

## Case Report

### Aneurysmal Bone Cyst: A Case Report Demonstrating the Role of Curettage, Bone Grafting and Prophylactic Screw Fixation

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#### ABSTRACT

Aneurysmal bone cyst (ABC) is a rare osteolytic bone tumour characterized by several sponge-like blood or serum filled, non-endothelialized spaces of various diameters. When it is located in the proximal femur it is associated with increased risk of pathological fracture. Different treatment modalities have been reported for the management of aneurysmal bone cysts, including surgical excision with or without adjuvants, intralesional injection of sclerosing agents, radiation therapy, cryotherapy, systemic calcitonin therapy, and selective arterial embolization. We present a young man with a proximal femoral ABC who was treated successfully with curettage, cancellous bone grafting and prophylactic cancellous screw fixation.

**Keywords:** Aneurysmal bone cyst, prophylactic fixation, bone graft.

**A**neurysmal Bone Cysts are rare, accounting for 1 – 6 % of all the primary bone tumours. The usual age of presentation is 10 – 20 years<sup>1</sup>. Macroscopically it appears like a blood-filled cavity that expands the affected bone. Histologically, fibrous septa are bordered by macrophages, giant cells, inflammatory cells, and areas of bone production<sup>2</sup>

#### CASE REPORT:

A 20 year old student from Makurdi in Nigeria presented to our orthopaedic unit with a six weeks history of left hip pain. The pain was of spontaneous onset, persistent, aggravated by exertion and relieved by rest. There was no associated swelling, fever, cough or weight loss. He is not a sickler and there was no family history of similar ailment.

General physical examination showed an anxious young man not in painful distress, not pale and not jaundiced. Musculoskeletal examination revealed an antalgic gait in the left lower limb. There was tenderness on the anterior aspect of the hip but no wasting, scars, sinuses, deformities or differential warmth. The pulse rate was

80/min and blood pressure 100/80mmHg. Examination of the chest, abdomen and central nervous system revealed normal findings.

Radiological examination revealed a cystic lesion in the intertrochanteric region of the left femur with extension into the femoral neck (Figure 1).

The pre-operative packed cell volume was 39% but it dropped to 26% on second day post operation because of bleeding at the operation site necessitating blood transfusion. Retroviral screen, Hepatitis C virus and HBs Ag were non-reactive.



Figure (1): Left hip radiograph showing aneurysmal bone cyst (Type III) in the intertrochanteric region.

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The patient had bone biopsy and curettage through a 1x1cm cortical window at the lower end of the lesion to avoid further weakening of the diseased area of the bone (Figure 2).

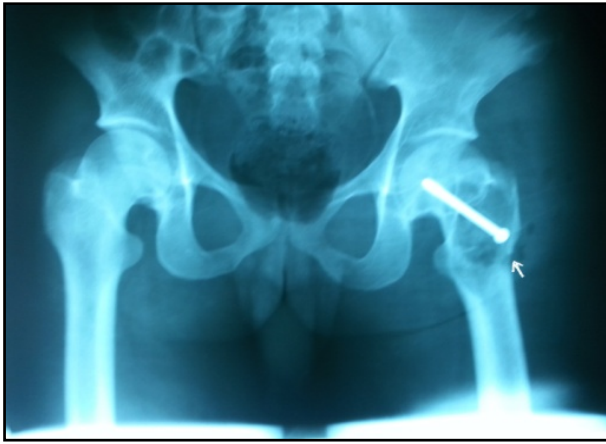


Figure (2): Immediate post-operative radiograph showing cortical window (white arrow), cancellous bone graft and prophylactic cancellous screw fixation.

He also had cancellous bone grafting harvested from the ipsilateral iliac crest and inserted via the cortical window into the intertrochanteric region. A 75mm cancellous screw was inserted through the tip of the greater trochanter into the head of the femur to reduce the risk of a pathological fracture. The wound was then closed in layers with a drain in place.

