tomography, we found that local PVAT removal transiently reduces muscle glucose uptake by ± 50 percent. Contrast-enhanced ultrasonography and intravital microscopy of the gracilis artery (GA) during the HEC showed that PVAT removal abolishes insulin-induced increases in GA diameter and abrogated insulin-stimulated muscle blood volume (microvascular recruitment or IMVR). The effect of PVAT on IMVR was mediated by distinct microvessels or anastomoses, which we showed using lightsheet microscopy of mice expressing mCherry in endothelial cells. Proteomics analysis revealed that PVAT removal significantly alters expression of 109 of 1719 detected proteins in muscle. Observed changes in protein expression included reduction of a mitochondrial protein cluster and of vesicle-associated membrane protein 5 (Vamp5), involved in Glut4 trafficking. In conclusion, we have found that PVAT within muscle regulates muscle perfusion, glucose uptake and muscle protein expression, communicating with the distal microcirculation via

microvascular anastomoses. These data highlight the importance of PVAT in vascular and metabolic physiology, and are relevant for type 2 diabetes and associated muscle dysfunction.

400: Epidemiology, Incidence, and Survival of Fibrosarcoma Sub-Types: SEER Database Analysis

by Kamil M. Amer | Jeremy Hreha | Kathleen Beebe

Abstract ID: 400

BACKGROUND:

Fibrosarcoma is a tumor of mesenchymal cell origin that can occur as a soft-tissue mass or as a primary or secondary bone tumor. Sub-types of this disease include: periosteal, fascial, and infantile. Different subtypes have different characteristics, but the rarity of these disease makes study on the unique personality of each subtype very difficult. One approach is to use large population based databases to study large numbers of these tumors. The purpose of this study was 1) to evaluate patient demographics, clinical behavior, incidence, and survival for Fibrosarcoma sub-types and 2) to determine if there was a difference in the epidemiology, overall survival, and 5-year survival rate between the three sub-types of Fibrosarcoma recorded in the SEER database.

METHODS:

The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database was used to search for patients diagnosed with all sub-types of Fibrosarcoma between 1973 and 2014. Patient demographics, tumor characteristics, incidence, and survival trends were all analyzed. Differences in the epidemiology, overall survival, 5-year survival rate, and incidence were also analyzed using ANOVA statistical test, a Chi-squared analysis, and pairwise tests with correction of multiple factors with the Holm-Bonferroni procedure. Significant differences were based on a $p < 0.05$.

RESULTS:

There were a total of 197 patients were identified in the SEER database. The highest rate of metastasis was seen in periosteal subtype (6.9%). Infantile had the worst overall survival with a 129.1 months. Facial fibrosarcoma had the lowest rate of 5-year survival. The presence of higher grade tumor and metastasis at presentation were significantly correlated with survival months ($p < 0.05$). There were no significant differences in the survival was found between gender or race between all of the subtypes ($p > 0.05$). Fascial fibrosarcoma had a predominance

for males while periosteal fibrosarcoma had a predominance for females. Patients with infantile fibrosarcoma had the least amount of radiation.

CONCLUSION:

This study represents a population database study on fibrosarcoma demonstrating that useful information can be gleaned from population database analysis for rare tumors. The results help to identify significant differences between the subtypes, allowing a better understanding of the personality of each subtype. By highlighting the difference between these subtypes, such as differences in metastatic rate and 5-year survival, this study helps the treating physician by allowing a more informed understanding of the expected behavior of each subtype, which can be critical for decision-making in patient care.

NURSES AND ALLIED PROFESSIONS PROGRAM

EMSOS 2018



394: Evaluation of delayed admission of patients with large tumours of the extremities in sarcoma centers

by Saskia Sachsenmaier | Frank Traub

Abstract ID: 394

Objective

Sarcoma of the bone and soft tissue account for 1% of all malignant tumours. There are about 100 different, histopathologically defined tumours of the connective tissue. Concerned patients observe a progressive, painless swelling. Many patients with huge visible tumours admit themselves delayed in specialized cancer centers. The aim of our study is the evaluation of the background to patients` late consultation with a questionnaire.

Study design and methods

Our questionnaire consists of questions about patients` individual handling after first signs of swelling, about their first thinking and the influence on their daily life. We asked about first medical consultations and their suggestions. The questionnaires were given to patients with a swelling bigger than 5 cm, who consulted our department with no histological diagnosis. Also patients with benign lesions were included.

Results:

Altogether 35 patients from our consultation with tumescences were included in a period from 07/2017 to 01/2018. 22 patients had malignant tumours (sarcomas and metastases) and the other 13 patients suffered from hematomas and benign tumours. The mean time delay from the first signs of the tumour to the admission in our department was 10 weeks. Nearly all patients reported about a rapidly growing, painless and subjective harmless swelling (n=27). Patients explained the tumescence by an old trauma. Only 15 patients wanted to contact a doctor very urgently. 30 patients estimated their psycho-emotional situation as anxious, sad and nervous although they trivialized the swelling. About 70% of the patients first contacted their physician and were sent afterwards to our sarcoma center.

Conclusion:

The main part of the patients felt psycho-emotionally burdened by the swelling, but estimated a medical consultation as not urgent. Our results show a repressive behaviour in patients with big tumescences that results in a delayed medical consultation.

