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Original Research Paper

Orthopaedics

A RARE PRESENTATION OF ANEURYSMAL BONE CYST IN THE METATARSAL : A CASE REPORT

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ABSTRACT

Background: Aneurysmal bone cyst is a benign, expansile osteolytic bone lesion characterised by blood filled spaces separated by septa containing fibroblast, giant cells, and woven bone. It commonly affects the metaphysis of long bones and the spine, while involvement of the metatarsal is rare. **Case Report:** A 16-year-old girl presented with a slowly enlarging swelling on the dorsum of her left foot that had been increasing in size over the past year. On examination, a firm, non-tender swelling was noted over the dorsum of the foot. There were no signs of inflammation such as redness or warmth. **Conclusion:** Aneurysmal bone cysts (ABCs) are benign yet locally aggressive lesions that predominantly occur in adolescents. While X-rays and MRI can provide important diagnostic clues, histopathological examination is essential for a definitive diagnosis. Surgical management, such as wide excision with bone grafting, is a safe and effective treatment strategy.

KEYWORDS :

INTRODUCTION

An aneurysmal bone cyst (ABC) is a benign but locally aggressive, blood-filled cystic lesion of bone that can cause extensive bone destruction and deformity despite its non-malignant nature[1]. First described by Jaffe and Lichtenstein in 1942 [2], ABCs may arise as primary neoplasms or develop secondarily within other bone lesions such as giant cell tumor, chondroblastoma, or osteoblastoma. The lesion typically affects children and young adults, most commonly during the first two decades of life, and shows no sex predilection.

Although rare, accounting for approximately 1–2.5% of all bone tumours and with an incidence of 0.14–0.32 per 100,000 population, ABCs can occur in any bone of the skeleton. The metaphysis of long bones, vertebral column, and pelvic bones are the most frequently affected sites, while involvement of the small bones of the hands and feet is uncommon[1]. Clinically, patients usually present with pain, swelling, and limited function at the affected site, and in some cases, pathological fractures or neurological deficits may occur depending on the lesion's location.

Historically, ABCs were considered reactive vascular malformations secondary to local hemodynamic disturbances or trauma. However, cytogenetic and molecular studies have demonstrated recurrent USP6 gene rearrangements involving chromosome 17p13.2, confirming the neoplastic origin of primary ABCs[3]. This discovery has significantly improved diagnostic accuracy and differentiation from secondary ABC-like changes seen in other tumors.

The management of ABCs has evolved over time, with intralesional curettage remaining the standard approach. Various adjuvant therapies—including phenol, cryotherapy, and bone cementation—are employed to minimize recurrence, while minimally invasive methods such as embolization, sclerotherapy, and denosumab therapy have gained interest in recent years [4,5,6,7]. Despite advances in treatment, ABCs remain challenging due to their potential for local recurrence and their occasional complex anatomical locations.

Case Report

A 16-year-old girl presented with a slowly enlarging swelling on the dorsum of her left foot that had been increasing in size over the past year . She denied any history of injury, fever, or weight loss. The swelling had started small and gradually increased in size. She had previously been evaluated elsewhere, where she received medication and a sclerosant injection, but there was no improvement.

On examination, a firm, non-tender swelling was noted over the dorsum of the foot. There were no signs of inflammation such as redness or warmth. The patient complained of pain while walking and during activity, but had no systemic symptoms. Routine blood investigations were normal.

An X-ray of the left foot showed an expansile lytic lesion in the fourth metatarsal, with marked cortical thinning, internal septations, and no calcifications (Fig. 1).

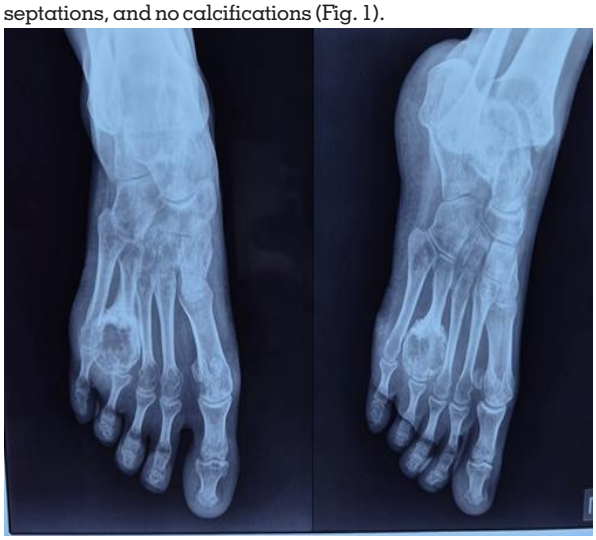


Fig.1

MRI revealed a multiloculated expansile lesion in the diaphysis of the fourth metatarsal, appearing hypointense on T1 and hyperintense on T2-weighted images, with a small cortical breach on the dorsal aspect (Fig. 2).

