Giant cell tumour of Hand-a rare case report

Nihal Gomes, Ashwani K. Mathur, Ayush Berwal

Mahatma Gandhi College and Hospital Jaipur, Rajasthan, India

Correspondence to Nihal Gomes, MS, Department of Orthopedics, Mahatma Gandhi Medical College and Hospital, Jaipur 302022, Rajasthan, India.
Email: nihalgomes@yahoo.com

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Introduction
Giant cell tumours (GCBs) are locally aggressive osteolytic benign tumours characterized by multinucleated giant cells. Recurrence rates are high after curettage and less after resection. However, reconstruction of the middle finger with large bone gaps is difficult.
Case presentation
The author describe the case of a 30-year-old male who presented with massive right-hand swelling and had a wide bone gap after the resection of a giant cell tumor. Of the various treatment modalities of giant cell tumours, the author describe the surgical approach to which the patient has a good functional outcome to where he can pinch and grasp objects. At 12 months postoperatively, there was no evidence of recurrence.
Conclusion
In summary, at 12 months, the author describe an original case report of the Orthopaedics and oncology interest in which the patient had improved strength and range of motion and good joint stability. There were no signs of failure or malunion. Author have described an acceptable alternative to current methods of curettage and reconstruction. The author believe that this method combines the strengths of the other approaches to minimize the risk of tumor recurrence and restore joint function. And hence reporting this case for the purpose of its complexity and good outcome.

Keywords:
giant cell tumor, GCTB, giant cell tumor of bone, review of giant cell tumor

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Introduction

Giant-cell tumor (GCT) of bone is an osteolytic locally aggressive benign tumor characterized by multinucleated giant cells Werner [1]. The tumor is rare, accounting for ~ 5% of primary osseous tumours Dahlin [2]. The osteolysis may cause extensive cortical damage and soft-tissue invasion, occasionally fracturing or eroding bone. As the tumor is typically found near joints, patients often present with pain and limited functionality. Most cases are treated through resection or curettage with local adjuvants Jacobs and Clemency [3]. Intralesional curettage without adjuvants produces recurrence rates between 12 and 65% Balke and colleagues, Blackley and colleagues [4,5]. Studies using curettage with the use of a high-speed burr reported recurrence rates of 15 to 32%, depending on the adjuvant used Klenke and colleagues [6]. However, the recurrence rates after resection are 0 to 5% van der Heijden and colleagues [7]. After resection, reconstruction of the adjacent joint is often required, with a potential loss of function or limited durability if a prosthesis is used. The most common sites of GCTs are the distal aspect of the femur and the proximal aspect of the tibia (52%), the distal aspect of the radius (12%), the sacrum(8%), and the distal aspect of the tibia (5%) Dahlin [2]. Prevalence in the hand bones is extremely rare, reported in only 0.16 to 0.5% of GCT cases Lewis and colleagues, Turcotte [8–10], and there are hardly any reports of surgical treatment in this location. One case report describes intraarticular en bloc resection followed by reconstruction Song and colleagues [11]. Another report describes treatment with curettage and bank bone graft Lewis and colleagues [8]. We describe ray amputation of the third metacarpal of the right hand, which was reconstructed by K-wire fixation after GCT resection. The patient was informed that data concerning the case would be submitted for publication, and he consented.

Case presentation

A 30-year-old right-hand-dominant man visited our hospital with complaints of mild pain and swelling over the right hand for one year. He described the swelling as insidious in onset and progressively increasing in size over the dorsum of the right hand (Fig. 1). And also, slightly extending to the palmar aspect.

Figure 1

Massive Swelling Right Hand.

