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Grade III Proximal Humerus GCT Treated with Excision and Reconstructed with Megaprosthesis Augmented with Prolene Mesh- A Case Report

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Abstract

Background: Giant cell tumor(GCT) of bone is a benign yet locally aggressive tumor affecting the epiphysis of long bones. Proximal humerus involvement is uncommon and presents significant reconstructive challenges, particularly in Campanacci Grade III lesions with pathological fracture.

Case Presentation: A 54-year-old female presented with pain, swelling, and inability to lift her left upper limb. Imaging revealed an expansile lytic lesion of the proximal humerus with pathological fracture. Core biopsy confirmed GCT. The patient received neoadjuvant denosumab followed by en-bloc resection and reconstruction using a proximal humerus tumor prosthesis with capsular augmentation using prolene mesh.

Results: At 2-year follow-up, the Musculoskeletal Tumor Society (MSTS) score improved from 41% preoperatively to 84%. Active abduction was 35°. There was no evidence of infection, implant loosening, or recurrence.

Conclusion: Wide resection with mesh-augmented tumor prosthesis reconstruction provides reliable local control and satisfactory functional outcome in aggressive proximal humerus GCT with pathological fracture.

Keywords: Giant cell tumor , Proximal humerus, Pathological fracture

Introduction

Giant cell tumor is a common, benign , locally aggressive tumor faced by orthopedic surgeons. Proximal humerus GCT are rare and account for 4% of all cases [1] . Various surgical treatment options include intralesional curettage , en-bloc resection depending on tumor stage. Curretage is associated with high recurrence rates while resection is associated with higher morbidity[2]. Recurrence rates after curettage is especially high in Grade III tumors [2] while resection is associated with lower recurrence rates and better disease free survival[3]. However , resection possess problems associated with reconstruction and surgical complications [3,4].

This poses a significant dilemma in a poor setup where patients often present late and with pathological fractures which excludes any possibility of using curettage and we are left with resection as the only viable surgical option.

Case Report

We report the case of a 54 year old hindu female who presented to us with acute pain and inability to lift her left upper limb since 2 weeks and a progressively increasing swelling in the left shoulder region since the last 5 months. The swelling was associated with pain which was of insidious onset, gradually progressive, not referred, not radiating, dull aching. The swelling did not show any malignant features clinically.

On roentengenography (Fig. 1), there was an eccentric, expansile, geographic lytic lesion in the epi-metaphyseal region of proximal humerus. There was no clear matrix. There was a narrow zone of transition. There was no periosteal reaction. There was a pathological fracture.

On MRI (Fig. 2), areas of low signal intensity were observed in both T1- and T2- weighted images. There were also areas of high signal intensity corresponding to hemorrhagic component.

A core needle biopsy with Jamshedi needle was performed under local anesthesia. Histopathological examination concluded our diagnosis as Giant Cell Tumor.

The patient was administered 6 doses of Injection Denosumab(120 mg) at 0, 7, 14, 28, 58, 88 days and planned for en-bloc resection and reconstruction with tumor prosthesis and capsular augmentation with prolene mesh (Fig. 3, 4, 5, 6, 7, 8).

The patient was followed up for 2 years. At the end of followup, the Musculoskeletal Tumor Society Score (MSTS) improved from 41% preoperatively to 84% . The active abduction angle was 35^0 (Fig. 9). There was no signs of infection. Radiologically (Fig. 10), there was no signs of recurrence. There was no signs of any prosthesis loosening or displacement.

Discussion

Giant cell tumor of bone represents approximately 5% of primary

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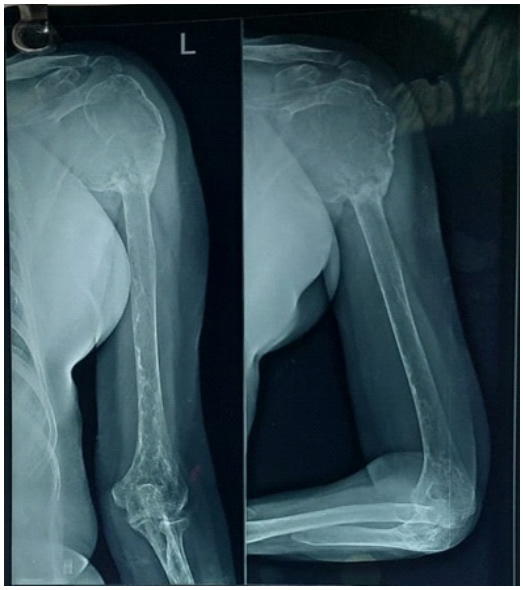

