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## A case report of: Aneurysmal bone cyst in proximal tibia treated with simple curettage with bone graft

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### Abstract

Aneurysmal bone cyst is a benign bone tumor occurring in the metaphysis of long bones of immature skeleton commonly. We present a case of aneurysmal bone cyst of proximal tibial metaphysis treated by curettage and bone grafting followed by one year followup. It was concluded that early detection and prompt treatment leads to reduced need of repeated surgeries.

**Keywords:** Proximal tibia, Aneurysmal bone cyst, bone graft

### Introduction

Aneurysmal bone cyst are benign bone lesion. ABC is also called as multilocular or hematinic cyst. Diagnosis of ABC is made with various imaging modalities and biopsy. Primary ABC is typically seen to affect individuals in first two decades. The lesion is usually solitary however multiple site involvement in same patients has also been reported and can be seen in 5% of patients. ABCs cause pain and swelling in close proximity to affected bone. As ABCs commonly manifest in paediatric patients, growth plate involvement and permanent limb length deformities are of great concern. By far majority of aneurysmal bone cyst present in metaphysis of long bone (femur, tibia, humerus). Due to its aggressive bony erosion, ABC can lead to pathological fracture. In axial spine the sacrum, pelvis (represent 50% of flat bony lesions) and vertebrae have been reportedly involved. Within the spine, the lesion may cause neurological symptoms secondary to mass effect impinging on the spinal cord or exiting nerve roots. There are several approaches for treatment of ABC. Currently most widely employed treatment for ABC is intralesional curettage with or without bone graft.

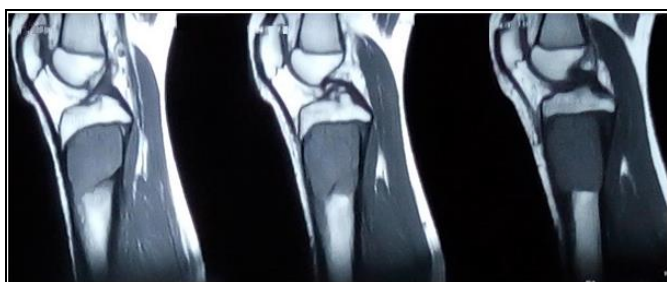
**Epidemiology:** ABC are a rare osseous tumour comprising 1% to 6 % of primary osseous tumours. The majority of patients diagnosed with an aneurysmal bone cyst are children and adolescents less than 20 years old.

**Presentation of Case:** A 12 year old female came to our hospital complaining of pain and swelling in her right leg. Initially she experienced pain in right leg and 3 months later she noticed a swelling in her right leg. On examination, there was a swelling in right leg without tenderness. The plain radiograph showed a multilocular, eccentric, expansile lesion in right proximal tibia with clear trabeculations and cortical thinning.



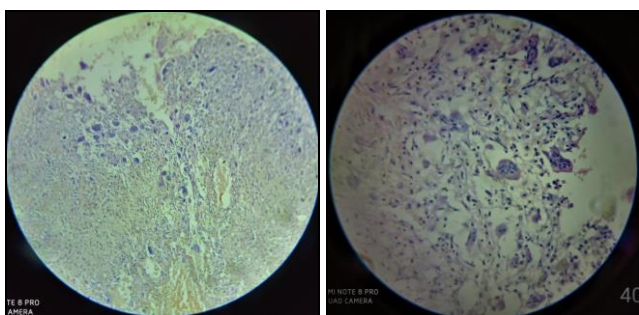
**Fig 1:** Plain radiograph of knee with leg showing a multilocular, eccentric lesion with cortical thinning

MRI of right proximal tibia was suggestive of large expansile, multiloculated, lytic cystic lesion measuring 54mm x 45 mm in size, involving metaphysis of tibia, mainly on medial condyle with fluid –fluid level, mild peri-focal and soft tissue edema, multiple cystic necrotic areas and periosteal reaction.



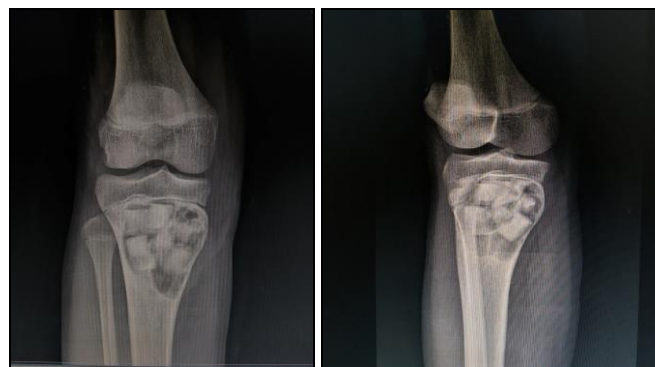
**Fig 2 and Fig 3:** MRI of proximal tibia showing multiloculated, lytic, cystic lesion involving metaphysis of medial condyle with fluid-fluid level and soft tissue edema

The lesion was extending upto epiphyseal plate with minimal edema in epiphysis. First fine needle aspiration and cytological examination was performed and the aspirated fluid gave the impression of reddish haemorrhagic fluid. Histopathological examination gave the impression of cyst wall with microscopic features of fibrocollagenous stroma, bony trabeculae and hemosiderin laden macrophages.



**Fig 4:** Histopathological evaluation of mass under low power and high power fields showing bony trabeculae and hemosiderin laden macrophages.