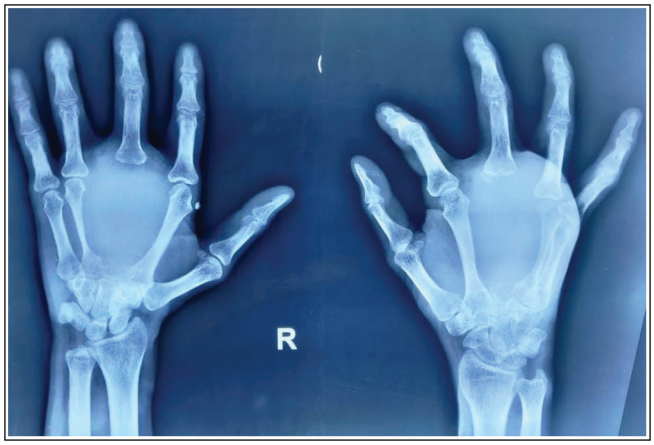
The pain was continuous, dull aching, and agonizing and more over the dorsum side. The medical and family histories were noncontributory. He reported a loss of functionality and decreased range of motion of the right-hand fingers due to the swelling. He had no constitutional symptoms. A physical examination of the right hand showed normal sensation, and complete fist closure was not possible, likely because of massive swelling.

This restriction affected his daily routine activities. No change in skin color was observed, but the skin was shiny, tense, and stretched, and a few dilated veins were present over the dorsum. Tenderness was noted over a palpable mass on the dorsum of the right hand. On palpation, it was a fixed and firm globular swelling that was warm on touch, 7 × 5×6 cm, and moderately tender. Visibly dilated veins were felt. Anteroposterior and oblique radiographs of the right hand reveal a soft tissue swelling with an expansile lytic lesion involving almost the entire third metacarpal except for the proximal end. A pressure erosion on the lateral aspect of the fourth metacarpal bone was observed (Fig. 2).

Magnetic resonance imaging (MRI) showed a well-defined expansile lytic lesion with soft tissue component involving the entire third metacarpal. The lesion reveals heterogeneously hyperintense areas and multiple cystic areas within the lesion. Multiple hypointense areas are seen in T1 and T2, representing hemosiderin deposition. The lesion is also seen causing mass effect and scalloping over the radial aspect of the fourth metacarpal, and the ulnar aspect of the second metacarpal represented a giant cell tumor of the third metacarpal (Fig. 3).

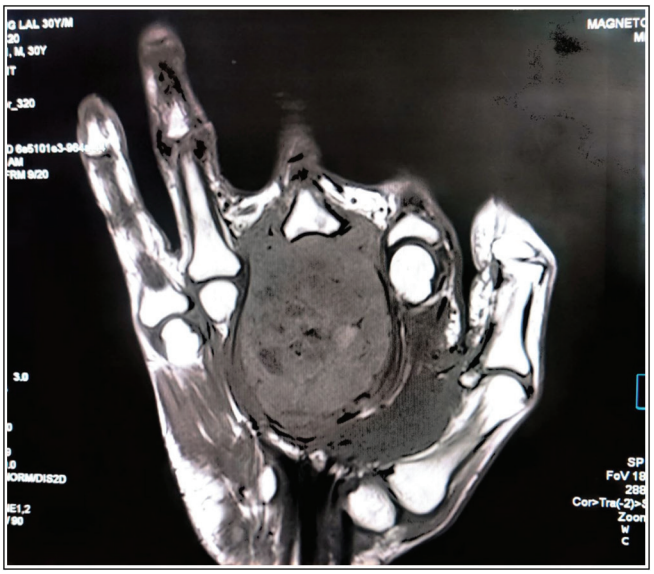
A core-needle biopsy showed no significant findings. Hence, we went ahead to perform an excisional biopsy. Because of the marked destruction and massive soft tissue expansion of the third metacarpal, we believed that intralesional curettage provide less effective local tumor control and have a high chance of recurrence. It