197: Improving lower limb function in patients with major muscular loss or denervation following resection of a sarcoma

by Jennifer Woodhouse | Richard Carey Smith

Abstract ID: 197

Background: Muscle and nerve resections required to obtain a wide surgical margin, leave survivors with functional disabilities long after the adjuvant treatment has been completed. Numerous studies have investigated the effects of exercise in cancer survivors, revealing benefits of aerobic and resistance training, however, no researchers have investigated the effects exercise rehabilitation has on the restoration of function following major sarcoma resection; We investigated the effects of a 12 week exercise programme on strength, functional movement, quality of life (QOL) and ability to perform activities of daily living.

Methods: Nine patients with damage to their sciatic or femoral nerve, or respective areas of muscle innervation, participated. Patients attended the clinic 3x week for 12 weeks with rehabilitation comprising of aerobic, resistance and hydrotherapy. Patients' physical and mental status in the form of the Short Form 36 (SF-36), Toronto Extremity Salvage Score (TESS), High Level Mobility Assessment Tool (HiMAT), strength (isokinetic and/or 3RM), joint range of motion (ROM), six minute walk test (6MWT) and timed up and go (TUG) were collected at baseline, 6 and 12 weeks.

Results: When pooled, all patients demonstrated significant ($p < 0.02$) improvements in functional scores in the first 6 weeks, this continued to 12 weeks. Specifically, improvements at 12 weeks compared to baseline were observed in strength (thigh abduction [27%], thigh adduction [34%], thigh flexion [105%]), joint ROM (leg flexion [17%], thigh flexion [35%], thigh extension [91%]), 6MWT (34%), TUG (50%), HiMAT (67%), TESS (26%), physical component score of the SF-36 (41%) and the mental component score of the SF-36 (22%).

Conclusion: Most of the patients were able to restore function of their affected limb to 80% of their unaffected limb. Sarcoma survivors tolerated the exercise intervention with no adverse events recorded. Therefore, we recommend beginning exercise rehabilitation in the acute phase of treatment in order to enhance functional recovery.

112: Is Malnutrition Associated with Postoperative Complications in Patients with Primary Bone Sarcomas?

by Andrew Park, MD | Jonathan Lans, MD | Kevin Raskin, MD | Francis Hornicek, MD, PhD | Joseph Schwab, MD, MS | Santiago A. Lozano-Calderón, MD, PhD

Abstract ID: 112

Objective:

The purpose of this study is to evaluate whether malnutrition is associated with a higher rate of postoperative complications in patients with primary bone sarcomas requiring surgical therapy.

Study Design/Methods:

We retrospectively identified 275 patients aged 18 and older who underwent surgery for primary bone sarcomas between 1992 and 2014 and who also had albumin values recorded within 4 weeks prior to surgery. Postoperative complications were defined as infection, hematoma, need for additional surgery, or wound complications. Demographic data were recorded as were comorbidities, laboratory values, treatment with chemotherapy and/or radiation, and tumor characteristics such as type, grade, and location.

Results:

Of the 275 patients, there were 172 patients with osteosarcoma, 15 with Ewing's sarcoma, 66 with chondrosarcoma, and 24 with other types of sarcomas. In the bivariate analysis, age, alcohol use, total lymphocyte count (TLC) < 1000, albumin < 2.7, neoadjuvant chemotherapy, neoadjuvant radiotherapy, and location in the pelvis were associated with postoperative complications ($P < 0.05$). In the multivariate analysis, age ($P = 0.04$), pelvic location ($P = 0.04$), and neoadjuvant radiotherapy ($P = 0.008$) were independently associated with postoperative complications. We then performed a sub-analysis of patients without a pelvic tumor who also did not receive radiotherapy ($n = 178$). In this population, albumin < 2.7 was found to be independently associated with postoperative complications (relative risk = 4.69, 95% confidence interval = [1.03-21.34], $P = 0.04$).

Conclusions:

This study demonstrates that hypoalbuminemia (albumin < 2.7) is associated with postoperative complications in patients with extremity bone sarcomas who do not receive radiation. Future studies are necessary to further elucidate the role of nutrition, and they may show that nutritional status is a modifiable risk factor that can be optimized to improve the outcome of surgery for primary bone sarcomas.

170: Compliance and satisfaction with intensive physiotherapy treatment during chemotherapy in patients with bone tumours and evaluation of related prognostic factors. An observational study

by Mattia Morri

Abstract ID: 170

The purpose of these study was to evaluate patients' compliance and satisfaction to intensive rehabilitation treatment during chemotherapy cycles after surgery for bone- musculoskeletal tumors, as well as to identify possible predictive factors. An observational, prognostic, prospective study was conducted. The study enrolled 27 patients undergoing modular knee prosthesis surgery in the period between 2014 and 2015 October. The outcome were compliance to intensive rehabilitation treatment during hospitalizations in the chemotherapy unit and patient satisfaction 6 months post-surgery. The variables taken into account were linked to the patient's characteristics, to the oncological pathology and to the chemotherapy

treatment administered. Patients' compliance was 93.8% (9.7). The presence of surgery complications (29.6%), produced 5% loss in adherence to treatment; likewise, chemotherapy treatment with prevalent use of Ifosfamide reduced adherence to rehabilitation by 6%. The mean patient satisfaction score was 7.9 in the Likert scale from 0 to 10. Intensive physiotherapy starting during chemotherapy administration is a feasible treatment for bone tumor patients that have shown to be able to positively adhere to it. Specific treatments, within chemotherapy wards, should therefore be promoted in order to guide patients' functional recovery and increase their level of satisfaction.