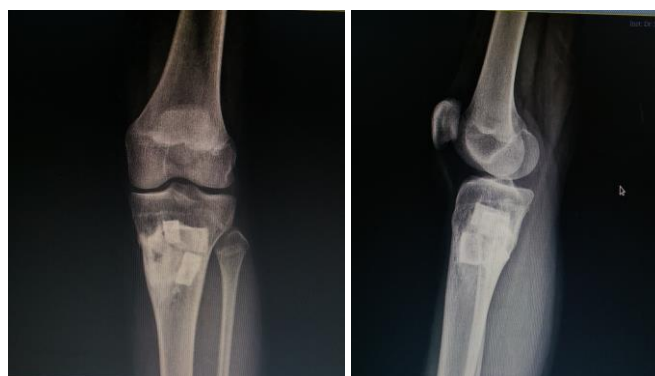
The lesion was surgically intervened with simple curettage and reconstruction of the defect with bone graft. Histological examination of the surgical specimen showed an aneurysmal bone cyst with fibro-collagenous stroma, bony trabeculae, medium to large sized spaces with multi-nucleated giant cells. An operative procedure was performed after which the pain was observed to decrease immediately. Radiographically the operated bone exhibited good remodelling and no recurrence of the lesion after the operation. After few months, she returned to all activities without any pain or limitation.



**Fig 5:** Anteroposterior and lateral radiographs of knee with leg at postoperative day 1



**Fig 6:** Anteroposterior and lateral radiographs of knee with leg at 3 months follow up showing uptake of artificial bone graft



**Fig 7:** Anteroposterior and lateral radiographs of knee with leg at 12 months follow up showing remodelling of the proximal tibial bone and complete graft incorporation

### Discussion

Osseous tumour containing giant cells are ABC, GCT, Brown tumour, GCRG. Their differentiation is crucial. In GCT tumour is located mainly in epiphysis of bone which exhibit lytic expansion and eccentric location. GCRG originate from periosteal connective tissue having low mitotic activity. It tends to form cyst and exhibit reactive bone formation histologically characterised by a predominance of giant and mononuclear cells in areas of haemorrhage. Brown tumours have been reported in patient with chronic renal failure with lobulated architectural growth pattern wherein hyperthyroidism should be ruled out. The standard treatment for ABC is curettage with or without bone graft. Due to the highly variable recurrence rate seen after curettage, several adjuvants have been used over past few years like cryotherapy, cement, phenol, high speed burr, argon beam coagulation.

Cryotherapy includes the use of liquid or aerosolised nitrogen that creates freezing temperatures that leads to a cytotoxic effect on the ABC lesion. Cryotherapy is done following curettage of the lesion. Cryotherapy though has a low recurrence rate, is still not used widely as it has often led to complications like postoperative fracture, skin necrosis and wound infection [1, 4].

Polymethylmethacrylate (PMMA) cement is a biologically inert substance that helps in stabilisation of cavity in paediatric bone lesion and also as a recurrence reducing adjuvant through its exothermic reaction [5]. But PMMA also increases the risk of pathological fracture since it lacks the potential for osseous incorporation and has no growth potential. PMMA may also act as a foreign body thereby acting as a nidus for infection.

Phenol is used to sterilise the lesion as it helps in removal of the residual neoplastic cells in the lesion [6]. Phenol with curettage has a low recurrence rate as compared to curettage alone [6].

High speed burr augments the process of curettage by mechanical disruption of the lesion thereby helping to increase the cure rate. High speed burr is not reported to decrease the recurrence rates.

Argon beam coagulation is a process that creates a unipolar electric current through the tissue and produces desiccation and coagulation which helps in reducing the recurrence rate of ABC when used following curettage [7]. Argon beam coagulation also runs the risk of developing a postoperative fracture by osteonecrosis and desiccation [8].

There also have been alternate treatment strategies in the form of adjuvant radiotherapy, arterial embolization and sclerotherapy in addition to standard procedure of curettage with use of adjuvants.

Selective arterial embolization is used when the lesion is difficult to assess like ABC located in pelvis, sacrum or the lesion at considerable risk of haemorrhage. It remains a limited treatment option since it results in skin necrosis, transient paresis and lesion may lack identifiable feeding vessels which makes it difficult to use SAE [9].

Sclerotherapy acts by destroying the endothelium of blood vessels resulting in the coagulation cascade, thrombosis and sclerosis of the vascular network resulting in local control of the lesion. Ethibloc is a radiopaque alcohol based sclerosant that causes local fibrinogenic and thrombogenic effect upon contact with ABC but results in aseptic bone necrosis, pulmonary embolism, deep venous thrombosis and cerebellar infarct which has led to its reduction in utilisation [10, 14]. Polidocanol used in treatment of varicose veins, is another sclerosant that also helps in providing faster pain relief, better functional outcomes, avoids the morbidity and costs of surgery [11, 15].

Emerging techniques for the management of ABC include less aggressive surgical techniques and medical managements in the form of Curettage, Bisphosphonates, Percutaneous Doxycycline, RANKL inhibition and Denosumab.

Bisphosphonates through their antineoplastic effects like induction of apoptosis, inhibition of tumour cell adhesion and invasion helps in pain relief in inoperable benign lesion like ABC [16, 17].

Percutaneous doxycycline is a drug with antimicrobial and anti-neoplastic properties. It inhibits angiogenesis and matrix metalloproteinase, both of which helps in expansion bone cyst [18, 19].

Denosumab is a monoclonal antibody that inhibits the RANKL signaling pathway. It is used as a neo adjuvant

therapy for osteolytic bone lesions including ABC [20]. It also reduces the tumour size and decreases the morbidity of surgical interventions in ABC.

## Conclusion

Although most aneurysmal bone cyst are benign bone lesion rarely they may spread locally very aggressively. Recurrence is also common with these lesions. Early diagnosis and prompt adequate therapy can help to reduce events of recurrence and repeated surgeries.

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