Title Case Study: Rare case of giant cell tumor of the hamate bone: case report

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Key words

- Hamate
- Giant cell tumor of bone
- Hand tumor
- Wrist tumor
- Bone grafting
- Tricortical iliac graft

Summary

This case report describes a 58-year-old female patient with a giant cell tumor in the left hamate bone, presenting clinically with pain at the ulnar border, assessed on a visual pain scale (VAS) 8 and functional limitation of flexion-extension (30-30°). The imaging exams showed lytic bone expansion affecting adjacent dorsal tissues. The patient underwent surgical planning for total tumor removal, removing the hamate bone and subsequent reconstruction with a non-vascularized autologous tricortical iliac bone graft, furthermore a carpal metacarpal arthrodesis to the fourth and fifth metacarpals. There was no recurrence after 4 weeks of follow-up, and radiographs of the right wrist demonstrated wound healing and left wrist stability.

Introduction

Giant cell tumors (GCT) are rare, and they represent 5% of primary bone tumors. The most frequent location, focusing on the upper limb, is in the long bones, the distal radius, the metacarpals, and the phalanges, rarely seen in the carpal bones (1-2). Usually, the focal appearance was the main one reported, unlike the multifocal one, being the rarest. Thus, generally demonstrating the low frequency and insufficient evidence of this type of tumor in the hamate bone. Two surgical strategies have been used in the treatment of GCT: resection and curettage of the tumor, plus the application of phenol and subsequent carpometacarpal arthrodesis with autologous bone graft from the iliac crest. In this case report, we describe a woman who arrived at our institution, with an anatomopathological diagnosis of GCT in the left hamate bone, who underwent surgical planning for tumor removal and subsequent reconstruction with a non-vascularized tricortical iliac bone graft. There was no recurrence after four weeks of follow-up, and radiographs of the right wrist demonstrated wound healing and left wrist stability.

Reasons for choosing this case

There are few case reports on the appearance of GCT in the carpal bones, being even rarer in the hamate bone. Of the 25-year-old cases reported in the analysis by Abdusamad et al., the scaphoid, capitate and finally the hamate were the most affected bones. From this study, they described nine cases of GCT in carpal bones, where seven of them presented focal involvement of the carpal bones, being one of them, the hamate bone (3). Our interest in this unique case is to provide important evidence about its clinical presentation and the surgical strategies used.

The historical context of GCT

GCT corresponds to a primary bone neoplasm originating from undifferentiated mesenchymal cells from the bone marrow (4). In particular, the tissue is highly vascularized, with the presence of multicellular proliferation and the appearance of osteoclasts in the stroma. In 1940, histological diagnostic criteria were defined in the giant cell tumor described by Jaffe, Lichtenstein, and Portis. Few cases have been reported in the carpal bones, all of them in the scaphoid. The presentation in the carpal bones is infrequent, even more so in the hamate bone as it appears in this case. Among other characteristics, they highlight the local aggressiveness with high rates of recurrence when it is partially removed (5).

Its appearance occurs in the second to fourth decade of life, with a predilection for females. These patients, genetically, present a cytological alteration with telomeric association and greater expression of p53 (6).

It usually affects the metaphysis and epiphysis of the long bones, proximal humerus, distal radius, metacarpals, and phalanges, rarely seen in carpal bones. Most of these tumors are benign, but 10% tend to malignant transformation and 3% can be malignant, presenting as primary tumors (4).

Difficulties in diagnosis or treatment

As for the diagnosis, before looking for us, the patient went through different professionals and subsequent referral and specialized management. But this meant two manipulations at the tumor site and delay in general management.

Information about treatment and diagnosis

Usually, this type of tumor is diagnosed as a finding of another type of lesion. Clinically, its symptoms are not very specific, such as wrist pain, functional limitation, swelling and pathological fractures (7). Simplex radiography is the first approach to diagnosis, showing itself as an expansive osteolytic lesion without sclerotic edges that can develop in the diaphysis and sub-articular zone. It manifests a marked bone destruction that compromises the local and adjacent soft tissues. There are two surgical strategies for treating GCT: tumor resection and curettage, plus the application of phenol, in some cases, and carpometacarpal arthrodesis with autologous bone graft from the iliac crest. In most cases with a good prognosis, showing local recurrence rates after partial resection (3).

