Giant Cell Tumours of Hand Bones: a Report of Two Cases

Umesh Kumar Meena • Yogesh Kumar Sharma •
Narendra Saini • Devi Sahai Meena • Nitesh Gahlot

Received: 7 March 2014 / Accepted: 13 June 2014 / Published online: 21 June 2014
© Society of the Hand & Microsurgeons of India 2014

Introduction

Giant cell tumor (GCT) of bone is a relatively common type of benign tumour involving the epiphyseal region of tubular bones such as the femur, tibia, and humerus but Giant cell tumour of hand bones are rare with an incidence of around 1–4 % [1–7]. Although GCT are benign tumours, but they can be locally malignant, and when so they have a higher recurrence. Giant cell lesion of the small bones were previously known as ‘Giant cell reparative granuloma’ but now there is a different entity called Giant cell tumour of the small bones of the hands and feet [3]. The recurrence rate of GCT of the small bones in the literature was found to be similar to the higher side of incidence of recurrence of GCT of long bones i.e. 27 to 65 % after isolated curettage, 20 to 35 % after curettage with adjuvants, and 10 to 15 % after en bloc resection, for GCT in the long [1, 4, 7, 8]. In hand bones, this tumour usually affect metaphyseal region with relatively higher recurrence than for other locations [1, 8]. It becomes symptomatic early in the hand because of tight compartments thus expansion of bone may give pain, and swelling, followed by early loss of function [3].

The goals in treatment of Giant cell tumour of hand bones are to obtain local tumor control, restore hand function and maintain good cosmesis. Various procedures including excision (either local or wide), and amputation are used to eradicate the disease completely but despite single or double ray resection local tumor control may not be absolute [1, 2, 7, 9–12].

Here, we report two cases of GCT of hand bones, one of them treated with wide excision and tricortical iliac crest graft and other with amputation through first carpometacarpal joint due to its aggressive nature.

Case Reports

Case 1

First case was a right-handed 60-year-old male presenting with, painless swelling of left thumb of 4 months duration without negative history of trauma or fever, the swelling gradually increasing in size leading to subsequent restriction of movement of interphalangeal as well as metacarpophalangeal joint of thumb. Examination revealed a fusiform swelling in the region of proximal phalanx of the thumb. The overlying skin was stretched and nonpigmented without adherence to the underlying mass. Regional lymph nodes were not palpable. Serum biochemistry was within normal limits. Radiographs demonstrated an expansile lytic lesion involving the entire proximal phalanx with a cortical breach (Fig. 1). MRI was not done in this case as the lesion was localized and no added benefit would have been gained. On radiograph the articular margins were intact. The complete skeletal survey of body (bone scintigraphy) was normal. Radiograph of the chest was also normal. FNAC (fine needle aspiration cytology) revealed sheets of multinucleated giant cells with stromal cells in the background with

U. K. Meena (✉) • Y. K. Sharma • N. Saini • D. S. Meena
Department of Orthopaedics, SMS Medical College and Hospital,
Jaipur 302004, India
e-mail: drumesh_meena@yahoo.co.in

Y. K. Sharma
e-mail: dryogiortho@yahoo.com

N. Saini
e-mail: sainidnarendar@gmail.com

D. S. Meena
e-mail: sahai.dr@gmail.com

N. Gahlot
Department of Orthopaedics, PGIMER, Chandigarh, India
e-mail: doc.nitesh@gmail.com

Fig. 1 Plain radiograph of hand showing expansile lytic lesion in first metacarpal with cortical breach

areas of haemorrhage and necrosis (Fig. 2). All routine blood investigations including full blood count, urea, electrolytes, liver function test, coagulation profile and parathyroid hormone levels were normal. Under general anaesthesia, en bloc, excision of proximal phalanx was performed resultant defect was filled with tricortical bone graft from the iliac crest with fusion of metacarpophalangeal and interphalangeal joints the graft held in place with an intramedullary 1.8 mm kirschner wire (Fig. 3) following which a thumb spica was applied for a period of 2 months. Histological evaluation of excised bone confirmed the diagnosis of a GCT, demonstrating osteoclastic giant cells admixed with stromal cells. The postoperative recovery was uneventful. Subsequently the wire was removed after appearance of radiological sign of union between graft and the host bone after three months postoperatively (Fig. 4). The patient is undergoing regular check-ups for 24 months, has not shown any evidence of local recurrence clinically or

Fig. 2 Histopathological slide showing sheets of multinucleated giant cells with stromal cells in the background with areas of haemorrhage and necrosis

Fig. 3 Immediate postoperative radiograph showing iliac crest graft fixed with k wire

Fig. 4 3 months postoperative radiograph with bony union between graft and host bone

radiologically, and had a fairly functional and good cosmetic hand.