Figure 2



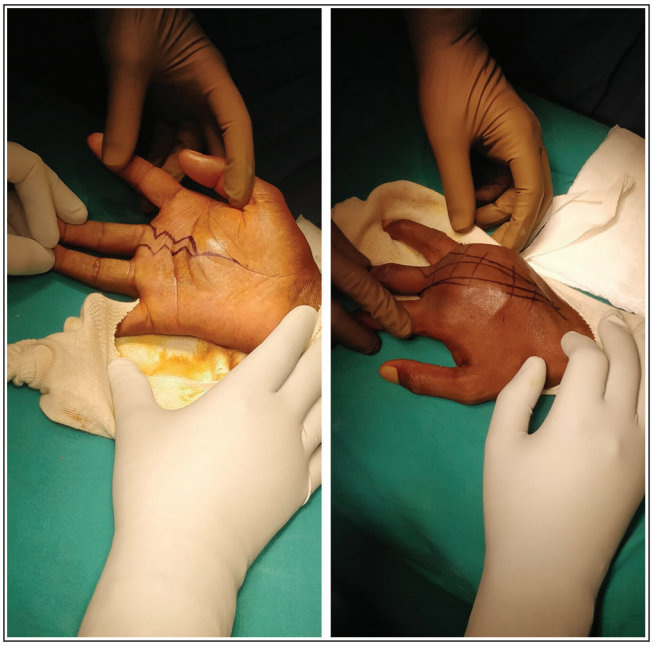
Radiography PreOperative.

Figure 3



MRI Findings show. Well-defined expansile lytic lesion with soft tissue component involving entire third metacarpal. The lesion reveals heterogeneously hyperintense areas and multiple cystic areas within the lesion. Multiple hypointense areas are seen in T1 and T2 representing hemosiderin deposition. The lesion is also seen causing mass effect and scalloping over the radial aspect of the fourth metacarpal and ulnar aspect of the second metacarpal likely represented to be a giant cell tumor of third metacarpal.

Figure 4



Zig Zag Markings Taken For Incision

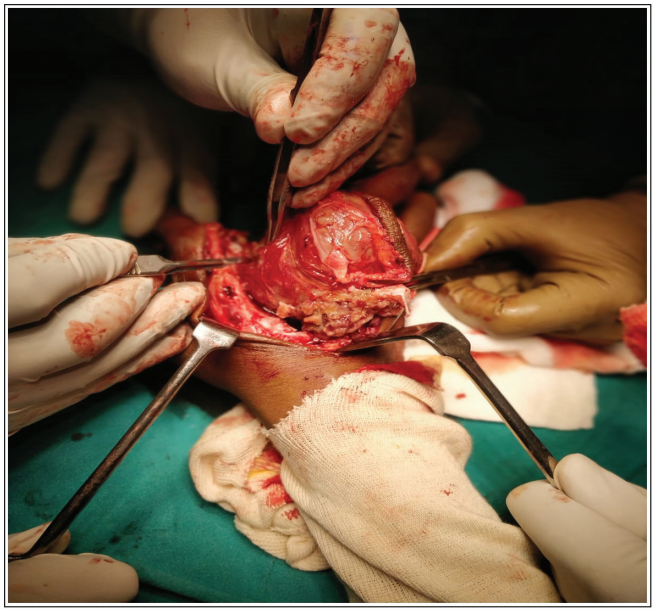
would leave a wide bone gap also, requiring extensive reconstruction. Reconstruction with osteoarticular allograft and internal fixation would cause functionality loss. The decision was made for a radical procedure of a ray amputation of the right middle finger, based on tumor characteristics as it was an extensive tumor with no bony margins.

The right upper limb was prepared and draped in the usual sterile fashion. A tourniquet was inflated to 250 mmHg. A zigzag marking was done so that a well-approximated closure could be obtained after the removal of this massive tumor mass, after which an incision of ~ 5 × 3 cm was performed over the dorsal aspect (Fig. 4).

Multiple small vessels of the tumor were ligated or cauterized. Extensive delicate excision was done to remove the massive tumor (Fig. 5). The entire specimen with the third metacarpal (Fig. 6),