83: Maximal activity program during childhood cancer treatment

By W. Peter Bekkering

Abstract ID: 83

Purpose: International public health and health promotion organizations have identified the health risks across the lifespan associated with physical inactivity. Physical inactivity is one of the leading causes of the major chronic diseases, and largely contributes to the burden of disease, death, and disability in developed countries.

Childhood cancer and its treatment have considerable impact on a child's physical and mental wellbeing and leads often to reduced physical activity levels and sedentary behaviour. Especially long-term administration of chemotherapy and/or radiotherapy impairs physical fitness both during and after therapy. Survivors of childhood cancer experience serious late effects, functional and sportive limitations and report a significant lower Quality of Life (QoL) in relation to healthy peers.

Physical activities are important for the development of children and increasing evidence suggests beneficial effects of physical activity promotion during cancer treatment as well.

Physical exercise can improve muscle strength and/or cardio respiratory fitness and subsequently also physical fitness.

Therefore, simple and inexpensive ways to promote physical activity and exercise are becoming an increasingly important part of children's cancer treatment.

Method: By means of the "MAXIMAL movement" project, we want to encourage patients to get out of bed and move around in the Princess Maxima Centre for paediatric oncology, children with cancer both during and after treatment. Goals of this project are; decrease of the negative effects of inactivity; faster and better recovery after / between treatment; reduction of stress; increasing autonomy; contribution to social development; reduction of long-term effects; increase the quality of life. For this group of children, it is important that they are actively challenged in their physical development at a level that is appropriate to

them. In addition, movement in groups also stimulates the physical, mental and social development of the child.

Elaboration: The idea of MAXIMAL movement will be elaborated also by the spaces, corridors and materials in the building that invite people to move, such as; a sports room, fitness room and a sports / movement garden, but also materials present in the building and on the corridors such as (walking) bicycles, scooters or go-karts. In addition, a sports / activities program will be offered by the children's physiotherapy, and parents will also be included in this program.

Conclusion: The ultimate goal is that children can optimally function in daily life after cancer and participate in social and sports / play activities with peers. Therefore, if necessary, a transfer to a peripherally functioning paediatric physiotherapist will be provided, sports leaders and gym teachers will be instructed and on request an exercise test and focused sports advice will be given.

169: Are proprioceptive and balance exercises able to improve motor performance after knee salvage surgery for bone primary tumor? A controlled prospective observational study

by Mattia Morri

Abstract ID: 169

Objectives: Does a rehabilitation protocol based on balance exercises improve walk performance in patients undergoing knee resection and reconstruction for bone primary tumor?

Methods: 30 patients undergoing modular prosthetic replacement, following a primary bone tumor were consecutively enrolled. During each hospitalization a physiotherapy treatment was activated, included 25 minutes training phase aimed postural and proprioceptive control. In order to better evaluate the walking speed at one year post surgery in the study group, data were compared with a group of 22 patients treated in a previous period, called the control group, collecting retrospectively. The control group differed only for the type of physiotherapy treatment offered

Results: No statistically significant differences emerged from the two groups, regarding baseline characteristics. Walking speed in the study group was improved compared to the control group with a median difference of 0.22 m/sec ($p=0.022$). A difference was also

measured in the speed of centre mass, with a median reduction of 4.5 mm/sec ($p=0.005$) in the study group, showing an improvement in postural control in stand up position.

Conclusions: exercises aimed at recovering balance and postural control should be proposed in order to improve motor performance and postural control in the medium and long term.

98: The patient perspective on the impact of Tenosynovial Giant Cell Tumors on daily living

by Monique Mastboom | Rosa Planje | Michiel van de Sande

Abstract ID: 98

Objective

Tenosynovial Giant Cell Tumor(TGCT) is a rare, locally aggressive and often recurring lesion of joints. A distinction is made between localized- and diffuse-type. This crowdsourcing study evaluates impact of TGCT on daily living and defines risk factors for deteriorated outcome.

Study-design

Cross-sectional study

Methods

Members of the largest known TGCT Facebook-community, 'PVNS is Pants!!', were invited to an e-survey, partially consisting of validated questionnaires, for six months. To confirm disease presence and TGCT-type, patients were requested to share histological- or radiological-proof of TGCT. Unpaired t-tests and chi-squared tests were used to compare groups with and without proof and to define risk factors for deteriorated outcome.

Results

337 Questionnaires (32% with disease confirmation), originating from 30 countries, were completed. Median age at diagnosis was 33(IQR25-42) years, majority was female(80%), diffuse-TGCT(70%) and affected lower extremities: knee(71%), hip(10%). No differences between patients with (32%) and without medical proof were detected. In 299 lower extremity TGCT-patients, recurrence-rate was 36% and 70% in localized- and diffuse-type, respectively.

