



Aneurysmal Bone Cyst of Tibia: Excision and Curettage of Cyst with Bone Grafting As Fibular Sturt Graft

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Abstract

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Introduction

Aneurysmal bone cysts (ABC) are benign expansile tumour-like bone lesions of uncertain aetiology, composed of numerous blood-filled channels, and mostly diagnosed in children and adolescents ^[1]. Aneurysmal bone cysts are primarily seen in children and adolescents, with 80% occurring in patients less than 20 years of age ^[2]. Patients may present with pain, which may be of insidious onset or abrupt due to pathological fracture, with a palpable lump or with restricted movement.

Aneurysmal bone cysts consist of blood-filled spaces of variable size that are separated by connective tissue containing trabeculae of bone or osteoid tissue and osteoclast giant cells^[3]. They are not lined by endothelium. ABCs usually appear in the first two decades of life, with the most common locations being the arm (humerus), leg (tibia, fibula, and femur), pelvis and spine.

ABCs cause pain and swelling in close proximity to the affected bone. Due to its aggressive erosion of bony architecture, ABCs can lead to impending or pathologic fracture, which can acutely worsen symptoms.

A variant of aneurysmal bone cysts is the giant cell reparative granuloma which is usually seen in the tubular bones of the hands and feet as well as in the craniofacial skeleton. Occasionally they are also seen in appendicular long bones where they are known as solid aneurysmal bone cysts. Histologically these two entities are identical ⁶. While the cause of aneurysmal bone cysts is currently unknown, recently ABCs have been linked to a mutation of the ubiquitin specific peptidase 6 (USP6) gene on chromosome 17^[4].

Most often, an aneurysmal bone cyst is diagnosed with an X-ray, computed tomography (CT) scan or Magnetic Resonance Imaging (MRI) examination of the painful damaged bone. Aneurysmal bone cysts have unique surgical challenges, sometimes with significant blood loss during surgery, risks of injury to surrounding normal structures, and risks of recurrence in the years after surgery. Risk of tumor recurrence following surgical management varies in different reports but ranges between 12 and 75 percent of cases ^[5].

Aneurysmal bone cysts historically were treated with surgical removal and this is still a good option for many ABCs. Either the entire bone containing the

tumor is removed or just the tumor can be scraped out of the bone. Surgery sometimes requires that the weakened bone be supported by metal or bone graft/cement implants^[6].

Case Presentation:

A 30year old female patient who presented with complains of pain over right leg upper 1/3rd region since 3 months following history of trivial trauma; and developed hard swelling over proximal tibia since 15 days. Pain was insidious in onset, gradually progressive, dull aching, constant, localized, non-

radiating, aggravated on movement and walking and relieved with rest.

Skin was intact, no scars, no dilated veins, no pigmentations. It was associated with swelling which was present over anterior aspect of proximal 1/3rd region of leg and patient perceived tenderness over proximal 1/3rd of tibia. The local temperature was mildly raised.

Knee ROM was 0°-100°and it was painful. Distal pulse and toe movement were present and sensations were intact.



In order to make a diagnosis first MRI of the affected knee with proximal part of leg was done which suggested primary intraosseous cystic lesion with possibility of aneurysmal bone cyst.

MRI RIGHT KNEE JOINT WITH CONTRAST

Technique:-

MRI of right knee joint has been performed using Sagittal T1, T2 & PD FAT SAT images in all three planes. Additional post contrast T1 fat suppressed sequences in multiple planes.

Imaging Findings and Remarks:-

Large expansile primary intraosseous lesion is seen in the proximal right tibia involving the anterior aspect of medial and lateral tibial condyles and intercondylar regions. Inferiorly the lesion extends into the upper shaft of tibia. The lesion overall measures 6.9 (SI) x 4.2 (AP) x 4.8 (RL) cm. The lesion shows predominantly cystic appearance with multiple internal septations resulting in multiple internal fluid pockets. Anteriorly the lesion causes expansion of the affected cortex with thinning and erosion of the cortex in the upper shaft. The periphery of the lesion shows irregular sclerotic zone with clear zone of demarcation with rest of marrow of affected tibia. The lesion shows predominantly fluid signal intensity on all MR sequences with post contrast images show peripheral enhancement in the wall of these cysts.

Overall features of the lesion are most likely suggestive of primary intraosseous cystic lesion possibly aneurysmal bone cyst.

Edema is noted in the subcutaneous tissue of surrounding region is noted mainly in anterior aspect along with fluid and edema in adjacent infrapatellar fat with trace of joint effusion.

The ACL and PCL are normal. The MCL and lateral capsular structures are normal. The anterior supporting structures, medial and lateral patellar retinacula are normal.

The menisci are normal.

The joint surface and articular cartilages are normal.

