International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(4): 14-17

www.orthopaper.com
Received: 10-08-2021
Accepted: 12-09-2021

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Tricortical reconstruction after excision of giant cell tumour in phalanx: A case report

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DOI: https://doi.org/10.22271/ortho.2021.v7.i4a.2859

Abstract
Giant cell tumor (GCT) of bone is common type of osteolytic tumor being benign involving epiphyseal aspect of long bones like femur, tibia, humerus. In contrast, GCT of hand bones are relatively rare incidence of around 1-4%. Despite being benign in nature, they may be locally malignant with significant bone destruction, local recurrence. The diagnosis is based on the clinical, radiological, and histopathological findings with primary treatment being surgical. Each case should be assessed individually to ensure adequate treatment, aiming to prevent recurrences and functional limitations. Resection with reconstruction using iliac crest graft can be considered as alternate modality instead of ray amputation in terms of functionality and cosmesis.

Keywords: giant cell tumor, excision, reconstruction, tricortical graft, iliac crest

Introduction
Giant cell tumor (GCT) of bone is common type of osteolytic tumor being benign involving epiphyseal aspect of long bones like femur, tibia, humerus. But, GCT of hand bones are relatively rare incidence of around 1-4% [1]. 'Giant cell reparative granuloma' was the older terminology used for GCT of small bones. Despite being benign in nature, they may be locally malignant with significant bone destruction, recurrence and pulmonary metastasis. 1-4% of GCT's was noted to have metastasis to lungs [2]. It is most common is females of age group 30-50yrs. Symptoms can start early in hand due to firm compartment and when tumor in bone expands reflects as swelling, pain followed by gradual loss of function. The goals in treatment is to obtain local tumor control, restore hand functionality. Decision making oscillates between salvage by excision or amputation.

Case Report
28 year old female home-maker who is Right hand dominant presented with pain and swelling of Right third finger since four months (Figure 1). There was increase in the swelling and limitation of movements of finger since one month with no history of trauma, fever or any co-morbidities. On examination, a globular swelling in the region of proximal phalanx of third finger was seen with overlying skin stretched shiny and non-pigmented. Tenderness was present over the proximal phalanx and metacarpo-phalangeal (MCP) joint with painfully restricted flexion of 10 degree and 20 degree at MCP joint and PIP joint respectively.
X ray (Figure 2) demonstrated an expansile lytic lesion involving base of proximal phalanx with cortical breach at radial side and intact articular surface at MCP joint. MRI (Figure 3) reported as 1.9x1.7x1.9cm mass lesion in medullary cavity with cortex disruption of proximal phalanx suggestive of GCT- Campanacci grade-3 with normal collateral, flexor and extensor tendons.
Routine blood investigations and Chest X ray was done and were normal. Pt was counselled regarding the need of surgery, complications associated, chance of recurrence prior to surgery and after taking written surgical consent, surgery was performed.
Tumor was resected (Figure 4) completely leaving thin flake of cartilage at MCP joint and PIP joint followed with reconstruction of proximal phalanx using tricortical iliac bone graft (Figure 5,6) shaped to fit the excised gap and transfixed with K wire (Figure 7) keeping MCP joint in 90 degree flexion. Post-op X ray shown in Figure 8.

Histological evaluation (Figure 9) of excised bone confirmed the diagnosis of GCT demonstrating osteoclastic multinucleate giant cells with eosinophilic cytoplasm mixed with stroma showing spindle shaped cells. Patient was immobilized with plaster slab for 4 weeks and mobilized with removable splint. K wire was removed after 8 weeks. The patient was on follow-up for 1 year and had no evidence of local recurrence clinically or radiologically and had fairly good functional range of movements of 3rd finger.