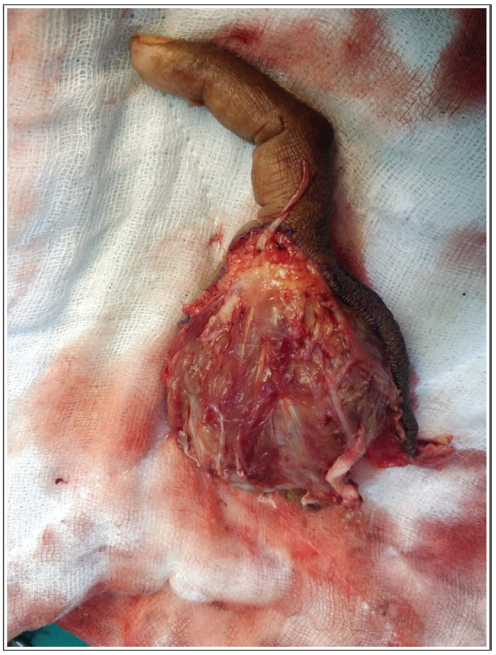
which measured 7 mm anteroposteriorly and 6 mm mediolaterally, was removed and sent to pathology. The tourniquet was released for greater than 30 min, during which time the wound was irrigated and hemostasis was obtained. Now after the removal of the entire tumor, we had a wide bone gap present (Fig. 7), and that needed reconstruction. Reconstruction was performed by pressing the second and fourth metacarpal closely and tightly together, and this was further held in place with the help of three K-wires (Fig. 8) after removal of tumor.

Figure 5



Excision of Tumor Mass.

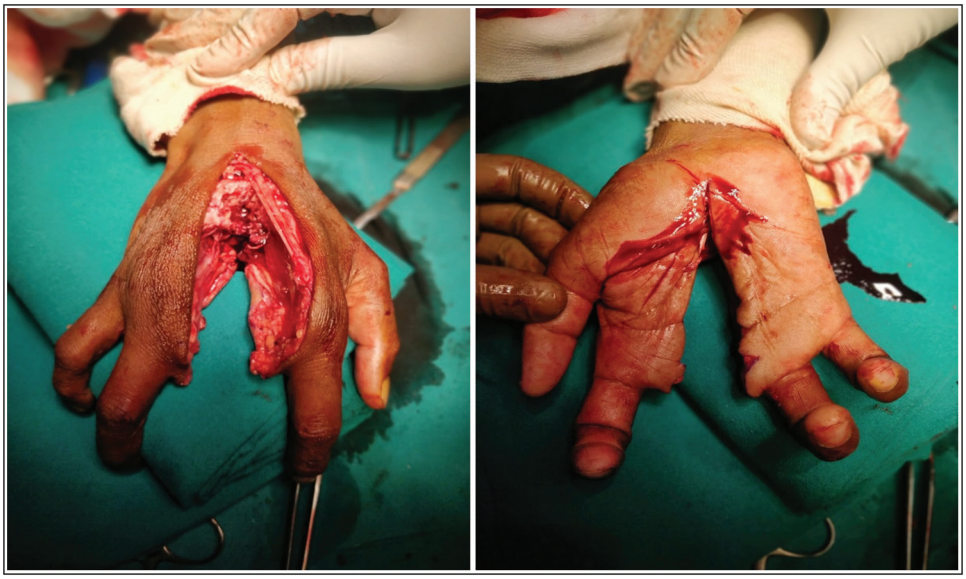
Figure 6



Specimen Sent For Pathology

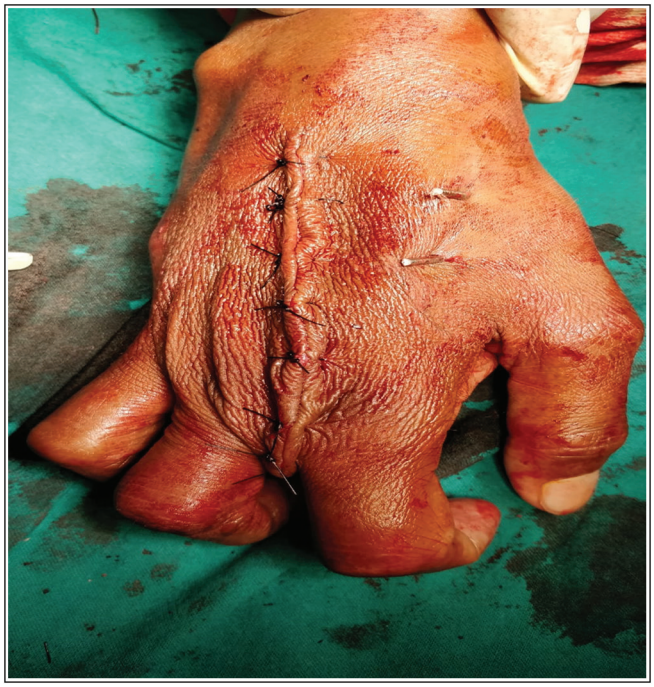
This was considered by the surgical team to be adequate fixation after which posterior splinting was done, which extended from the distal forearm to the right hand. The intraosseous lesion measured 5.1 × 3.5 cm. Histopathological findings confirmed the diagnosis of GCT by the presence of sheets of monomorphic ovoid cells admixed with evenly distributed multinucleated osteoclastic giant cells, mild nuclei atypia with small nucleoli having mitotic activity of 6-8/10 HPF and around 20% necrosis. There was lymph vascular