Suggest correlation with other relevant parameters.

MRI RIGHT KNEE

In order to confirm the diagnosis and plan further treatment, first the patient was taken to operation theatre and tru cut biopsy was taken using biopsy needle under sterile conditions and the material aspirated was sent for Histo-pathological examination.

HISTOPATHOLOGY

Specimen : Coll.
HP FORMALIN 08/07/2021 10:30: Received at Lab

SURGICAL PATHOLOGY REPORT

Clinical Details

- * Hard indurated swelling over right proximal tibia
Swelling and pain over right knee region and proximal leg since 15 days, difficulty in walking since 15 days
 - * MRI - Large expansile primary intraosseus lesion in proximal right tibia involves anterior aspect of medial and lateral condyles of tibial and inter condylar regions inferiorly extending up to upper shaft of tibia, measures 6.9x4.2x4.8cm.
- Overall features are s/o Intraosseous cystic lesion - Aneurysmal Bone cyst

Specimen

Right Proximal tibia lesion

Histology Number

N2663

Gross Appearance

Received multiple tissue bits aggregate measuring 2x1x1cm.

Grossing done by

Dr Bankim

Microscopy

The sections show cystic spaces filled with blood and separated by fibrous septa, composed of bland fibroblast and rimmed by osteoclast type giant cells. The cells show minimal atypia with scanty mitosis. There is no evidence of malignancy.

IMPRESSION

Right Proximal Tibia lesion - Aneurysmal Bone Cyst

Section Code

N2663, N2663A-Submitted entirely,
N2663B-Fluid.

HISTO-PATHOLOGY REPORT

After confirming the diagnosis patient was posted for operative intervention where the patient was operated for excision and curettage of the tumour with bone grafting from fibula (Fibular strut graft)

After taking written and informed consent patient was shifted to OT. After achieving desired effect of spinal anaesthesia, patient positioned in left lateral position. Painting and draping done. 4-6cm incision placed over distal end of fibula; incision of 4x1 cm placed over proximal 1/3rd part of lateral part of fibula.

Entry taken into Intraosseous membrane between tibia-fibula. Osteotomy performed and approximately 15 cm fibular graft resected. Graft sites closed layer by layer.



Aneurysmal Bone Cyst site marked ↓ 11TV-AP view. 10cm curvilinear incision taken, starting from lateral condyle of tibia and incision extended medially. Skin and subcutaneous tissue dissected. Lateral condyle of tibia felt and broken with gentle hammering. Bone cyst cavity washed with NS and curettage done till fresh bleeding seen. Fibulae graft broken into two pieces and placed in the bone cyst canal. 4mm CC Screw - 40mm with washer passed through the graft. Muscle layer closed with Vicryl-1 RC. Skin and subcutaneous tissue closed. Sterile dressing done. Above knee bivalve slab was given.

