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A Case of Proximal Radius Aneurysmal Bone Cyst Treated with Curettage and Inlay Fibular Graft

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Abstract: ***Background: Aneurysmal bone cyst, abbreviated ABC, is an osteolytic bone neoplasm characterized by several sponge-like blood or serum filled, generally non-endothelialized spaces of various diameters. A 13 year old male child presented with pain and deformity of forearm, diagnosed to be Aneurysmal Bone Cyst of proximal radius with functional impairment and movement restriction of elbow and forearm. Methods and Materials: Functional status on first visit-Mayo Elbow Performance Score=55.After non-invasive investigations, biopsy was done and diagnosis was confirmed as Aneurysmal bone cyst.There were many options but we went for curettage and fibular grafting. Pre-operatively we calculated the length of fibula required. We harvested the fibula by percutaneous subperiosteal resection and after curettage of the tumour,fixed the fibula with proximal and distal part of radius by k-wire which was removed after 3 weeks and proper rehabilitation was given. Results: By 14 months there were regression of tumor, complete fibular graft incorporation with the radius, regrowth of fibula at the donor site, functional improvement and increase in joint movement. By that time the Mayo Elbow Performance Score=100. Conclusion: Even large osteolytic cavity may be treated with Autogenous Inlay Bone Grafting after satisfactory Curettage with successful post-op Functional Recovery.***

Keywords: Aneurysmal Bone Cyst, Inlay Fibular Graft, Curettage

1. Introduction

Aneurysmal bone cysts (ABC) are benign bone lesions which usually arise in childhood or early adulthood. Patients usually complain for pain, swelling in the affected skeletal region, and rarely with a pathological fracture. A plain radiogram typically reveals an expansile osteolytic lesion; whereas magnetic resonance tomography shows characteristic fluid-fluid levels due to blood sedimentation. The natural evolution of the lesion remains unclear, and there have been reports of involution and self-healing [1,2] . Biopsy is obligatory, as the telangiectatic variant of osteogenic sarcoma needs to be taken into account in the differential diagnosis of the lesion [3] . The most widely accepted theory explaining the pathophysiology of the lesion suggests that there is a locally increased vascular pressure in the venous network of the bone tumor that results in the dilation of the small vessels. This in turn causes erosion and resorption of the bone matrix. Most primary ABCs demonstrate a t(16;17)(q22;p13) fusion of the TRE17/CDH11USP6 oncogene. This fusion leads to increased cellular cadherin11 activity that seems to arrest osteoblastic maturation in a more primitive state [4] . As a treatment a variety of methods has been described in the medical literature but no one is optimal till date. Open surgery has long been considered the gold standard, resulting in good local control, especially in the case of wide excision or when local adjuvants are used. However, the complication rate is not negligible, and some authorities prefer non-invasive methods such as embolization. Radiotherapy has also been used, but a major concern is the risk for secondary malignancies. More recently, the use of sclerotherapy has proved an easy and safe method which is associated with good local control and few side-effects. The introduction of novel medical treatments that block the osteolytic pathway, such as denosumab, has given encouraging preliminary results.

2. Case Report

13 years old boy with history of mild trauma followed by delayed onset of gradually increasing swelling at proximal part of left forearm for 1year. There was Pain, especially during weight lifting. Functional status on first visit- Mayo Elbow Performance Score=55. During first visit on examination there was a spherical mild tender swelling involving anterolateral, lateral and posterolateral aspect of left proximal left forearm. There was wasting of arm and forearm muscles. Regarding ROM – 10-100 degree flexion, 0-20 degree supination, 0-20 degree pronation at same visit. Shoulder and wrist movements were normal. Overlying skin was normal and there was no distal neurovasculsar deficit. A skiagram was done in AP and LAT view of left forearm (Fig. 1) which shows Well defined expansile metaphyseal osteolytic cystic lesion with trabeculation. Confirmation was done by biopsy (Fig. 2) and diagnosed as aneurismal bone cyst. So, next was our goal of management- i. Removal of Tumor cells, ii. Painless stable elbow joint , iii. Full range of motion of Elbow and Forearm with maximum functional recovery.