Figure 1: PROXIMAL HUMERUS GIANT CELL TUMOR WITH PATHOLOGICAL FRACTURE

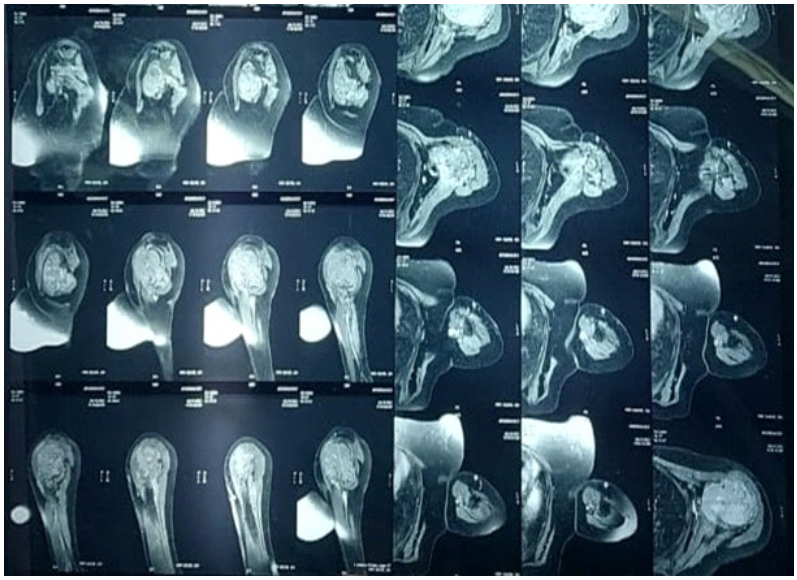

Figure 2: MRI SHOWING FEATURES CONSISTENT WITH GIANT CELL TUMOR

Figure 3: SHOWING TUMOR SIZE AND LEVEL OF OSTEOTOMY(9 CM IN THIS CASE)

Figure 4: SHOWING DEFECT TO BE RECONSTRUCTED AFTER TUMOR RESECTION

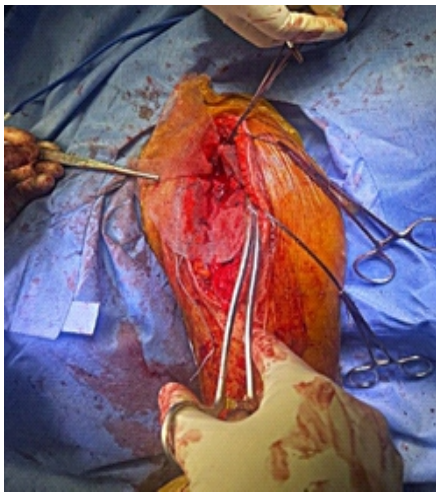

Figure 5: MESH APPLICATION

Figure 6: TUMOR PROSTHESIS FIXATION

Figure 7: MESH SECURED

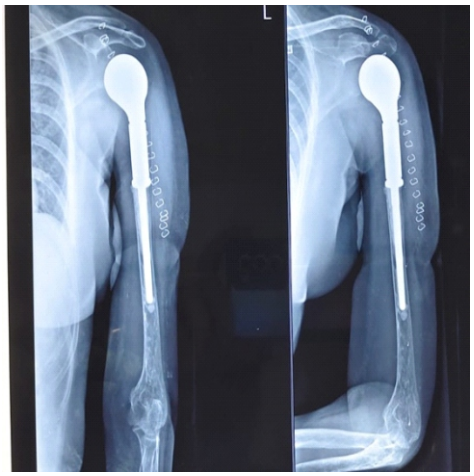

Figure 8: IMMEDICATE POST OPERATIVE XRAY

Figure 9: FOLLOW UP EVALUATION AT 2 YEARS

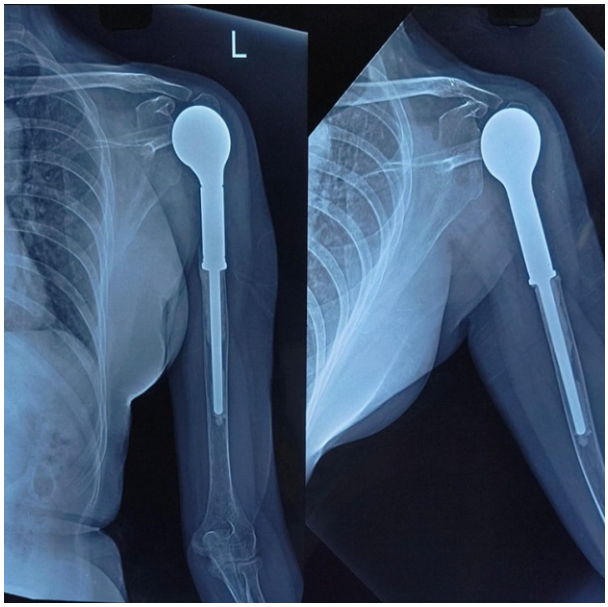

Figure 10: FOLLOWUP XRAY AT 2 YEARS

bone tumors and demonstrates unpredictable biological behavior [3]. Grade III lesions characterized by cortical breach and soft tissue extension often require wide resection.

Intralesional curettage is associated with higher recurrence rates [2, 4]. Wide resection significantly reduces recurrence risk and provides better disease control [1, 4]. Denosumab acts by inhibiting RANKL and can facilitate resection, though long-term recurrence remains a concern.

Reconstruction after proximal humerus resection remains challenging. Tumor prosthesis allows early mobilization but functional outcomes are limited by rotator cuff deficiency. Mesh augmentation improves soft tissue attachment and prosthetic stability. Studies have demonstrated improved outcomes with prolene mesh reconstruction [5,6]. Additional evidence from oncologic femoral reconstructions supports the biomechanical benefit of mesh augmentation [7].

Conclusion

This case reports highlights the difficulty with regards to decision making when dealing with grade III periarticular Giant Cell Tumors with pathological fracture. The case report also highlights the benefits of capsular augmentation with prolene meshsss to increase construct stability and reduce incidence of prosthesis displacement in view of capsule weaknening post resection. Long term followup is necessary to study implant survivorship and recurrence.

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Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

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