EUROPEAN
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ONCOLOGY SOCIETY

Sclerotherapy of an Aneurysmal Bone Cyst of the Distal Radius

Maria Clara Correia, Lizz van der Heijden, Michiel A.J. van de Sande

Princess Máxima Center for Pediatric Oncology, Utrecht, the Netherlands

Expert comments by: Ajay Puri, Tata Memorial Centre, Mumbai, India

1. Introduction

Aneurysmal bone cysts (ABC) are primary benign bone tumours. Although rare, they can be locally aggressive. Most occur within the first two decades of life, and while most patients are over 10 years old, there have been reports in patients as young as 18 months [1].

ABC is a primary bone lesion in 70% of cases, as the remaining 30% represent ABC-like changes, formerly known as secondary ABCs [1]. These share morphological similarities with primary ABCs but lack the characteristic USP6 mutation. They can be found in both benign and malignant tumours, such as giant cell tumour of bone (GCTB), osteoblastoma, chondroblastoma, chondromyxoid fibroma, simple bone cysts (SBC), fibrous dysplasia, non-ossifying fibroma (NOF), and (telangiectatic) osteosarcoma [1, 2].

ABCs can present as indolent pain, a palpable mass, pathological fractures, or neurological symptoms when located in the spine [3]. They're mainly located on the metaphysis of long bones but can occur in any bone [1].

Radiographically, they appear as lytic, expansile lesions with a soap-bubble appearance. MRI offers better contrast resolution, highlighting fibrous septations, hypointense borders, and fluid-fluid levels. Perilesional oedema may be present in one-third of ABCs as a sign of rapid growth in more aggressive lesions, which does not necessarily indicate malignancy [1].

Diagnosis is made based on MRI findings combined with biopsy [3]. Biopsy, using techniques such as fluorescent in situ hybridisation (FISH) and next-generation sequencing (NGS), is essential for identifying USP6 mutations or CDH11 gene mutations, thereby enabling the diagnosis of primary ABCs [1].

There are several treatment options available, which can be broadly divided into three categories: surgical, percutaneous, and others [2-4]. Surgical procedures include curettage and bone grafting, with or without adjuvants or osteosynthesis. Percutaneous treatments involve arterial embolization and sclerotherapy, which uses injections of various substances such as alcohol, polidocanol, and doxycycline. Other procedures encompass radiofrequency ablation and systemic treatment with bisphosphonates or denosumab. No treatment has been proven superior, prolonging the debate on which modality to adopt [3]. Currently, percutaneous sclerotherapy is accepted as a valid first-line treatment for primary ABCs, with fewer complications, less morbidity, and comparable efficacy to surgical procedures [4]. However, more than one percutaneous injection may be necessary, subjecting the patient to multiple anaesthetics [2, 4]. Different sclerosant agents have been described, with no single agent superior, and they mainly depend on each centre's preference [3]. Polidocanol is a sclerosant agent that has long been used to treat varicosities due to its effect on damaging the endothelial cell line. Although rare, systemic side effects such as hypotension, cardiac arrest, and anaphylaxis, as well as local side effects such as pain, induration, swelling and skin necroses, have been reported [2, 4].

We describe a case of using sclerotherapy with polidocanol for the treatment of an ABC of the distal radius, preceded by a biopsy of the lesion.

2. Clinical presentation

A 3-year-old male presented with a painful lesion of the distal radius. Radiographs revealed an eccentric, expansile, lytic lesion with cortical thinning and well-defined margins. MRI showed a multiloculate, septated lesion with fluid-fluid levels in multiple cavities, and no significant oedema in the surrounding tissue or solid component. The radiological and MRI diagnosis was most likely that of a primary aneurysmal bone cyst.

3. Treatment strategy

Percutaneous biopsy of the lesion followed by sclerotherapy.

4. Surgical steps

1. The patient is prepared in a supine position. Due to the child's small size, instead of using a radiolucent arm support, we used the image intensifier to support the child's arm after inverting the C-arm of the fluoroscope.
2. The incision site is determined under fluoroscopic guidance.
3. A stab wound incision is made on the dorsal aspect of the wrist, followed by dissection of the tissue down to the bone.
4. Before perforating the first cortical layer with the Jamshidi needle, the stylet is removed, and the cannula is inserted until the second cortical layer is reached.
5. A 10mL syringe is attached to the Jamshidi needle, and contents are aspirated. The contents of the syringe are then examined for tissue suitable for biopsy amidst the blood.
6. The injection preparation includes two syringes and a three-portal intravenous cannula. The syringes are attached to the cannula: one is empty and the other contains 6 ml of polidocanol (30 mg/ml) and 2 ml of contrast. The contents are transferred between the syringes in a rhythmic motion.
7. After confirming a successful biopsy, we proceed with sclerotherapy, injecting the contents of the syringe slowly while monitoring with fluoroscopy to ensure the cyst is fully filled.
8. After injecting the sclerosant, a small piece of a haemostatic sponge is inserted to prevent the sclerosant from being expelled through the entry portal.
9. Skin is closed with absorbable monofilament or with steristrips, depending on the size of the incision.

