Case Report

Total Elbow Arthroplasty in a Rare Case of Giant Cell Tumour of Humerus: A Case Report

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Abstract

Giant cell tumour forms 4 percent - 5 percent of all bone tumours & 20 percent of all benign bone tumours. It is responsible for 20 percent of bone tumours in China. It is usually single , aggressive locally & accounts for 5 percent of metastasis & 1 percent - 3 percent with malignant changes. Most commonly it is found in people aged 30 to 40 years and in the long bones mainly the meta-epiphyseal region . It is most commonly affects the distal femur , distal radius , proximal tibia and proximal humerus. But the occurrence in the distal humerus is rare. A 50 year old male patient who came with complaints of pain and swelling over right elbow since 3 years. Patient gave history of trauma to right elbow as he met with a road traffic accident. After few days patient noticed swelling which was insidious in onset and gradually kept increasing in size. Patient also had pain in right elbow which was insidious in onset and increased in severity daily. Pain was managed with total elbow arthroplasty and elbow range of motion improved after the surgery. Patient was managed with total elbow arthroplasty and wide resection of tumour which has good functional outcomes , less complications and lower recurrences rates. Patient was followed up at 18 – month and free range of motion of 10º to 110º without pain along with no proof of reoccurrence was noted .

Keywords: *Giant cell tumour , Humerus , Arthroplasty , Elbow prosthesis, Rehabilitation.*

Introduction

Giant cell tumour (GCT) forms 4 percent to 5 percent of all bone tumours and 20 percent of all benign bone tumours [(1)]. GCT is responsible for 20 percent of bone tumours in China [(2)]. It is usually single, aggressive locally & accounts for 5 percent of metastasis & 1 percent - 3 percent with malignant changes [(3)]. Most commonly it is found in people aged 30 to 40 years and in the long bones mainly the meta-epiphyseal region [(4)]. It is most commonly affects the distal femur , distal radius , proximal tibia and proximal humerus . But the occurrence in distal humerus is rare [(5)].

Histologically, giant cell tumour is divided into 3 types:

a) Multi-nucleated giant cells resembling osteoclasts

b) Mononuclear histiocytic cells

c) Neoplastic stromal cells – main proliferating cells [(3)]

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Radiologically, giant cell tumour presents as radiolucent lesion without calcifications which are centrally placed inside the bone giving it soap bubble appearance [6].

Giant cell tumour is usually treated with intralesional curettage either with bone cement packing or bone grafting. If the lesion is close to the articulating surface , subchondral bone grafting is done . With these procedures the reoccurrence rate ranges from 10 percent to 40 percent [7].

Patient and Observation

In November 2019, A 50 year old male who came with complaints of pain and swelling over right elbow since 3 years. Patient gave history of trauma to right elbow as he met with a road traffic accident. After few days patient noticed swelling which was insidious in onset and gradually kept increasing in size. Patient also had pain in right elbow which was insidious in onset and increased in severity daily.

On examination a diffuse swelling was noted around the distal humerus . The local temperature was raised, and tenderness was noted over and surrounding area of the swelling. The swelling was extending from 18cm distal to tip of Greater tuberosity right side; up to 17cm proximally from radial styloid process ; 55cm in circumference at most prominent part with 25cm vertically and 20cm horizontally (Figure 1,2). Margins of swelling are ill defined with soft, doughy, bony hard mixed consistency present. Over lying skin was non-pinch able. A fixed flexion deformity of 60º, along with range of motion of 30º to 80º was noted which was painful. Supination and pronation was painful and restricted.

Radiographs showed an expansile osteolytic lesion in the olecranon fossa of the humerus with involvement of radial and ulnar head resembling a 'soap bubble' like appearance. Magnetic resonance imaging (MRI) depicted a well-defined, expansile mass, with altered signal intensity, involving the articular surface of the distal end humerus causing cortical break with extra-osseous extension into adjacent soft tissue; displacing adjacent muscles and the vessels. Patient was advised cytology and the report was suggestive of Giant cell tumour.