For both types, pain and swelling decreased after treatment, in contrast to stiffness and range of motion. Patients were limited in their employment (localized 13%, diffuse 11%) and sport-

activities (localized 58%, diffuse 64%). Compared with general US population, all patients showed lower PROMIS-PF, SF-12 and EQ5D-5L scores; considered clinically relevant, according to estimated Minimal Important Difference(MID). Diffuse- versus localized-type scored almost 0.5 standard-deviation lower for PROMIS-PF(P<.001) and 5% lower for EQ-5D-5L(P.03). In localized-TGCT, recurrent disease and ≥ 2 surgeries negatively influenced scores of VAS-pain/stiffness, SF-12 and EQ-5D-5LP(<.05). In diffuse-type, recurrence resulted in lower score for VAS, PROMIS-PF, SF-12 and EQ-5D-5LP(<.05). In both types, patients with treatment ≤ 1 year ago had significantly lower SF-12.

Conclusions

TGCT has major impact on daily living in a relatively young and working population. Patients with diffuse-type, recurrent disease and ≥ 2 surgeries represent lowest functional and quality-of-life outcomes.

Relevance for EMSOS

Physicians should be aware that TGCT patients frequently continue to experience declined health-related quality of life and physical function and often remain limited in daily life, even after treatment(s).

Invasive treatments in Palliative Care – are they justifiable?

By Susanne Berthold | Christine Bodenstein

To say goodbye to life is very difficult, because it`s a farewell to hope.

So patients with cancer arrive at a treatment decision to make a difficult choice between continuing anti-cancer treatment and supportive palliative care with no curative approach.

The statement of Palliative care is the improvement of quality of life and the prevention and relief from suffering.

But does (what we understand as palliative care) justify invasive measures like surgery, radiation or chemotherapy?

With the help of case-studies of two young adults, we would like to shed some light on this aspect, taking account of the special needs of adolescents and young adults.

Which conclusion we will reach?

There is no general rule if the subject depends on so many perspectives and requirements.

Mentorship for patients treated for sarcoma

By Lotta Våde

Objective:

Research agrees that many cancer patients experience long term side effects after finished treatment. A mentorship program for sarcoma patients wants to find out if this program can help patients with their daily life after finished treatment.

Study design:

Former sarcoma patients apply to be a part of the program. To be accepted they should have a specific goal for the program. Private companies participate in the program by providing a personal mentor and 4000 Euro. The program lasts for 8 months.

Methods:

Part 1: All the participants get a mentor from a private company. Mentor will contribute with their ideas, experience and knowledge.

Part 2: All participants in the group should participate in three daily meetings. The program has a supervisor who will support both participants and mentors' during the program.

Part 3: All participants, and the mentors who like, travels to Katmandu in Nepal. This travel will give the participants an increased reflection and understanding of themselves.

Results:

The participants write a diary, and send it to the supervisor at least every second month. The mentors are called every second month to follow up their needs.

Conclusion:

Research and feedback from sarcoma patients tells us that there sometimes is a need for more intensive follow up after treatment. This program will be evaluated and give us more information about how this need can be met.

309: Digital decision aid: a tool to avoid unnecessary surgery in patients diagnosed with atypical cartilage tumor (ACT)

by Petra Veldman

Abstract ID: 309

Introduction: Due to more frequent imaging, accidental findings of atypical cartilage tumors (ACT's) have become more common. This often leads to referral of the patient to an orthopaedic oncologic centre for further diagnostics and treatment advice. Patients often live with the idea that the tumor needs to be removed by surgery. According to the WHO-classification, ACT's are not considered malignant, so inactive and asymptomatic tumors might not need surgery.

Aim: By using a digital decision aid, patients are well informed about the treatment (conservative or surgical) and follow-up of ACT. It supports patients and doctors in their shared decision for treatment and unnecessary treatment can be avoided.

Methods: We inform patients diagnosed with ACT about the options of treatment, supported by a digital decision aid. In case of non-operative treatment, radiological follow-up will be

performed with scheduled MRI-scans (first after 6 months, next with an interval of 1-2 years). Indications for surgery are progression of the tumor on MRI-scan or patient complaints. In our study so far, only 5% of the patients undergo surgery. In case of surgery, treatment will be curettage, cryosurgery and bone graft or bone cement. The post-operative follow-up period will be 5 years, with 5 outpatient clinic visits including radiographic imaging.

Results : By introducing the decision aid, patients are well informed and are better able to decide what treatment will be best. Shared decision making will be optimised, by better informed patients and doctors. We gain insight in the number of patients with ACT that will be treated conservative and operative and obtain information about the natural course of ACT. We can measure fear & quality of life experienced by our patients with ACT. Unnecessary surgery will be avoided and costs will be reduced with € 2000 / patient

84: Shared Decision Making in children and adolescents undergoing malignant bone cancer surgery

by Dr. W. Peter Bekkering

Abstract ID: 84

Purpose. Current guidelines in paediatric oncology care encourage health-care providers to share relevant information with young patients to enable their active participation in decision making. In malignant bone tumour surgery where the decision concerns a surgical intervention with a wide range of consequences, involvement of the patient and parents in the final decision is of great importance. Aim of this study was to evaluate the actual and desired involvement of young patients and their parents in surgical decision making, to develop a digital decision aid and to implement Shared Decision Making (SDM) in malignant bone cancer surgery.

Method. The introduction of Shared Decision Making (SDM) has been carried out in four steps.