Figure 7



Wide Bone Gapping Seen On Tumor Removal.

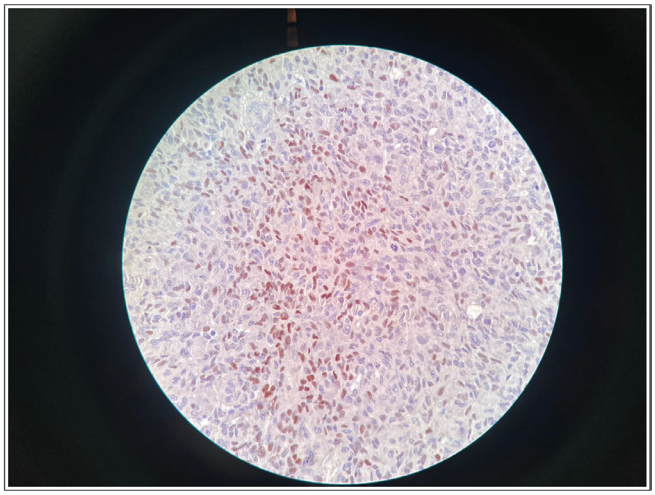
Figure 8



Post Op Closure And Fixation.

invasion with infiltration in soft tissue. Tumor extended into the bone and outer soft tissue. H and E staining observed under 100x and 400x showed negative margins with P53 positive. P53 Is Involved in Cisplatin Resistance in Both Wild-Type (Testicular) and Mutant (Mediastinal) GCT Cell Lines. P53-positive tumors had significantly shorter survival than did those with P53-negative tumors (HR = 1.89, 95% CI, 1.07 to 3.34; $P = 0.03$).

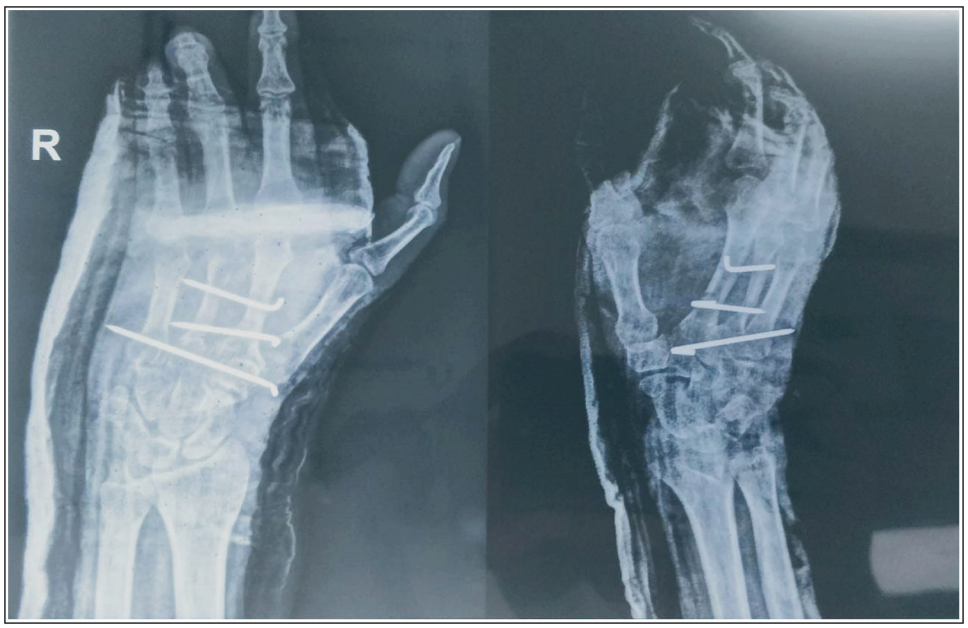
Figure 9



Histopathology Finginds Confirming Gct.