The patient was operated with total abscission of the distal humerus along with total elbow arthroplasty. A cemented 'sloppy-hinge' total elbow prosthesis (Bakshi, Sis Ortho, Bangalore, India) made of stainless steel was used. A high arm tourniquet was used during the procedure to avoid excessive blood loss.

A posteromedial skin incision taken, soft tissues dissected & the ulnar nerve along with blood vessels was identified and isolated. The excision of tumour was done by sharp dissection with a edge of normal tissues & precaution was taken that the capsule was not damaged. The olecranon process along with radial head was excised and removed. The triceps attachment was not resected during the procedure (Figure 3).

Appropriate sized cemented elbow prosthesis was used and inserted (Figure 4). Hemostasis was achieved after removal of tourniquet. Irrigation was done with 3 litres of normal saline and wound was sutured in layers. A suction drain of size FG 10 was inserted. The limb was kept in full extension with an above-elbow slab. The resected tumour mass was sent for histo-pathological examination and the report confirmed the diagnosis of Giant Cell Tumour of bone. After one week of post-operative time, rehabilitation was initiated which comprised of active and passive movement within pain free range and with gradual progression. Stiches were removed two weeks later and was discharged with home program exercises and advised for monthly follow-ups. At 8th month follow up patient had a free range of motion of 10º to 110º without pain along with no evidence of reoccurrence was noted .

Timeline:

First encountered discomfort	2016
Date of injury(accident)	09-11-2019
Date of surgery	11-11-2019
Date of physiotherapy rehab	18-11-2019
Date of suture removal	30-11-2019
Date of follow-up	03-08-2020

Fig 1A : Figures shows giant cell tumour of right elbow (lateral , anterior and posterior view)

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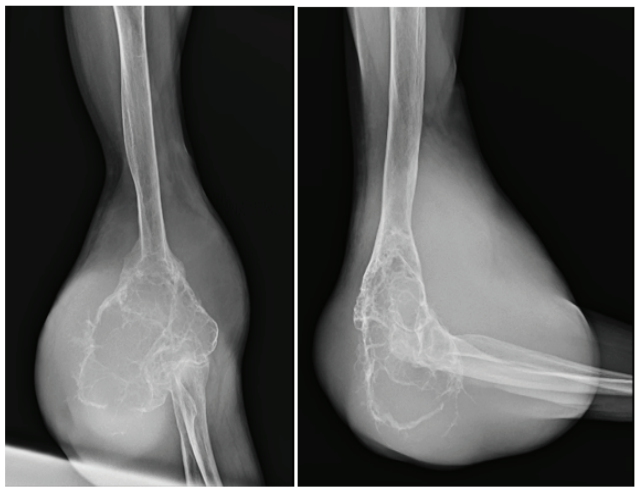

Fig 1B : Figure shows pre-operative X-ray anterior and lateral view of right elbow showing soap bubble appearance suggestive of Giant Cell Tumour.

Figure 2: Figure shows pre-operative X-ray anterior and lateral view of right elbow showing soap bubble appearance suggestive of giant cell tumour.

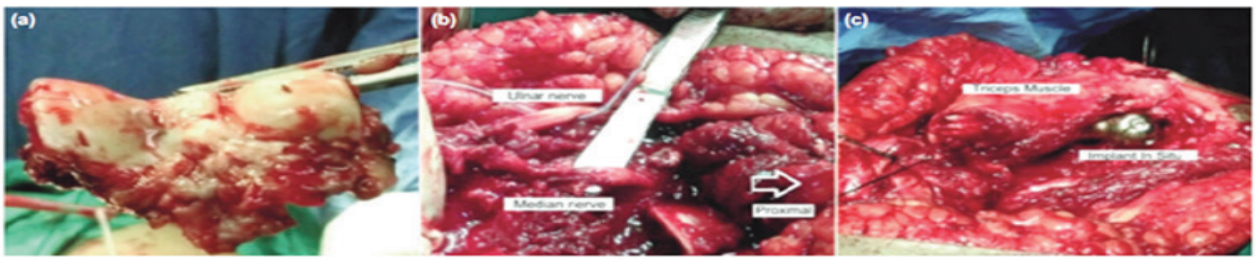

Fig 2 : Intra-operative images showing a) excised giant cell tumour with part of distal humerus , b) isolated median and ulnar nerves , c) Implant in-situ