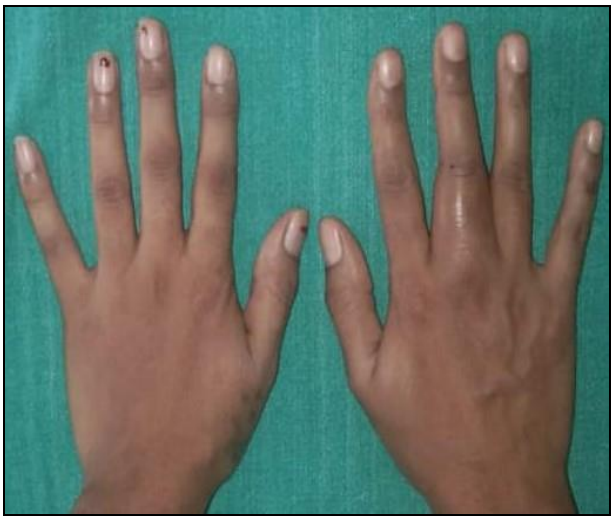

Fig 1: Pre-op Hand image.

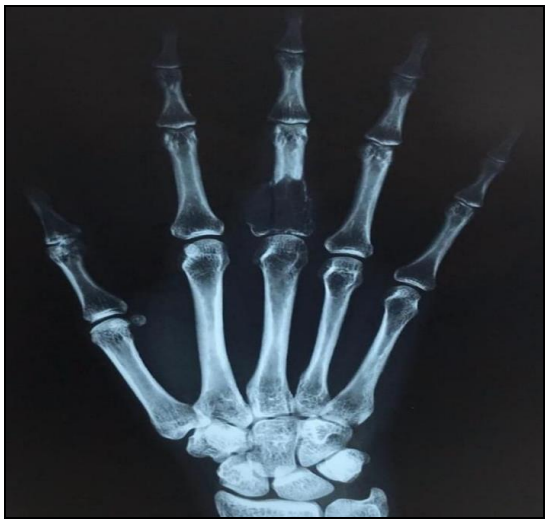

Fig 2: X ray of hand Showing lytic lesion at base of proximal phalanx of 3rd finger

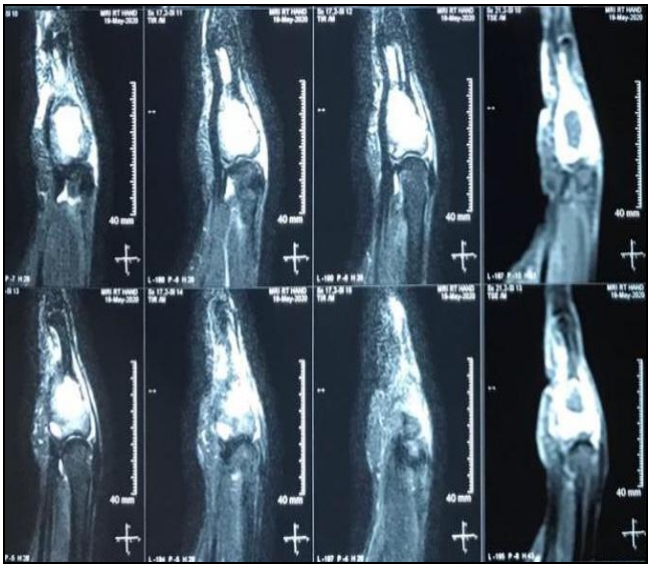

Fig 3: MRI hand = mass lesion in medullary cavity with cortex disruption of proximal phalanx.