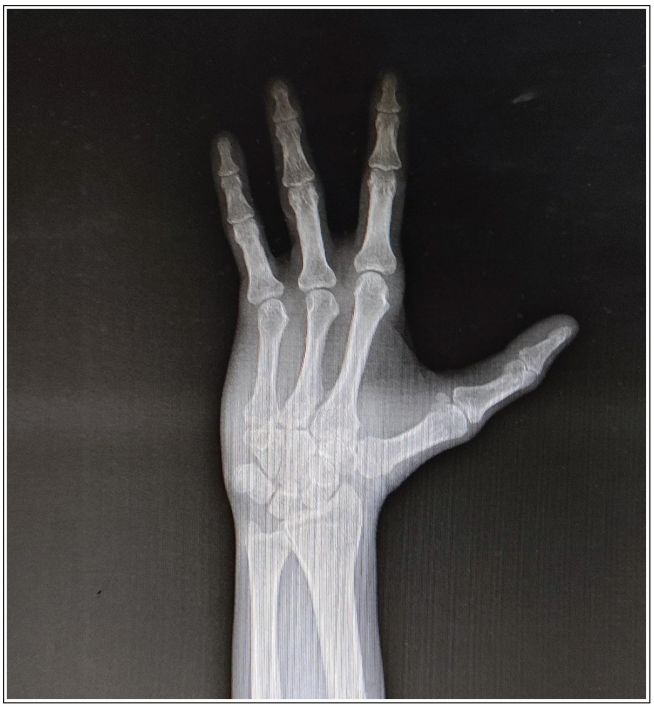
The patient had an uncomplicated recovery and pursued occupational therapy for strengthening and range-of-motion exercises. The patient was regularly followed up in OPD. Twelve months after surgery, the baseline strength had improved (5 of 5) in all hand muscles and wrist range of motion. He was now able to perform complete fist closure and opening, which was not possible before. Physical examination showed a healed incision, no tenderness to palpation, and no joint subluxation. Radiographs at 12 months after surgery showed natural bone growth. Full union was achieved at 12months (Fig. 9) and there was now improved functionality at 12 months with flexion and extension at 0-180 degrees that had only 30 degrees flexion before (Fig. 10).

Figure 10



Immediate PostOperative radiograph

Figure 11



PostOperative radiograph 12 Months Later.

Discussion

We have described a case of ray amputation of the third metacarpal of the right hand along with resection of an aggressive massive rare giant cell tumor mass which is not referred in any journals. GCT of the hand is a rare entity (2-4%) and total destruction of the third metacarpal is even rarer. Excision, fibular graft and metacarpophalangeal arthroplasty techniques are very complex surgeries that have high chances of possible recurrence and require repeated surgeries. Ray amputation is a simple, functional, economical, and recurrence-free option in selected cases. This approach allows maintenance of stability, functionality, and a lower incidence of recurrence compared with intralesional curettage without reconstruction. We found no other reports in the literature of such cases of a massive GCT over the hand region. Surgical techniques involve curettage using high-speed burr and curettage with adjuvants. For the resulting bone defect, reconstruction using bone cement, bone grafts like fibular strut graft, vascular fibular graft, tricortical iliac crest graft and morselized corticocancellous graft may be done. Implants or megaprosthesis are also used.

Conclusions

We have described an acceptable alternative to current methods of curettage and reconstruction. We believe that this method combines the strengths of the other approaches to minimize the risk of tumor recurrence and restore joint function Figs. 11 and 12.

Acknowledgements

Not applicable.

Ethics approval and consent to participate

All approvals obtained.

Consent for publication

All Consents obtained.

Figure 12

PostOperative 12 months Later Clinical Photos

Availability of data and materials
Not applicable.

Authors' contributions
All authors performed equal work in the said case report.

Authors' information not applicable.

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Conflicts of interest
Competing interests-not applicable.

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