Figure 3: Intra-operative images showing a) Excised giant cell Tumour with part of distal humerus, b) Isolated median and ulnar nerves, c) Implant in-situ.

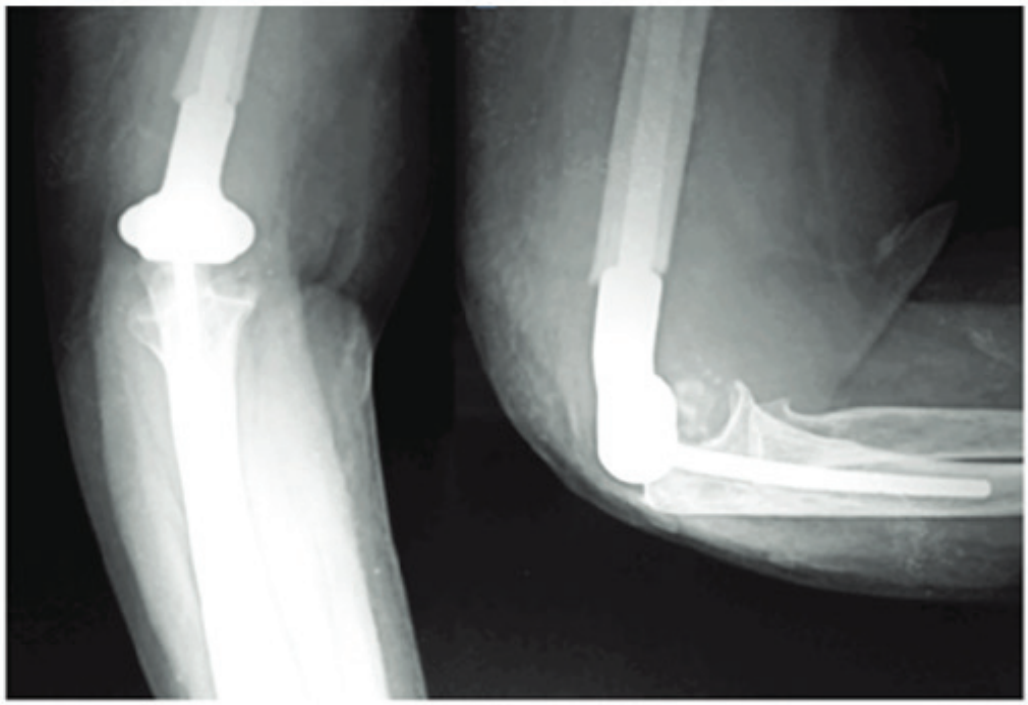

Fig 3 : Figure shows post-operative X-ray with prosthesis in-situ

Figure 4: Figure shows post-operative anterior and lateral X-ray with prosthesis in situ.

Discussion

Giant cell tumour of bone most commonly occurs as anomalous, expansile lytic lesion, with thinned cortex and in later stages may breach the cortex of bone [8]. Giant cell tumour results in expansile remodelling of the overlying bone; cortex overlying the tumour mass remains intact. Sometimes tumour contains foci of dystrophic mineralization [9]. The most important histological and morphologic feature is multi-nucleated giant cells which may have 100 nuclei with prominent nucleoli. The distinguishing feature of giant cell tumour from other bone tumours or the osteogenic lesions that have benign osteoclast is that the surrounding mononuclear and multinucleated cells that are small in size have nuclei similar to those found in the giant cells.