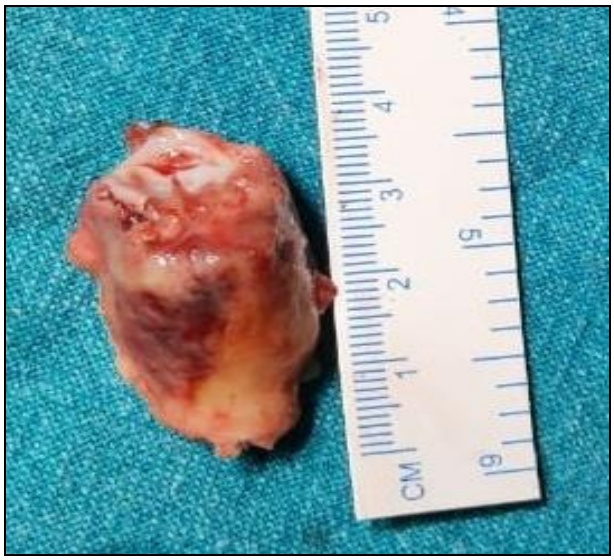

Fig 4: Resected diseased proximal phalanx bone

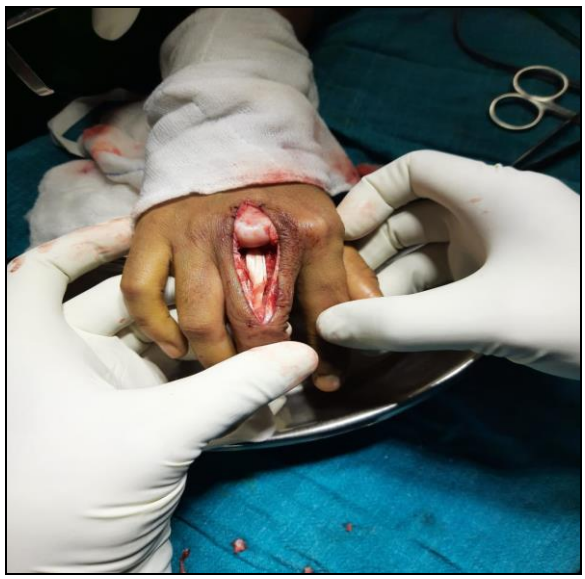

Fig 5: Defect after resection of proximal phalanx

Fig 6: Iliac crest bone graft

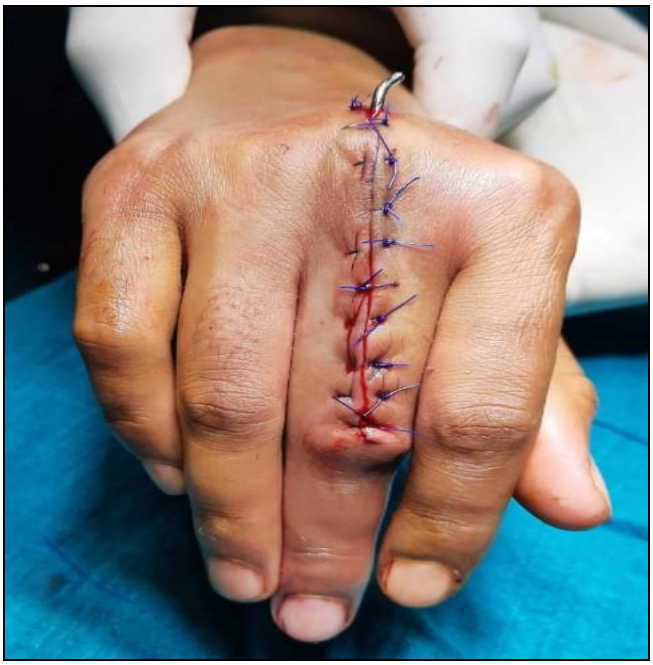

Fig 7: Graft fixed with K wire and closure of wound done.