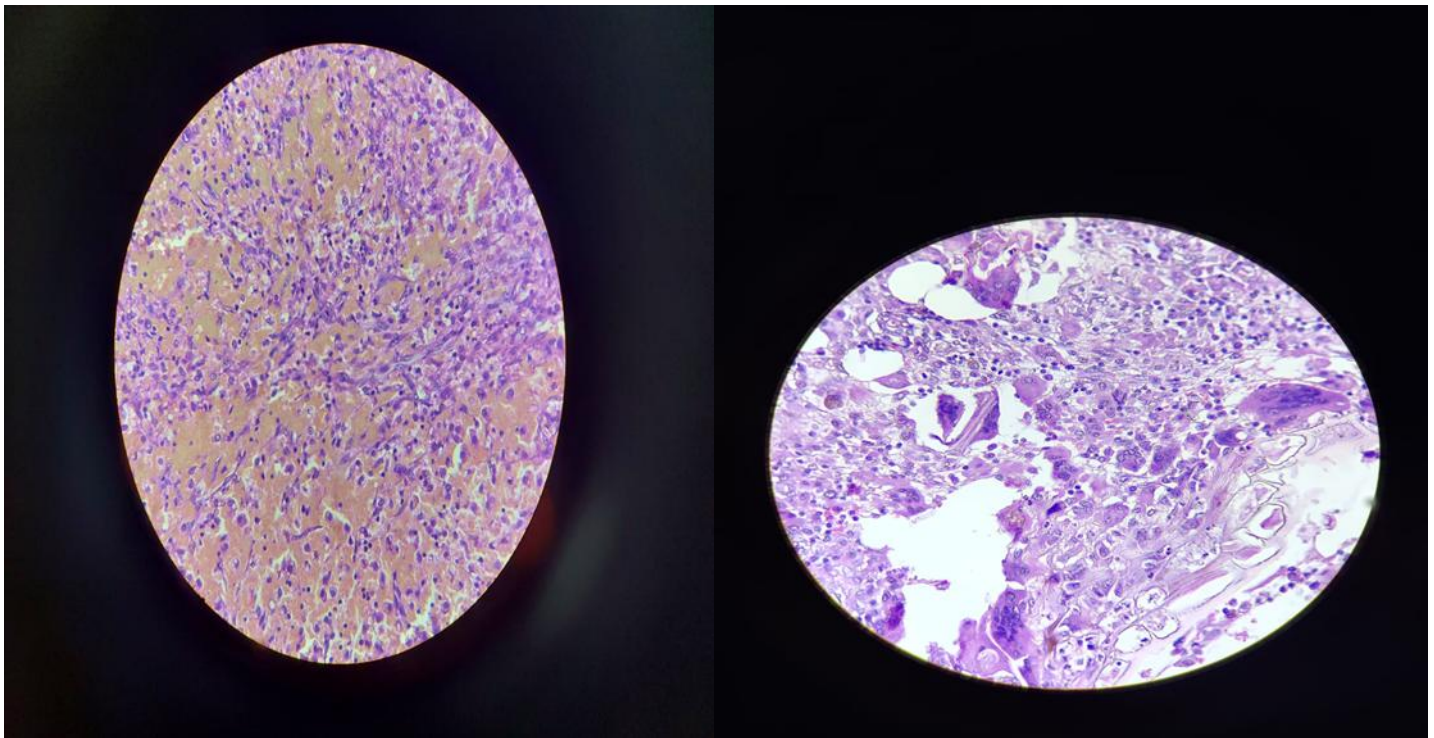


15cm FIBULAR GRAFT RESECTED



GRAFT STABILISED WITH CC SCREW

The resected material was again send for pathological examination which correlated with the earlier biopsy report



MICROSCOPIC VIEW OF THE CYST

At the end of 6 months on final follow-up patient had presented with full knee range of movements with no difficulty in walking and able to do activities of daily living.



The patient is free from symptoms and with full range of movements without any flexion deformity with range from 0 to 120 degrees at 6 months follow-up

Discussion:

There is limited knowledge regarding the cause of the lesion, its natural history, and the results of treatment

[7]. The concept that the lesion represents a vascular degenerative process for some benign bone lesions is an attractive one, but the pathologic findings, with rare exception, do not really support this proposal.

Few pathologic specimens contain tissues that are highly characteristic or diagnostic of giant cell tumor, chondroblastoma, hemangioma, osteoblastoma, nonossifying fibroma, fibrous dysplasia, chondromyxoid fibroma, and other tumors.

The imaging studies, even CTs and MRIs, sometimes do not provide clearly diagnostic criteria for the diagnosis of aneurysmal bone cyst, and aneurysmal bone cyst is sometimes added on to a list of diagnoses including eosinophilic granuloma, giant cell tumor, nonossifying fibroma, unicameral bone cyst, fibrous dysplasia, chondroblastoma, chondrosarcoma, chondromyxoid fibroma, Ewing's tumor, and, in older patients, metastatic carcinoma or myeloma^[8].

The lesions are often eccentric and irregular in structure and sometimes show calcification in the central areas. As a rule, the cortex is thin, but there is rarely a cortical defect or a soft tissue mass. CT and MRI are often helpful in defining the extent of the lesion and establishing the diagnosis. A biopsy is often helpful, and many of our patients underwent a needle biopsy before definitive treatment. Needle biopsies are sometimes a problem because the material obtained may consist of mostly blood elements. Often, an open biopsy and frozen section are necessary to establish the diagnosis.

Principal current approach was biopsy followed by curettage and then implantation of allograft chips or, more recently, polymethylmethacrylate. Auto graft implantations or utilization of intercalary allografts were quite successful but were, for the most part, used for patients with lesions that were large or seemed to threaten the integrity of the bone and were used less frequently for patients who experienced failure of their primary procedure^[9].

Aneurysmal bone cyst is sometimes an aggressive lesion that is difficult to treat. Lesions that occur in the proximal tibia should perhaps be treated more aggressively, partly because of the high rate of local recurrence and the risk of fracture. The most appropriate techniques for some of these tumors are primary resection surgery and allograft implantation^[10].

There is perhaps some hope for implantation of newer agents, such as the bone substitutes like hydroxyapatite, to aid in healing of the lesions.

Although there are now some markers that are alleged to be specific for aneurysmal bone cyst, there is still no system to establish the diagnosis or to support different methods of treatment and, thus, reduce the problems encountered by the patient and the surgeon^[11].

Conclusion:

Patient with confirmed case of aneurysmal bone cyst of tibia managed surgically with excision of tumour and fibular strut grafting showed good results as patient had good functional outcome of return to routine activities and providing additional benefit of pain relief, early mobilization.

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