Surgery is the management of choice. Cementing and/or bone grafting along with curettage is done [10]. If the tumour invades the bone cortex along with the joint, an enbloc (total) resection with reconstruction of total joint is the treatment modality of choice. The complications rates among these are very high and are mainly used as salvage procedures if the total elbow arthroplasty fails [11]. Excellent functional outcomes and less recurrences rates have been seen in wide resection of tumour and total elbow arthroplasty [12]. A well-structured rehabilitation is a vital part in the successful recovery of the patient outcomes to restore patient's functions [13]. Total elbow arthroplasty is another option as it has good functional outcomes and pain relief with less complication rates.

Conclusion

Giant cell tumour is rare condition in lower end humerus and the prompt and accurate diagnosis of the same and total elbow arthroplasty management led to a successful and acceptable functional improvement for our patient. Physical rehabilitation post-surgery in such replacement procedures stands a important aspect in the positive outcomes.

Declaration of Patient Consent:

The authors certify that appropriate consent form was obtained from the patient. In the consent form, the patient has given his consent for his clinical information to be published in the journal. The patient understands

that their personal information will not be described.

Author's Contribution:

All authors made the best contribution for the concept, assessment and evaluation, data acquisition and analysis and interpretation of the data.

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References

1) Gamberi G, Serra M, Ragazzini P, Magagnoli G, Pazzaglia L, Ponticelli F, et al. Identification of markers of possible prognostic value in 57 giant cell tumors of bone. Oncol Rep 2003;10:351–6.
2) Thomas DM, Skubitz KM. Giant cell tumour of bone. Curr Opin Oncol 2009;21:338–44
3) Werner M. Giant cell tumour of bone: morphological, biological and histogenetical aspects. Int Orthop 2006;30:484–9.
4) Dickson BC, Li SQ, Wunder JS, Ferguson PC, Eslami B, Werier JA, et al. Giant cell tumor of bone express p63. Mod Pathol 2008;21:369–75
5) Kulkarni A, Fiorenza F, Grimer RJ, Carter SR, Tillman RM. The results of endoprosthetic replacement of tumours of the distal humerus. J Bone Joint Surg Br 2003;85:240–3.
6) Freyschmidt J, Ostertag H, Jundt G (1998) Knochentumoren. 2. AuXage. Springer, Berlin, pp 611–649
7) Blackley HR, Wunder JS, Davis AM, White LM, Kandel R, Bell RS (1999) Treatment of giant-cell tumors of long bones with curettage and bone-grafting. J Bone Joint Surg Am 81(6):811–820
8) Yochum TR, Rowe LJ. Essentials of skeletal radiology. Lippincott Williams & Wilkins
9) Moser RP Jr, Kransdorf MJ, Gilkey FW, Manaster BJ. From the archives of the AFIP. Giant cell tumor of the upper extremity. Radiographics 1990;10:83–102
10) Balke M, Schremper L, Gebert C, Ahrens H, Streitbuerger A, Koehler G, et al. Giant cell tumor of bone: treatment and outcome of 214 cases. J Cancer Res Clin Oncol 2008;134:969–78.
11) Kharrazi FD, Busfield BT, Khorshad DS, Hornicek FJ, Mankin HJ. Osteoarticular and total elbow allograft reconstruction with severe bone loss. Clin Orthop Relat Res 2008;466:205–9.
12) Sait SA, Nithyanath M, Cherian VM. Giant cell tumour of the distal humerus treated with elbow arthroplasty: a case report. Int J Case Rep Images 2012;3:37–40
13) Bawiskar D, Dhote S, Phansopkar PA. Early physical rehabilitation post-surgery in a complex type 5 Schatzker Tibial plateau fracture improves functional outcomes: A case report. Medical Science, 2020, 24(104), 2675-2682.