Figure 1: expansile metaphyseal osteolytic cystic lesion with trabeculation

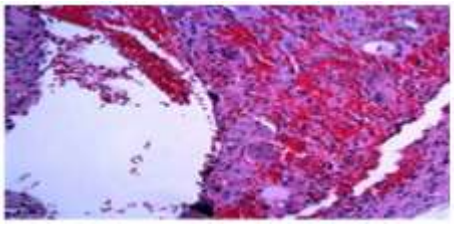

Figure 2: Histopathology picture

So, the options were as follows

1) Excision of the tumor mass.
2) Excision of the tumor mass and Fibular / Iliac crest / synthetic Bone Graft or Cement.

3) Curettage.
4) Curettage with Inlay Fibular Graft.
5) Percutaneous Sclerosants.
6) Embolisation.

- We opt for **Curettage with Inlay Fibular Graft**

As a preop workout we measured the length of the lesion from x-ray after correction of magnification = 9 cm. Determined the length of Fibula required to be cut = 11 cm. Regarding surgical steps – the operation was done under brachial block. Tourniquet given without exsanguination. Dorsal approach to Radius through a 10 cm long incision done to expose the tumor. Large window was created through the wall of the tumor and blood clot filled trabeculated cavity was exposed. Thorough curettage of the tumor and whole of the inner wall of the tumor was done until normal bone visible and fresh bleeding came out. Subperiosteal resection of 11 cm long segment of Fibula was done percutaneously with two 1 cm incisions accordingly in leg above and below in roof-head-cut technique and taken out through distal incision (Fig. 3, 4, 5). Fibular graft then prepared by drilling the medullary cavity of the graft and tappering of both ends. Fibular graft was inserted between the distal and proximal remaining part of Radius and fixed with 1 Radio-Capitellar K wire. Wound was closed in layers (Fig. 6, 7) .


Figure 3: Incision for fibular graft


Figure 4: fibular graft taken out


Figure 5:


Figure 6: post op LAT view


Figure 7: post op AP view

After 21 days

- K wire and Stitches removed
- Elbow mobilisation exercise advised.


Figure 8


Figure 9

Figure 8 and 9 shows 7 weeks post operative xray AP & LAT views


Figure 10


Figure 11

Figure 10 and 11 shows 14 weeks post operative xray LAT & APa views


Figure 12


Figure 13

Figure 12 and 13 shows 9 months post operative x-rays : early incorporation of the graft


Figure 14


Figure 15

Figure 14 and 15 Regrowth of Fibula at the graft donor site because of biological method of graft harvesting


Figure 16


Figure 17

Figure 16 and 17 shows 14 months post operative x-rays with no signs of local recurrence and fully incorporation of fibular graft.

Figure 18

Figure 18 WHAT WE GAINED….

- Improved function- Mayo Elbow Performance Score Preop = 55 and now 100
- Tumour removal
- Almost normal range of movement with respect to other forearm

3. Discussion

The aneurysmal bone cyst is the result of some specific pathophysiological change which may be due to trauma or tumour induced anomalous vascular changes. There are various methods of treatment such cases like selective arterial embolization. Phenol, plymethylmethacrylate or liquid nitrogen may be used as adjuvants to minimise the recurrences. Calcium sulphate injection may be used intralesionally[5]. More recently, the use of sclerotherapy has proved an easy and safe method which is associated with good local control and few side-effects.

The recurrence rate of various surgical procedures may be in between 10%-59% [6-8] . There are various factors which may predispose to recurrence such as age, location, gender, primary or secondary and histopathological properties. Proximity of the cyst to epiphyses may be a cause of recurrence.

4. Conclusion

Even large osteolytic cavity may be treated with autogenous Inlay bone grafting after satisfactory Curettage with successful post-op Functional Recovery without any recurrence.

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