5. Technical Pearls

Try to remove tissue for biopsy using syringe aspiration. If the Jamshidi needle is removed, it may be difficult to locate the same cortical perforation site. Creating a second perforation site may lead to sclerosant leakage during injection.

6. Avoiding and Managing Complications.

If no tissue is available for biopsy after the first aspiration, one should try to scrape the cyst wall with the cannula, then aspirate again with the syringe.

The patient's vitals should be closely monitored when injecting the polidocanol, as anaphylaxis cases have been described.

Although local side effects have seldom been reported, all leakage of the sclerosant agent into the surrounding soft tissues should be minimised to prevent them.

7. Infography

Fig 1: Materials required for sclerotherapy (contrast, polidocanol, syringes, three-portal intravenous cannula, haemostatic sponge)



Fig 2: Determining site for incision with fluoroscopic guidance

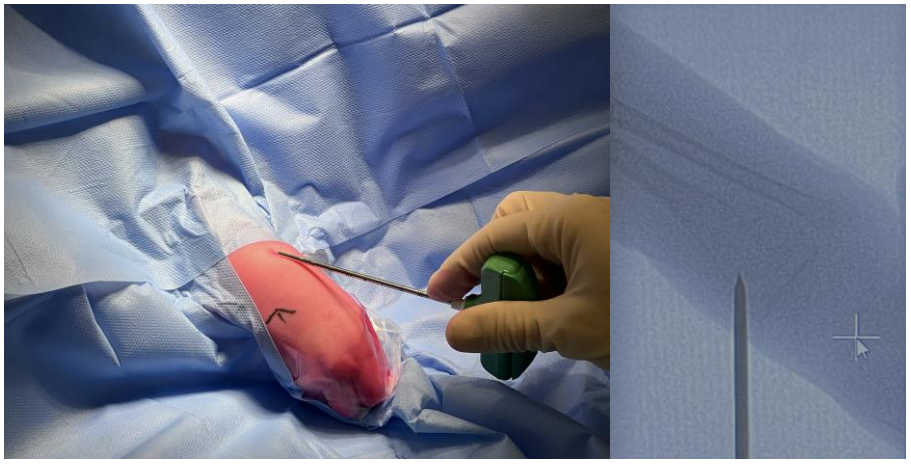


Fig 3: Remove the stylet after perforating the first cortical layer



Fig 4: Aspirate the content of the ABC for biopsy



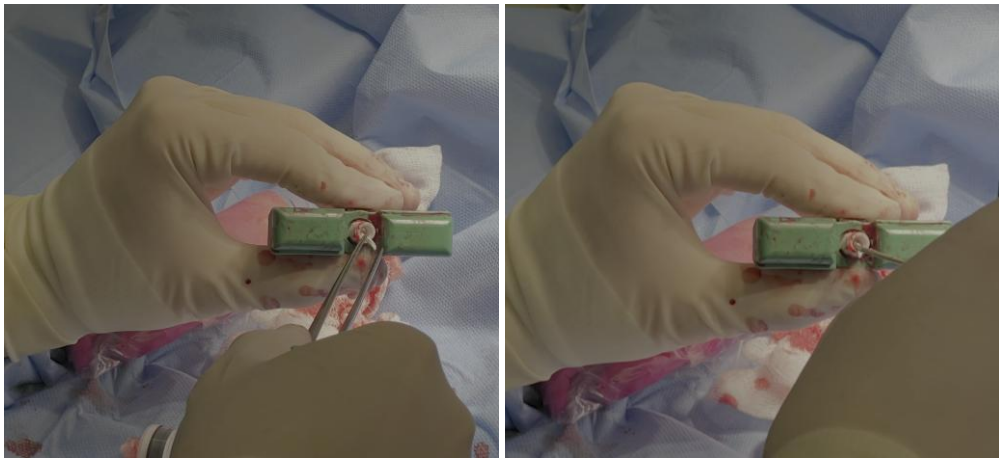
Fig 5: Prepare the sclerosant agent



Fig 6: Inject the sclerosant agent with contrast under fluoroscopic guidance



Fig 7: A small piece of a haemostatic sponge is inserted through the cannula



8. Expert comments by Ajay Puri

Sclerotherapy is successful in the majority of cases, with minimal or no complications. However, careful evaluation of radiological imaging is essential before proceeding. Specifically, one must ensure the absence of cortical breaks in the cyst, as leakage of the sclerosant through such defects may lead to complications.

If there is suspicion of cortical breach, the “curopsy” technique can be considered. This involves gentle scraping of the cyst walls with the Jamshidi needle used for biopsy. The mechanical stimulation may activate the coagulation cascade, which in turn can promote healing of the cyst without the need for sclerosant injection.

When assessing follow-up imaging for signs of healing, it is advisable to wait 8–10 weeks before considering a repeat sclerosant injection, as the healing process is often gradual.

In cases where a cyst has persisted or recurred after prior surgical curettage, the likelihood of response to sclerotherapy is low. Such cases typically require repeat surgical intervention.

9. Bibliography

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