Case 2

Second case was a 28-year-old right hand dominant male presented with progressively increasing globular swelling of around $6 \times 7 \times 4$ cm in right hand at base of thumb and index finger involving whole of thenar region and first web space over a period of 6 months. On examination the swelling was tender with nonpigmented stretched skin and restriction of movement of both carpo-metacarpal and metacarpophalangeal joints of the thumb. All routine blood investigations were normal. Radiographs demonstrated an expansile lytic lesion involving the whole first metacarpal bone with soft tissue extension and destruction of metacarpophalangeal and carpo-metacarpal joints (Fig. 5). MRI revealed a mass lesion of $67 \times 61 \times 59$ mm which was heterogeneously hyperintense on T2 and STIR images while hypointense on T1W images (Fig. 6a and b). It also revealed erosive changes along lateral aspect of second metacarpal bone with soft tissue expansion and partial encasement of flexor tendon sheaths. Skeletal survey (bone scintigraphy) was performed revealing no other lesion in body. On open biopsy there was grayish mass with areas of hemorrhage and a diagnosis of high grade giant cell tumor was made due to presence of increased mitotic activity and significant cellular atypia (Fig. 7). Considering the high grade and soft tissue extension the lesion was treated with amputation through carpometacarpal joint was done. Patient was followed up regularly both clinically and radiologically. At 18 months of follow up patient is able

Fig. 5 Radiographs demonstrating an expansile lytic lesion involving the whole first metacarpal bone with soft tissue extension and destruction of metacarpophalangeal and carpo-metacarpal joints

Fig. 6 (a) (b) MRI images showing a mass lesion

to use his fingers for grasp without any pain or stiffness in hand. Till the last follow up there was no local recurrence or any distant metastasis.

An informed consent was obtained from both of the patients to publish their clinical case reports.

Fig. 7 Histopathological slide showing multinucleated giant cells with stromal cells in the background with areas of haemorrhage and necrosis with of increased mitotic activity and significant cellular atypia

Discussion

Giant cell tumours of hand bone represent a rare but different and more aggressive lesion than conventional GCT in rest of skeleton [1, 7, 10]. Incidence of Giant cell tumour of bones of hand is comparatively higher in Asian population compare to western world [1, 12, 13].

Overall, they appear in a younger age group [4, 8, 14, 15] and recur more rapidly in the hand bone than they do in other locations. They also have a shorter duration of symptoms averaging six months or less before a diagnosis is made [7, 10, 15]. Aggressiveness was observed in one of our case and had presented as stage 3 lesion according to enneking staging system [16], thus requiring amputation.

Primary Giant cell tumour of the hand bones usually differs from the usual eccentric location in epiphyseal region of long bones at other sites and were occupying central diaphyseal location, expansile with paper-thin cortex and soft tissue extension and these features make simple curettage more difficult and less effective [6] and also GCT of bone located in the small bones of hand and feet could be presented as multicentric lesions more often as the GCT located at the usual sites. Therefore, “general” investigations such as scintigraphy should be performed in such rare localizations to exclude multicentricity.

The various treatment modalities described in literature are curettage, curettage and bone graft, en bloc resection, amputation, and resection with reconstruction [1, 2], but curettage alone or curettage with bone graft is not effective even for giant cell tumours of long bones and hand also [1, 17–19]. Although denosumab is currently, a therapeutic option for patients with unresectable GCTs of bones but its place in the global therapeutic strategy is yet to be defined [21], so we did not used this therapy in our second patient. Despite the fact that the GCT is not a malignant tumour, the extent of tumour at the time of diagnosis and the high recurrence rate following limited resection often dictate the need of an en bloc resection through normal tissues to prevent local recurrence of the lesion [6]. Such a treatment creates a significant skeletal defect and a challenging reconstructive problem requiring reconstruction using autograft, allograft or silastic (synthetic) implant [1, 8, 10, 11, 20]. We have used iliac crest autograft in one of our patient to achieve functional and cosmetically acceptable hand. Amputation was done in another case because of aggressive nature of tumour and significant soft tissue expansion, because it should be borne in mind that multiple surgical procedures may increase the chances of conversion of benign lesion in to malignant one so amputation was opted initially [7, 20]. Most local recurrences of GCT cases of the hand bones are reported to occur within one year of primary surgery [1, 8, 10] but most of them have occurred after curettage or incomplete resection, none of our patient have shown local

recurrence, showing adequacy of our surgical technique according to the stage of tumour in both cases. Following operation there was decrease in grip strength but was satisfied with a functional and cosmetically improved hand. This case demonstrates the efficacy of the iliac crest graft and its subsequent consolidation and modeling in accordance with the functional demands of the hand. Although fibula can be used as graft but iliac crest graft shows early and better consolidation with host bone because of its cortico-cancellous nature which has all three properties of a graft (osteoproliferative, osteoinductive and osteoconductive properties).