1. A cross sectional evaluative study concerning role and appreciation of all stakeholders.
2. Development of a digital decision aids.
3. Implementation of SDM in daily practice.
4. Process evaluation

Results. The first two steps of this SDM project are currently performed and implementation and evaluation has been started in the Academic Medical Centre Amsterdam. With a response rate of 63%, the mean age of our patients at surgery was 15,6 ± 4,1 years, follow-up duration 2,0 ± 1.1 years and 60% underwent limb-salvage surgery. SDM-Q-9 scores were 59,4 ± 25,2. 72% of patients and 88% of parents prefer independent or shared decision making concerning the surgical intervention.. Furthermore; a bigger involvement in decision making resulted into a significant lower percentage decisional conflict and regrets. Finally, a remarkable great number of patients reported to have discussed only one surgical option and knowledge of the available options and the pro's and con's of these

options are limited.

Conclusion. Most patients and parents request a bigger or shared role in the decision for malignant bone cancer surgery, a larger involvement in decision making resulted in lower decisional conflict and regrets.

Discussion. A digital decision aid has been produced containing information, visual material and animations about the surgical options and SDM will be implemented in the daily practice in the Dutch appointed centres. The impact of the implementation of SDM and the decision aid will be evaluated during the next two years.

“Oncological rehabilitation and empowerment in patient care”

By Martine Karlsen Ødegaard

Objective:

I was motivated to find out how nurses can facilitate better for effective and optimal rehabilitation for sarcoma patients during hospitalization at the surgery department, and in that way prepare the patients for discharge. On our department we can develop how we make patients more involved in their own treatment. I wish to optimize the information we give the patients, so that both nurses and patients work against the same goal. Often in advance of discharge patients tell me they feel insecure and anxious about leaving. This is because we help them with everything they need, maybe a little too much. If the patients are more informed and experience more empowerment during their stay, the discharge might not be as frightening, but rather be motivated by their own progress to continue the work.

Problem statement:

It is interesting to see how nurses can safeguard the patients' needs in the rehabilitation phase. How can we make patients participate more in the treatment, and safeguard their autonomy during the hospital stay? My experience is that nurses do a lot more than necessary for the patients, instead of encouraging them to manage it themselves. For example in ADL we do a lot of “disfavors”, instead of involve for example occupational therapist the first or second day postoperative to facilitate the patient in daily care, such as bed bath, shower and getting dressed. By doing this, it will save the nurses a lot of time to do other tasks, and the patient will be more independent.

Method:

I have visited two other hospitals, Rizzoli in Bologna and MD Anderson in Houston. I got to see how they organized their work, how patients participated in their own treatment, the structure of the unit, information they give - and so on. I have also talked to my colleagues and discussed the problem, and how we can motivate patients to take a bigger part in their own treatment. I therefore compared how this is managed during my exchange to Rizzoli and MD Anderson.

Results:

I definitely saw a lot of potential during my visit to MD Anderson, small differences from our practice that will make a severe difference for the patients during hospitalization. They are more informed before admission to the department and surgery. We can be clearer about what it requires from them and our suggestions on how they can reach it. I want to implement a to-way board in the patient room, who describes “daily goals” and questions from the patient. In that way the goals will be “right there” and motivate them. Also, every person in the multidisciplinary team will know about it, and therefore work on it together with the patients.

Conclusion:

If we empower the patient more in their own treatment it will give nurses a better structure on work, make the patient more involved in their daily goals, and how to approach them together. So will this make a change? Not only by saving time in the long run, I think the hospital stay can be more effective, and therefore they can further move on to other rehabilitation centers – without being so afraid of it.

102: Pelvic surgery in malignant bone tumors; three complicated cases

By Nicolette Leijerzapf

Abstract ID: 102

Background

Surgical treatment of periacetabular malignancies ranks among the most challenging procedures in orthopaedic oncology. Part of the difficulties result from the complexity of tumor resection; however, reconstructive techniques are also associated with dissatisfying complication rates. Complications because of the risk of infection and dislocation.

In the past Saddle prosthesis were used in our Center, after that the Pedestal implant (Zimmer). In an attempt to reduce complication rates of pelvic reconstruction, in 2008 a novel modular implant: the LUMiC® prosthesis (implantcast, Buxtehude, Germany) was introduced.

The LUMiC® prosthesis is a modular device, built of a separate stem (hydroxyapatite-coated uncemented or cemented) and acetabular cup.

The most common diagnosis in the pelvis are chondrosarcoma, Ewing sarcoma, osteosarcoma, multiple myeloma and metastasis.

A presentation of three patients with a characteristic clinical course.

34 yr old pregnant female with a chondrosarcoma in the acetabulum, during delivery a biopsy was performed and six weeks after birth a resection and reconstruction with a LUMiC prosthesis. Dislocation, infection and lung metastasis occurred. After resection of the lung

metastasis, debridement and antibiotics she has NED at this moment, 2 years after birth of her son.

29 yr old male diagnosed with Ewing sarcoma of the left ilium, after chemotherapy a resection and reconstruction with LUMiC prosthesis was performed. Infection and lung metastasis occurred. After loosening the LUMiC a high hip procedure was performed. Now seven years later NED.

21 yr old male diagnosed with osteosarcoma of the left crista iliaca, after chemotherapy he received a LUMiC prosthesis. Infection and lung metastasis occurred. After loosening the LUMiC he walks on his pseudo arthrosis with NED.