Stitches were removed after fourteen days and the wound healed. He was discharged home on non-weight bearing for twelve weeks until callus was noticed within the grafted area of the lesion. He subsequently did partial weight bearing for five months before it was discontinued when there was complete resolution of symptoms and radiological evidence of consolidation of the graft (Figure 3).

#### DISCUSSION:

Aneurysmal bone cyst is one of the non-neoplastic bone lesions which mimic primary bone tumors. They are actually masses of vascular spaces encased within periosteal new bone. This innocuous description, however, does not undermine their ability to destroy normal bone and extend into the surrounding

soft tissues. The condition was first described by Jaffe and Lichtenstein in 1942<sup>3</sup>.

Histology result showed a large cavernous space filled with red blood cells and lacking endothelial lining. The space was surrounded by fibroblast, inflammatory cells, osteoclast-like giant cells and osteoid tissue (Figure 4 (a, b)). These findings were found to be consistent with aneurysmal bone cyst.



Figure (3): Showing consolidation of the bone graft after 8 months.

Aetiology of these tumours is unknown. Most of these lesions start from a previously normal bone and are termed as 'Primary ABCs'. They may also arise in conjunction with other lesions such as fibrous dysplasia, osteoblastoma, chondromyxoid fibroma, nonossifying fibroma, chondroblastoma, osteosarcoma, chondrosarcoma, unicameral bone cyst, hemangioendothelioma, and metastatic carcinoma. Such tumours are designated as 'Secondary ABCs'<sup>4</sup>.

ABCs can involve any bone; the favoured sites of involvement being the long tubular bones, the spine and the pelvis. The lesion is invariably metaphyseal though rarely, it may be subperiosteal where it tends to form soft tissue masses. Vertebral ABCs most commonly involve the arches; lesions in the vertebral body are rare. Radiographs typically show an eccentric, lytic lesion with an expanded, remodelled 'blown out' or 'ballooned' bony contour of the host bone<sup>5,6</sup>. Capanna *et al* classified ABCs into 5

morphologic types based on the radiographic findings<sup>7</sup>.

Type I - Central metaphyseal presentation, well contained within the bone, with the bone profile intact or with slight expansion.

Type II - ABC that involves the entire segment of bone, an inflated appearance with cortical thinning.

Type III - Eccentric metaphyseal location, no or minimal expansion of the cortex

Type IV - Subperiosteal extension, no or minimal cortical erosion, rare in the diaphysis

Type V - Metadiaphyseal location, inflation of periosteum toward the soft tissues, penetration of the cortex, extension into cancellous bone.

