CASE REPORT

Just a drop of cement: a case of cervical spine bone aneurysmal cyst successfully treated by percutaneous injection of a small amount of polymethyl-methacrylate cement

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SUMMARY

Aneurysmal bone cyst (ABC) is a benign hemorrhagic tumor, commonly revealed by local pain. The best treatment for this lesion is still controversial. We report the case of a patient with chronic neck pain revealing an ABC of the third cervical vertebra. After percutaneous injection of a small amount of polymethyl-methacrylate bone cement, the patient experienced significant clinical and radiological improvement.

BACKGROUND

Aneurysmal bone cyst (ABC) is a benign bone hemorrhagic and lytic tumor, affecting children or young adults, usually in the second decade of life,¹ with a male/female ratio of 1/1. This tumor may affect any bone in the human body; however a tumor located in the cervical spine is very rare (2%).² When located in the spine, ABC is more frequently observed in the posterior arch of the vertebra. Seventy per cent of ABCs are primary lesions while 30% occur secondary to a pre-existing bone tumor, such as an osteoblastoma. On imaging workup, this tumor appears as an osteolytic lesion with multiple loculi presenting the typical pattern of fluid fluid levels which are related to intraleisional hemorrhage. ABC is mostly found during radiological examination for chronic pain and may even be revealed by pathologic fracture and/or neurologic symptoms.³ Treatment of ABC is controversial. Several techniques have been described: curettage,⁴ surgical resection,³ radiotherapy,⁵ curettage (biopsy in combination with curettage),⁶ and curettage associated with bone graft.⁷ The main limitation of these techniques is the risk of local recurrence (~30% of cases).⁸

We describe a case of a painful C3 vertebra ABC successfully treated by percutaneous injection of a small amount of polymethyl-methacrylate (PMMA) bone cement, performed just after percutaneous biopsy.

CASE PRESENTATION

A 17-year-old woman with no past medical history was admitted to our department for chronic neck pain of 10 months' duration. Cervical rotations worsened the pain, with a maximum Visual Analogue Scale (VAS) score of 10/10. No neurological deficit was observed. A bone CT scan

showed an osteolytic lesion of the right aspect of the posterior arch of C3 (lamina and spinous process), extending to the zygapophysis and to the posterior aspect of the vertebral body. The 'blow-out' pattern seen on the CT scan suggested a slow growing benign lesion (figure 1A). A cervical MRI (1.5 T) was performed and showed a heterogeneous lesion with multiple loculi presenting various signal intensities on T2 weighted images (WI) (figure 1B). Neither epidural nor soft tissue extension was seen on contrast enhanced T1 weighted images (figure 1C). These imaging findings suggested a primitive ABC of the C3 vertebra.

After a multidisciplinary meeting and obtaining informed consent from the patient's parents, a percutaneous biopsy was proposed to confirm the suspected diagnosis. The biopsy was performed under general anesthesia, in the prone position, in the hybrid angiographic suite (Somatom Emotion; Siemens, Erlangen, Germany) using both CT and fluoroscopic guidance. An 11 gauge 100 mm bone needle (Thiebault, Margencelle, France) was placed laterally in the right lamina of the third cervical vertebra inside the lesion (figure 2A). Due to the hemorrhagic nature of the biopsy, at the end of the procedure, 0.5 mL of PMMA cement (Biomet V; Biomet, Dordrecht, The Netherlands) were injected through the 11 gauge bone needle left in place within the lesion, under anteroposterior fluoroscopic guidance (figure 2B), in order to stop the bleeding. We aimed to fill the hole created by the needle placement inside the lesion by injecting bone cement while gently retrieving the bone needle. No complications occurred during the procedure. The patient was discharged 24 h later with no adverse events.

OUTCOME AND FOLLOW-UP

Pathological study of the biopsy revealed a fibrous cyst wall with edema, and several osteoclasts and clefts filled with blood vessels, which confirmed the suspected diagnosis of ABC.

Follow-up 2 months after the procedure showed a clinical improvement in the patient, with a VAS of 5/10. Neck CT demonstrated regression of the lesion size with partial re-ossification (figure 3A, B). On follow-up at 4 months after the procedure, neck pain remained unchanged (VAS 5/10); no limitation in cervical rotation was noticed. Cervical CT scan

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Figure 1 (A) Axial slice unenhanced C scan (16 row); bone windowing showing an osteolytic lesion of the right aspect of the posterior arch of C3 extended to the zygapophysis and spinous process. (B) Sagittal T2 weighted image (WI) showing a heterogeneous signal of the lesion, with multiple loculi of various signals (arrow). (C) Axial contrast enhanced T1-WI demonstrating enhancement of the lesion, without epidural extension.

Figure 2 (A) Percutaneous biopsy under CT guidance of the lesion via a lateral route. (B, C) Postprocedure control imaging after the polymethyl-methacrylate (PMMA) bone cement injection. (B) Plain x-ray; anteroposterior projection. (C) Axial CT scan, bone windowing. The small amount of cement is seen in the right aspect of C3 (B, C: arrows).

Figure 3 (A) Initial CT scan before treatment, axial slice; bone windowing. (B–D) Control unenhanced CT scan (bone windowing) performed after 2, 4, and 16 months of follow-up, respectively. Progressive sclerosis of the lesion is seen, as well as re-ossification of most of the aneurysmal bone cyst.

showed continuation of regression of the lesion (figure 3C). Neck pain had almost completely disappeared (VAS at 1/10), with no limitation in cervical rotation, at follow-up 16 months after the procedure. Cervical CT scan showed almost complete re-ossification of the lesion (figure 3D).

DISCUSSION

Although benign, ABC is an aggressive bone lesion with rapid growth, most frequently revealed by local pain. There is no gold standard treatment; the main concern is local recurrence after treatment. Several percutaneous treatments of painful ABC have been reported previously, but these were mainly direct injection of sclerotic agents such as absolute alcohol⁹ or calcitonin associated with corticosteroids.¹⁰

To the best of our knowledge, only one case of bone cement injection has previously been reported for the treatment of an L5 painful ABC.¹¹ In their case report, the authors used osteoconductive cement (Cerament), with satisfactory results in terms of analgesia and tumor sclerosis. The authors hypothesized that the bioactive properties of this cement may have promoted the sclerosis and subsequent re-ossification of the ABC.

The probable mechanism that led to tumor regression in our case was the sclerotic effect of the PMMA bone cement on the wall of the cyst. This sclerosis may be due to the chemical properties of the bone cement or to the local heating observed during PMMA bone cement polymerization (~70°C).

Learning points

- Intra-tumor percutaneous polymethyl-methacrylate (PMMA) bone cement injection may lead to clinical improvement in painful aneurysmal bone cyst (ABC) of the spine.
- Injection of a small amount of PMMA may be sufficient to obtain pain relief.
- Injection of a small amount of PMMA bone cement may lead to progressive re-ossification of the bone in ABC.

The advantages of the technique in our case were twofold: firstly, we injected a very small amount (0.5 mL) of PMMA bone cement inside the lesion, thus avoiding the risk of venous or intracanal leakage. Secondly, this technique can be performed at the same time as bone biopsy, allowing for pathological confirmation of the diagnosis of ABC. It is noteworthy that the aim of the PMMA injection in our case was only to stop the bleeding and not to fill the entire lesion.

Our case report suggests that injection of only a small amount of PMMA cement may lead to clinical and radiological improvement in patients presenting with painful spine ABCs. The procedure is both technically feasible and safe.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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