367: Self-related quality of life and functional results after hemipelvectomy

by Israel Pérez-Muñoz | Ignacio Sánchez del Campo Arriola

Abstract ID: 367

Introduction. Wide resection in pelvis delivers great drawbacks not only physically but also mentally lowering the functional status and self-related quality of life (SRQL). Our aim is to show functional results and SRQL in patients with wide resections in pelvis due to musculoskeletal tumours.

Material and Methods. It is a retrospective study in patients with wide resections in pelvis due to musculoskeletal tumours and we focus on: demographical data, preoperative and pathology studies, type of resection and reconstruction, functional results (MSTS score) and SRQL (SF-12). For 35 years we have performed 15 external hemipelvectomies (EH), 57 internal hemipelvectomies with pelvic ring stability reconstruction (IHPR), 10 internal hemipelvectomies without reconstruction of the pelvic stability (IHWR). There were 10 patients with soft tissue sarcomas and benign but aggressive tumours that we do not include in the study as they did not need hemipelvectomy. Statistical analysis was done with SPSS 15.0.

Results. We found there is a tendency to better functional results in IHPR, though it shows no statistical differences between the three types of reconstruction. According to SRQL we observed light score loss in mental status related to general Spanish population. On the other hand, physical status showed strong score deviation from general Spanish population.

Conclusion. The severe loss of function and physical status in these patients mark the type reconstruction and avoiding complications as critical steps. The light score deviation in mental status may represent an adaptive pattern and social support of patients with this severe disease and its complications.

174: Negative Pressure Wound Therapy In Lower Limb Amputations - A Case Control Trial

by David W Shields | Brendan Chan | Ashish Mahendra | Sanjay Gupta

Abstract ID: 174

Introduction:

The use of negative pressure wound therapy (NPWT) in the treatment of chronic wounds has demonstrated improved wound outcomes via increased wound healing, wound shrinkage, and decreasing wound oedema. Literature for the use of NPWT in amputations in the oncological discipline is scarce despite the necessity for timely wound healing to optimise function.

Objectives:

To evaluate the wound healing outcomes of patients after lower limb amputation treated with and without the use of NPWT.

Study Design: Case Control Trial

Methods: Patients for the intervention group were chosen from an amputation database whom had received NPWT from 2015 to 2017. A control group was established by an independent investigator from a prospective amputation database whilst matching patients in the intervention group for age, gender, type of amputation and method of closure. Outcomes assessed were the presence of wound complications, additional surgical procedures, and drainage volumes.

Results:

Patients in both the intervention group (n=9) and control group (n=9) were well matched for demographics. The intervention group had a higher yield of mean drainage volumes compared to the control group of 285.6ml and 220.0ml respectively. Additionally, the intervention group demonstrated fewer patients with wound complications compared to the control group. This was recorded at 2 and 5 patients respectively, however the results were not statistically significant ($p=0.335$).

Conclusion:

Despite the results of this case controlled study being statistically insignificant, there is a potential trend toward a benefit of NPWT in amputation therapy. Therefore, a prospective investigation with a larger sample size is warranted for further assessment of the effectiveness of NPWT as routine therapy for amputations to evaluate both wound and functional outcomes.

173: Negative Pressure Wound Therapy for Closed Surgical Wounds in Musculoskeletal Oncology Patients – A Case-Control Trial

by David W Shields | Roderick Kong | Ashish Mahendra | Sanjay Gupta

Abstract ID: 173

The use of negative pressure wound therapy (NPWT) continues to have a growing body of evidence regarding its beneficial effect on wound healing by promoting cell differentiation, minimising oedema and optimising thermoregulation. Traditionally these dressings have been used for open or dehisced wounds, however recent research has investigated its role in closed wounds.

Objective: Evaluation of the effect of NPWT in patients with closed wounds, either primarily or with flap coverage, in our high risk group.

Study Design: Case Control Trial

Study Methods: Consecutive patients who had a NPWT dressing applied, and a control group established by a blinded researcher with matching for tissue diagnosis, surgical site, gender and age. The primary outcome measured was documented wound complications, with secondary data collected on radiotherapy and wound drainage.

Results: Patients were matched between intervention (n=9) and control (n=9) groups; age 56 versus 57 respectively, matched diagnosis, surgical sites, equal gender ratio. Among these patients, 3 had both preoperative and postoperative chemotherapy in the NPWT group and 1 in the control group. Both groups had 1 patient who underwent preoperative radiotherapy. A total of 3 (33%) wound infections occurred in the control group and none in the NPWT group. One patient in the NPWT group developed ischaemic necrosis of their flap which was managed with increased duration of NPWT dressings. Overall there was a trend towards lower drain output and reduced infections in the NPWT group.

Conclusions: In this small short series, despite the NPWT patients having more additional risk factors for wound issues, they resulted in fewer infections. The sample size is not sufficient to have statistically significant reduction. Further evaluation on the value of NPWT in this patient group with primarily closed wounds is being prospectively evaluated via a randomised controlled trial, Sarcoma; Usual versus Negative pressure (SUNstudy - www.sunstudy.co.uk).

175: Management of sacrococcygeal chordoma: clinical results and review of wound problems

by yusuf yildiz | onur nazim tan | ali eren | kerem basarir

Objective: The aim of this study is to report the results of patient series with sacrococcygeal chordoma and relation of wound problems with surgical techniques.