Although amputation was done in our second case but it was inevitable because of its aggressiveness and absence of local recurrence and distant metastasis favors our policy of aggressive primary surgery.

The present case reports considered worth reporting in view of the comparative rarity of giant cell tumors of hand bones, and both of cases were evaluated thoroughly and managed accordingly to their stage, aggressiveness and degree of involvement without any complication with more than one year follow up.

Source of Support/Funding None

References

1. Averill RM, Smith RJ, Campbell CJ (1980) Giant cell tumours of the bones of the hand. *J Hand Surg* 5:39–50
2. Unni KK (1996) Dahlin's bone tumors: general aspects and data on 11,087 cases, 5th edn. Lippincott Williams & Wilkins, Philadelphia, pp 263–82
3. Fletcher CDM, Bridge JA, Hogendoom PCW, Mertens F (eds): “WHO Classification of Tumours of Soft Tissue and Bone.” Lyon: International Agency for Research on Cancer (IARC), 2013: 320)
4. Oliveira VC, van der Heijden L, van der Geest IC, Campanacci DA, Gibbons CL, van de Sande MA et al (2013) Giant cell tumours of the small bones of the hands and feet: long-term results of 30 patients and a systematic literature review. *Bone Joint J* 95:838–45
5. Minguella J (1982) Giant cell tumour of metacarpal in a child of unusual site and age. *Hand* 14:93–6
6. Sanjay BK, Raj GA, Younge DA (1996) Giant cell tumours of the hand. *J Hand Surg (Br)* 21:683–7
7. Saikia KC, Bhuyan SK, Ahmed F, Chanda D (2011) Giant cell tumor of metacarpal bones. *Indian J Orthop* 45:475–8
8. Athenasian EA, Wold LE, Amadio PC (1997) Giant cell tumour of the bones of hand. *J Hand Surg [Am]* 22:91–8
9. Eckardt JJ, Grogan TJ (1986) Giant cell tumour of bone. *Clin Orthop* 204:45–58
10. Patel MR, Desai SS, Gordon SL, Nimberg GA, Sclafani SJ, Vigorita VJ et al (1987) Management of skeletal giant cell tumour of the phalanges of the hand. *J Hand Surg [Am]* 12:70–77
11. Gadegone WM, Salphale YS, Sonwalkar HA (2009) Resection of a giant cell tumour of the proximal phalanx and reconstruction by iliac crest graft. *J Hand Surg Eur* 34:272–4

12. Reddy CR, Rao PS, Rajakumari K (1974) Giant-cell tumours of bone in South India. *J Bone Joint Surg Am* 56:617–9
13. Sung HW, Kuo DP, Shu WP, Chai YB, Liu CC, Li SM (1982) Giant-cell tumour of bone: analysis of two hundred and eight cases in Chinese patients. *J Bone Joint Surg* 64:755–61
14. Saikia KC, Bhuyan SK, Goswami S, Bora A (2009) Rare site giant cell tumors: report of two cases on phalanges of the finger and review of literature. *J Orthopaed Traumatol* 10:193–197
15. Dhillon MS, Prasad P (2007) Multicentric giant cell tumour of bone. *Acta Orthop Belg* 73:289–99
16. Enneking WF. *Musculoskeletal tumor surgery*. Vol. 1, New York: Churchill Livingstone, 1983:1436–76
17. Goldenberg RR, Campbell CJ, Bonfiglio M (1970) Giant cell tumor of bone. An analysis of 218 cases. *J Bone Joint Surg Am* 52:619–64
18. Gupta S, Kumar A, Gupta I (1980) Giant cell tumour of the first metacarpal bone. *Hand* 12:288–92
19. Wittig JC, Simpson BM, Bickels J, Kellar-Graney KL, Malawer MM (2001) Giant cell tumor of the hand: superior results with curettage, cryosurgery, and cementation. *J Hand Surg [Am]* 26:546–555
20. Ropars M, Kaila R, Cannon SR, Briggs TW (2007) Primary giant cell tumours of the digital bones of the hand. *J Hand Surg Eur* 32: 160–64
21. Thomas DM (2012) RANKL, denosumab, and giant cell tumor of bone. *Curr Opin Oncol* 24:397–403