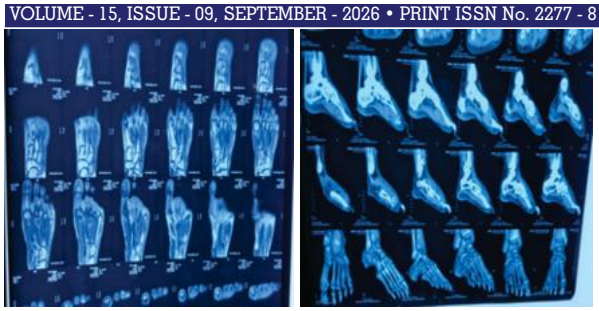
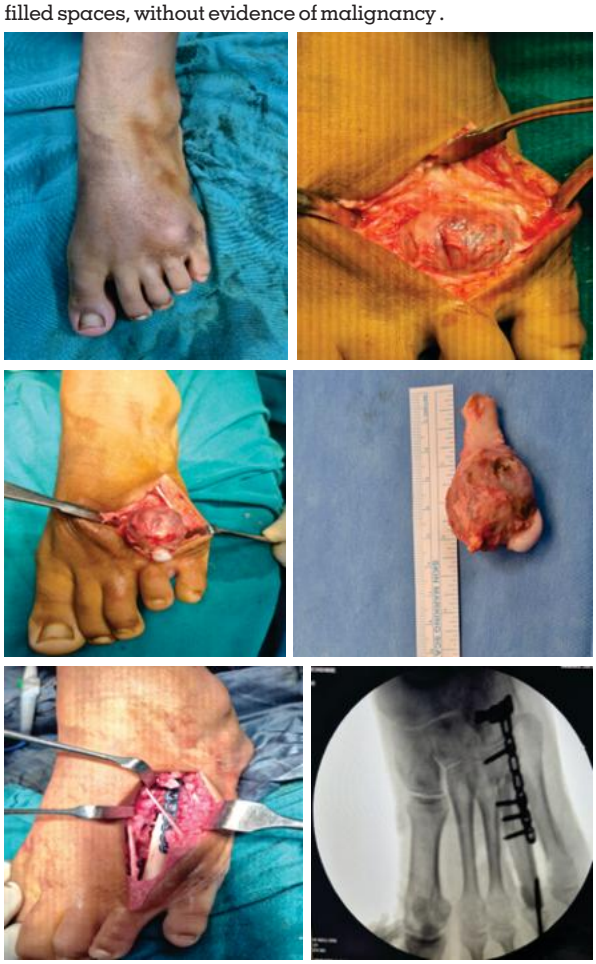


Fig.2

A core-needle biopsy, performed under C-arm guidance, showed fibro-collagenous tissue, numerous multinucleated giant cells, areas of hemorrhage, and hemosiderin-laden macrophages, which were consistent with an aneurysmal bone cyst (ABC).

After confirming the diagnosis, an en bloc resection of the fourth metatarsal was carried out. Through a 10 cm dorsal incision over the metatarsal, the tumor was exposed and completely excised. The defect was then reconstructed using an autogenous ipsilateral fibular graft of matching size. The graft was secured proximally with a 2.7 mm metatarsal plate and distally with a K-wire into the proximal phalanx. The resected specimen was sent for histopathological examination, which confirmed ABC by showing fibrohistiocytic tissue, numerous giant cells, and reactive bone around blood-filled spaces, without evidence of malignancy .



Postoperatively, the limb was immobilized in a plaster cast for 12 weeks. A slab was used for the first 3 weeks, followed by a cast after suture removal. The K-wire was removed at 8 weeks, and partial weight-bearing was started.

At the 1-year follow-up, the patient was pain-free, walking comfortably, and showed no evidence of recurrence either clinically or radiologically. Follow-up X-rays showed good graft incorporation and bone healing. The fibular graft successfully restored the shape of the foot and provided excellent cosmetic and functional results.

DISCUSSION

Aneurysmal bone cysts (ABCs) are rare, benign but locally aggressive bone lesions, representing about 1% of all primary bone tumors [8]. Their exact cause remains uncertain, but the most accepted theory links them to abnormal local blood flow and increased venous pressure, leading to the formation of blood-filled cystic cavities within bone[9].

Differentiation from other giant cell–containing bone lesions is critical. Giant cell tumors (GCTs) are locally aggressive lesions that occur mainly in the epiphyseal–metaphyseal region of long bones and contain numerous osteoclast-like giant cells. Giant cell reparative granulomas (GCRGs) are benign, reactive lesions composed of mononuclear and giant cells in areas of hemorrhage. Brown tumors, associated with hyperparathyroidism, show lobulated bone destruction and can be distinguished by abnormal serum calcium and parathyroid hormone levels.

In contrast, ABCs are histologically defined by blood-filled cystic spaces separated by fibrous septa containing fibroblasts, multinucleated giant cells, and reactive bone trabeculae. MRI, especially T2-weighted imaging, is valuable for diagnosis, typically showing a multiloculated, expansile lesion with fluid–fluid levels[10,11].

Surgical excision remains the mainstay of treatment. Intralesional curettage with bone grafting or en bloc resection—depending on the site and size—is most effective. Embolization and sclerotherapy may be considered in select cases. Despite being benign, recurrence is not uncommon, highlighting the need for close postoperative follow-up

CONCLUSION

In summary, aneurysmal bone cysts (ABCs) are benign yet locally aggressive lesions that predominantly occur in adolescents. While X-rays and MRI can provide important diagnostic clues, histopathological examination is essential for a definitive diagnosis. Surgical management, such as wide excision with bone grafting, is a safe and effective treatment strategy.

Clinicians should consider metatarsal ABC as a potential cause when evaluating foot swellings. Due to the high risk of recurrence, ongoing clinical and radiological follow-up is crucial for early detection and timely intervention.

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