Study Design: Single-center based retrospective study

Methods: Patients treated for sacrococcygeal chordomas between 1986 and 2016 were evaluated. Wide or marginal/intralesional resection was performed according to patients' choice. Combined anterior and posterior approach or posterior approach was performed depending on extension of tumor. Dead cavities were reconstructed with vertical rectus abdominis myocutaneous (VRAM) or gluteal advancement flaps. Colostomy was performed in all patients who had combined anterior and posterior approach to prevent infections.

Results: Thirty patients (11 female, 19 male) with a mean age of 53.2 ± 12 (range, 30-78) years were evaluated. The mean follow-up was 74.7 ± 66.2 months (range, 1-266). The mean volume of tumors was 434 ± 585.3 cm³ (range, 5.2-2210.5). Two patients were inoperable, 13 patients had wide resection (WR) while 15 patients had marginal/intralesional resection (M/ILR). Local recurrence rate was 23 % (n=3) in (WR) whereas 66.6 % (n=10) in M/ILR with a significant difference (p=0.027). Despite metastasis rate was higher in M/ILR (n=6) than WR (n=2), there was no significant difference (p=0.083). Wound problem duration was significantly longer in WR (29 ± 9.2 days) than M/ILR (2 ± 4.8 days, p=0.002). The overall survival rate was 46.7 % and the overall mean survival time was 68.8 ± 8.6 months. The mean survival time was significantly longer in WR (89.7 ± 12.6 months) than M/ILR (53.1 ± 9.1 months; p: 0.02). Tumor diameter, volume or wound problem did not affect survival rate significantly.

Conclusions: Wide resection is still the best option for treatment of sacrococcygeal chordomas. However, sacrifice of sacral nerve roots and wound problems are major concerns of wide resection. Wound infections increased after resection of larger tumors and colostomy.

237: Sexuality, self-worth and resilience 20 years after amputation, rotationplasty and megaprosthesis

by Carmen Trost | Jeannine Huber | Tryphon Kelaridis | Joachim Gubba | Reinhard Windhager | Georg Fraberger | Gerhard M Hobusch

Objective

Surgeries due to malign bone tumor of the lower extremity change the physical function of the human body. This is a major incision in the sense of self.

Study design

In this retro-perspective, 20 years long term follow-up study a total number of 80 patients were interviewed. The patients underwent three types of surgery: (1) amputation of the thigh (n=21), (2) rotationplasty (n=22) and (3) KMFTR prosthesis (n=37) and they were asked to fill-out 18 questionnaires inter alia three questionnaires regarding (1) sexuality, (2) resilience and (3) self-worth.

Methods

For every questionnaire the factor analysis was performed, to exclude all inconsequential questions. For every questionnaire an index was built. The indices show the relation between the groups and the asked topics.

Results

The overall results show a strong significant relation between self-worth and resilience (0,65). Furthermore, patients picture a moderate significant coherence between self-worth and sexuality (-0,38) and there is also a weak correlation between sexuality and resilience (0,65). Patients with amputation revealed no correlation between sexuality and resilience and between self-worth and sexuality, but there is a strong correlation between resilience and self-worth (0,538). However, the rotation plasty patients represent a strong positive interrelation between self-worth and sexuality (-0,749), but no significant correlation between sexuality and resilience. The cohesion for the KMFTR patients was between self-worth and resilience (0,702) and no significances between sexuality, resilience and self-worth and sexuality.

Conclusion

Patients with amputation and KMFTR prosthesis revealed a correlation between resilience and self-worth. In the group of rotationplasty the self-worth is important to have a good relation to sexuality, which was not significant in the other groups.

86: Patients' perception of changes and consequences after tumor surgery/treatment

by Carmen Trost | Gerhard Hobusch | Catharina Chiari | Richard Crevenna | Reinhard Windhager | Philipp T Funovics

Abstract ID: 86

Objective

After being diagnosed with cancer of the bone or soft tissues, patients are not only confronted with their diagnosis but frequently with the need for extensive surgery and functional impair. In the guidance of patients and relatives it may be essential to gather and analyse the respective patients' experience. The aim of this study was to investigate how patients establish a concept of their disease and how they experience the impact and consequences of treatments.

Study design

A qualitative project asked for communicative aspects in a term of three years. The analysis took place with the Atlas.ti software using the Grounded Theory method.

Methods

Two narrative and nine guided interviews were performed, interviews were recorded and then transcribed. In a stepwise iterative-cyclic process, less new codes were created throughout the consecutive interviews. Following the theoretical saturation, the generated lingual codes will be engaged in interviews with participants from patient-support groups and expert interviews (surgeons and physical therapists), as well as further guided interviews in an outpatient setting.

Results

This mid-term examination reveals three main topics at the level of defined code groups: First, movement is important for daily routine. Second, patients need the support from their family and life-partners to experience a feeling of normality and avoid the impression of incapability or uselessness. Third, individuality is indicated to be required for a feeling of physical health during and after treatment. All factors, however, seem to interact in the perception of patients to generate an impression of normal daily activity and routine, as before illness.

Conclusion

A Grounded Theory method seems helpful in generating lingual codes in patient communication. The results of interviews can generate ground for future psychological hypotheses regarding doctor-patient- interaction, sociological changes and cancer patient expectations.