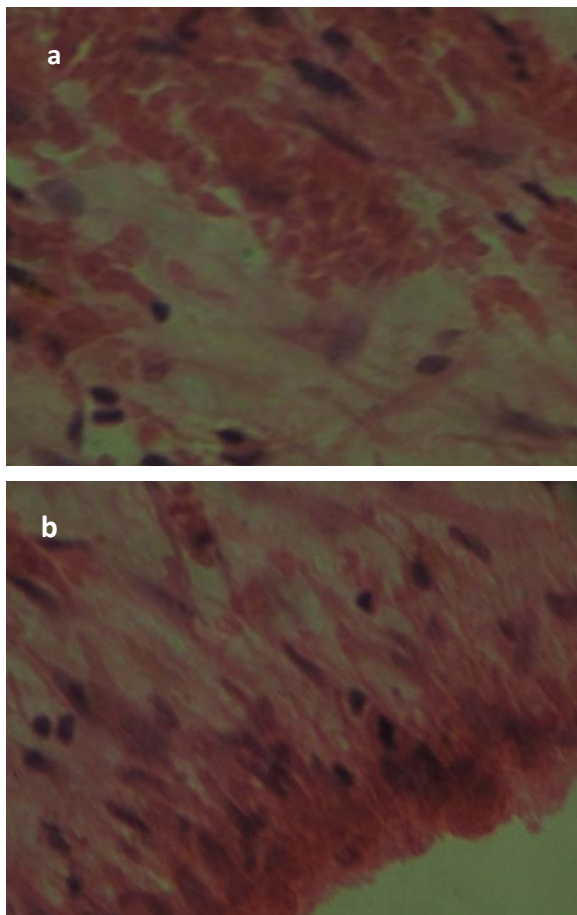


Figure (4): (a) Photomicrograph of aneurysmal bone cyst showing a cavernous space filled with red blood cells and surrounded by inflammatory cells, fibroblast and osteoclast-like giant cells and osteoid tissue. (Haematoxyline and eosin x 40). Figure 4 (b) Photomicrograph of aneurysmal bone cyst showing cyst walls. (Haematoxyline and eosin stain x 40).

The natural history of aneurysmal bone cyst has been described as evolving through four radiological stages: initial, active, stabilization and healing<sup>6,8</sup>. In the initial phase, the lesion is characterized by a well-defined area of osteolysis with discrete elevation of the periosteum. This is followed by a growth phase, in which the lesion grows rapidly with progressive 'destruction' of bone and development of the characteristic 'blown-out' radiologic appearance. The growth phase is succeeded by a period of stabilization, in which the characteristic 'soap bubble appearance' develops, as a result of the maturation of the bony shell. Final healing stage results in progressive calcification and ossification, with the lesion transformed into a dense body mass. The case presented was in keeping with the growing phase of ABC type III. CT scanning and MRI were not done for this case, but they are useful. CT scanning can be used to define the lesion and is especially valuable for those lesions that are located in areas in which the bony anatomy is complex and that cannot be adequately evaluated by plain films. CT scanning will show an interrupted cortex in many instances, although in these instances the adjacent soft-tissue mass is smooth, sharp and well defined, indicative of an intact periosteum<sup>5</sup>. MRI shows typically a well-defined lesion, often with lobulated contours. Internal septa with multiple fluid levels may be seen. In T1-weighted images fluid levels are better seen<sup>9</sup>. Bone scintigraphy will show increased uptake of radionuclide in all cases and it accurately reflects the extent of osseous involvement in approximately 88 % cases<sup>10</sup>. There are different treatment modalities for ABC. Curettage with bone grafting and bone graft substitute remains the gold standard. Since recurrence and even persistence of the lesion following curettage is known, the procedure is sometimes supplemented with cauterization of the cyst wall with phenol and alcohol followed by bone grafting<sup>11</sup>. Liquid nitrogen cryotherapy is an alternative. Transcatheter arterial embolisation of cysts is done in cases of cysts located about the



pelvis<sup>8</sup>. Also, Synthetic Bone Substitutes are being increasingly used following curettage; most of these are calcium phosphate ceramics<sup>12</sup>.

Recurrence rate is seen as 10-44 % of cases<sup>3,13,14</sup>. Despite the importance of proper treatment of this problem, the literature on the treatment strategy of pathological fractures of the proximal femur secondary to benign bone tumors is limited. There is also lack of documentation on prophylactic fixation to reduce the risk of pathological fracture which exists during the time of the disease and after curettage and bone grafting until there consolidation. Jaffe and Dunham reported on one patient with a pathological femoral neck fracture through an aneurysmal bone cyst<sup>15</sup>. This was treated with curettage, cortical fibular autograft, and dynamic hip screw. This patient had avascular necrosis and required a total hip replacement. We believe that if these patients are identified early, curettage, bone grafting and prophylactic fixation can be done. This is a less extensive surgery than dynamic hip screw that is sometimes used when a pathological fracture occurs and can lead to avascular necrosis of the femoral head.

### CONCLUSION:

Aneurysmal bone cysts are more common in the first and second decades of life. However, the condition must be borne in mind when the clinician is presented with a lytic bony lesion. Biopsy is the gold standard for diagnosis in such cases. Owing to the high rates of recurrence, curettage should be supplemented with bone grafting, bone substitutes and prophylactic cancellous screw fixation where the risk of pathological fracture is high.

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