Case presentation

Female patient, 58 years old, with a history of progressive pain in the ulnar border of the left hand and limitation of flexion-extension movements, around 10 months, with an increase in local volume, visible on the back of the wrist at the level of the base of 4th and 5th metacarpals **(Figure 1).**



Fig. 1 Photograph showing the increase in volume over the dorsum of the left wrist

Initially, she was evaluated by an orthopedic doctor who performed imaging tests and indicated a biopsy of the tumor on the back of the wrist, which resulted in villonodular synovitis. Subsequently, he decides to refer to a rheumatologist who indicates a bone biopsy, leaving the result and diagnosis of GCT. Once again, she was referred to an oncologist. Immediately, being directed to a hand surgeon. Imaging tests were performed prior to the consultation, magnetic resonance imaging of the left wrist in T1 and T2 images showed insufflative lytic lesion compromising the entire hamate bone, determining bone deformity, and accentuating cortical thinning with areas of discontinuity / fracture of the same and intense inflammatory process. adjacent rational. In addition, subcortical cysts in carpal bones (Figure 2, 3). With an anatomopathological diagnosis of GCT, she was submitted to surgical planning for tumor removal and subsequent reconstruction with a non-vascularized tricortical iliac bone graft.





Fig. 2 MRI coronal views demonstrating homogeneously intermediate signal mass in the hamate on (A) T1 and (B) T2



Fig. 3 MRI axial views - Two Imagens demonstrating (A) T1. (B) T2

Management and outcome

The planning of this surgery was to make two approaches, considering the size of the tumor and the noble structures in its vicinity. The first approach was a volar approach, where the Guyon's canal is released, the ulnar neurovascular bundle is identified, it is carefully removed and protected **(Figure 4)**. Dissection and separation of the soft tissues around the hamate's hamulus are performed, followed by a wide dorsal approach to the wrist in the previous scar. In this dorsal pathway, bone structures, the tumor hamate and its adjacent bones are identified. This dorsal approach was less difficult because it is the most voluminous part of the tumor, without having important vascular or nervous structures at this level **(Figure 5)**.

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Fig. 4 Dorsal approach to the tumor. Careful dorsal dissection, protecting the extensor tendons for total hamate excision.



Fig. 5 The tumor is dissected through the dorsal approach to the exposed and remove hamate after capsulotomy of the wrist joint.

However, the difficulty of dissecting the entire bone, going from dorsal to volar, was the care not to injure the noble volar structures. Having a completely modified anatomy in this area, it motivated the surgeon to define the limits of the tumor that was going to be removed. From the dorsal incision, he marked the limits by placing Kirschner wires from its blunt end in the direction of dorsal to volar.

Concurrently, the resection of the non-vascularized triangular tricortical bone graft from the iliac was performed. The planned characteristics of the graft were: tricortical graft in a triangular shape, with the objective of maintaining a stable structure of the carpus and for the base of the 4th and 5th metacarpals(8). The bone graft was fixed with two cannulated screws to the capitate, and plates were used to arthrodesis the carpal metacarpal joint of the 4th and 5th fingers **(Figure 6, 7)**.



Fig. 6 (A) Dorsal approach to the tumor. Careful dorsal dissection, protecting the extensor tendons for total hamate excision. (B) Scopy images during the transsurgical procedure

Care received by the patient:

Treatment that was used

Total tumor removal, including complete excision of the hamate bone, adjacent tissue ablation, and reconstruction with a non-vascularized iliac tricortical bone graft, furthermore a carpometacarpal arthrodesis.

Duration of Hospital stay

The patient was discharged postoperatively on day two.

Duration of post-operative treatment

The patient will undergo 6 weeks of immobilization.

Improvements during treatment

There was no recurrence after 4 weeks of follow-up, and the right wrist radiograph demonstrated healing and left wrist stability and there was an improvement in the Flexo-extension function (80-80°) and in the VAS 1.



Fig. 7 Postoperative radiographs in AP and profile of the left-hand showing integrity and fixity of the bone graft fixed to the capitate and the carpometacarpal arthrodesis.

Reasons if treatment was stopped or failed

Treatment has been a success thus far.

Discussion of case

Carpal bone GCTs are rare, both in their focal presentation and in their involvement with other adjacent bones in their multifocal presentation. In the analysis by Abdusamad et al, of the nine cases of GCT in carpal bones published in the last 25 years. Seven cases presented focal involvement of the carpal bone, one of which was the hamate bone. Thus, generally demonstrating the low frequency of this tumor in the hamate bone, demonstrated in this report.

Two surgical strategies have been used in the treatment of GCT: tumor resection and curettage, plus the application of phenol and carpometacarpal arthrodesis with autologous iliac crest bone graft. Strategies that were applied to the surgical planning of this case.

The total removal of the tumor, excision of the hamate bone and ablation of the adjacent tissues, plus the application of a non-vascularized triangular tricortical bone graft, which had satisfactory results, allowing an adequate ROM of the wrist without important limitations or pain referred by the patient, maintaining an improvement in the Flexo-extensor function (80-80°) and a 1 VAS. The 4-week follow-up showed no evidence of local or diffuse recurrence 9-10). This study represents an important scientific contribution in reconstructive surgery of the hand, as evidence in the choice of surgical procedure and technique, as well as a reference regarding satisfactory postoperative results.

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