280: Limb salvage for very large tumors - Are we justified?

by Mandip Chandravadan Shah, Chetan Anchan

Abstract ID: 280

Purpose: While limb salvage is the norm for small or medium size tumors, there is still no clarity in literature on the large tumors. In this paper we have analysed retrospectively 126 very large tumors where limb salvage was attempted and tried to find out the safety, function and disease control rates.

Methods: Between 2010 and 2016 , 126 patients with very large tumors underwent limb salvage surgery. The judgment of “very large” was made on 3 objectives. (1) Tumor size of >12cm in at least two dimensions &/or (2) tumor diameter $\geq 2/3$ rd of the limb diameter on axial MRI &/or (3) marrow extent of the tumor $\geq 1/2$ of the bone length on coronal or sagittal MRI. An analysis was done as to the surgical morbidity, disease and functional status.

Results: complications In 126 patients (92 malignant, 34 benign), included 1 perioperative mortality, 2 infections (1.5%), 3 major skin necrosis and 5 nerve palsies. 13 repeat surgeries were needed for dealing with complications. 3 patients had to be amputated later. Resection margins were adequate in 110 and inadequate in 16 patients. At a mean follow up of 48

months, Local recurrence (LR) developed in 9 patients (7.1%). Distant metastasis developed in 46 patients. All 34 benign tumor and 13 low grade sarcoma patients are disease free. Of 92 malignant tumor patients, 39 have died of disease, 7 are alive with disease and 46 (50%) are disease free. Functional scores were good /excellent 116 patients.

Conclusions: For very large benign tumors or low grade sarcomas the disease control rate of almost 100% justifies all attempts at extremity preservation. For high grade sarcomas, where it is possible to get technically tumor free margins and with good adjuvant treatment, results for limb salvage may be similar to an amputation.

105: Phase 1 in developing a sarcoma-specific patient-reported outcome measure in the UK: exploring patient's experiences

by Ana Martins | Lesley Storey | Mary Wells | Lorna A Fern | Lindsey Bennister | Craig Gerrand | Maria Onasanya | Julie Woodford | Rachael Windsor | Jeremy S Whelan | Rachel M Taylor

Abstract ID: 105

Introducing patient-reported outcome measures (PROMs) into clinical practice is known to improve patient-clinician communication, patient experience and outcomes. While there are many generic cancer PROMs there are none developed for sarcoma so these may not capture issues that are tumour-specific.

To describe the experiences of being diagnosed, treated and living with sarcoma to inform the development of a PROM.

Participants across the UK were recruited by healthcare teams in Trusts or through the charities. Due to the heterogeneity of sarcoma, recruitment considered biometric factors, location of care, sarcoma type, treatment intent, treatment type, time since diagnosis, and other factors. Patients' experience was shared in semi-structured interviews and focus groups, which were transcribed and analysed using Framework analysis.

A total of 120 patients participated [50% male; 13-82 years old; with soft tissue (62%), bone (28%) and GIST (10%)]. Five overarching themes were identified: impact of the diagnostic timeline (e.g. time to diagnosis; professionals' roles), physical wellbeing (e.g. mobility restrictions), emotional wellbeing (e.g. fear of recurrence), social wellbeing (e.g. impact on relationships) and financial wellbeing (e.g. challenges). The analysis identified the core experiences common to all sarcoma patients and the variances in reported experience depending on factors such as age and sarcoma type.

In the first step towards developing a sarcoma-specific PROM we have identified the key defining characteristics of patients' sarcoma experiences. While some were similar to experience in other cancer types, many were unique to this population. These will form the basis for content to be included in the PROM.

401: Enhancement of Nurses Performance Concerning Perioperative Care to Children with Osteosarcoma and Their Families

by Tanazor Hemdan Abdelhamed Morsi

Abstract ID: 401

This study was a quasi-experimental study, aimed to assess nurses knowledge and practices related to perioperative care provided to the children with osteosarcoma and their families, develop and disseminate hand out for the nurse's about perioperative care and evaluate the effect of the of educational program among nurses about care given to the children with osteosarcoma perioperatively. osteosarcoma is the most critically diagnosed of malignant bone tumor among children have an average 5-years survival of about 80% but those with metastatic disease have much worse outcomes .This study was conducted at 57357 children's cancer hospital, Egypt. The study involved 70 nurses selected from nurses working in the recovery room and 48 nurses working at surgical department and 22 operating room nurses at the previously mentioned setting. Tools of the study involved a pre-designed questionnaire to assess characteristics of nurses such as age, level of education, occupation, nurse's knowledge regarding osteosarcoma such as definition, causes, complications and management of osteosarcoma, standard observational checklist to observe nurse's practice regarding surgical care of children suffering from osteosarcoma and their families. The main results regarding nurses' knowledge level about surgical nursing care before operation among recovery room nurses, surgical nurses and operating room nurses pre and post program implementation the study findings illustrated that nearly half of the studied sample had poor knowledge regarding preoperative surgical nursing care intervention. While these percentages were decreased to post program implementation and at follow up reached to 81.25% and 81.25% for both recovery room nurses and operating room nurses with statistically significant difference. This study recommended the introduction of additional educational programs for nurses regarding osteosarcoma to keep them in touch with advances in health education about care of children suffering from osteosarcoma and to motivate nurses in oncology hospitals to acquire updated knowledge and perfect efficiently practice through financial sources, workshops and training by international hospitals.