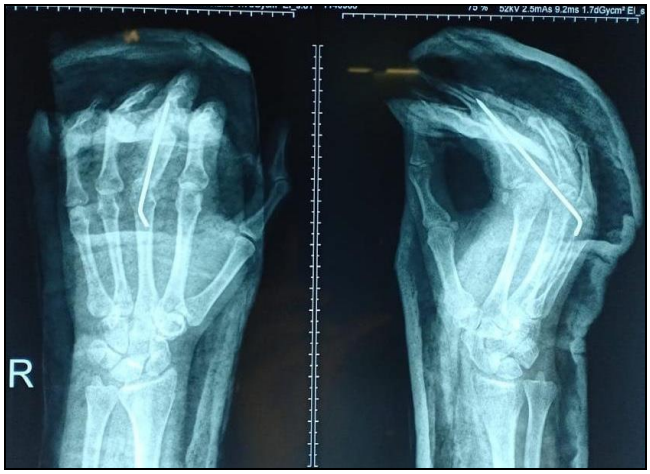

Fig 8: Post-op X ray image

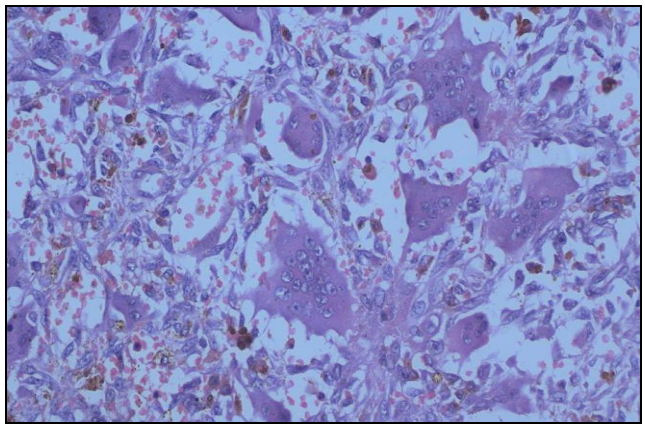

Fig 9: Histological image showing Giant cells surrounded by spindle shaped cells.

Discussion

GCT of hand are highly aggressive and rare lesion than conventional GCT in rest of skeleton [3]. Mostly, the incidence is in younger age group with short duration of symptoms ranging within 6 months and rapid recurrence in hand bone than any other bony location. Primary GCT of hand bones usually differs from usual eccentric location in epiphyseal region of long bone at other sites and were occupying central diaphyseal location, expansile paper-thin cortex, soft tissue extension make simple curettage more difficult and less effective [4]. Enneking first described the staging of GCT bone, followed by Campanacci who detailed radiological classification [5]. Our case was categorised under Grade 3. The highest rate of recurrence is seen in Grade 3 leisons. Grossly, they are brown in colour, solid, with areas of necrosis and haemorrhage, microscopy shows highly vascularised neoplastic tissue and stroma mixed with spindle shaped cells, with osteoclastic multinucleated giant cells variants [6]. Mitotic figures may be seen [7].

Differential diagnosis include aneurysmal bone cyst, brown tumour of hyperparathyroidism, early stages of metastatic lesion and multiple myeloma [8]. Radiologically, they may appear alike with GCT features, but histological examination solves the puzzle in establishing diagnosis.

Surgical procedure for phalangeal tumor can be ray amputation, salvage modalities like intralesional curettage filling with bone graft, excision of involved bone and filling the defect with cement spacer or iliac bone graft or fibular bone graft [9]. Treatment of primary GCT's of phalanges is challenging due to increased recurrence. Patel *et al*. observed that two out of three patients with GCT of phalanges of hand treated with curettage and bone graft had recurrence within one year. Fusion by bone graft done in phalanges GCT had relatable outcomes [10]. When bone graft is used, it is mandatory to wait for healing and has risks with union complication thus not giving immediate stability. The functional entity has to be considered while doing fusion. Double fusion with MCP joint and PIP joint at 45^0 allowing the palm to pulp apposition when making fist. But cosmetically it would be unacceptable though functionally definitively better.

Despite fact that GCT is not malignant, extent of tumor at the time diagnosis and the high recurrence rate following limited resection often dictate the need of en-bloc resection through normal tissues to prevent local recurrence of lesion(4). This will create significant skeletal defect and challenging reconstructive issues.

We have used tricortical iliac crest autograft in this patient. Post- surgery there was decrease in grip strength but satisfactory functional and cosmetically improved hand. This case depicts efficiency of tricortical iliac graft, its consolidation and remodelling according to functional demands. Iliac crest graft has better consolidation with neighbouring bone as it has osteo-inductive, osteo-conductive properties and osteo-productive.

Conclusion

GCT of hand being a rare tumor, highly aggressive and chance of recurrence provokes difficult issue to treat. The diagnosis is based on the clinical, radiological, and histopathological findings with primary treatment being surgical. Resection with reconstruction using iliac crest graft can be considered as alternate modality instead of ray amputation in terms of functionality and cosmesis. Each case should be assessed individually to ensure adequate treatment, aiming to prevent recurrences and functional limitations.

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