Learning Point of the Article:
Giant cell tumor of the phalanges is relatively rare; however, it is important to consider, particularly in patients presenting with persistent, localized pain, and swelling and no recent history of trauma as the implications of a delayed or missed diagnosis of giant cell tumor, especially of the thumb distal phalanx can be extremely debilitating.

Abstract

Introduction: The following report describes a rare case of giant cell tumor (GCT) of the bone that presented in the distal phalanx of the thumb. GCT of the bone is a relatively rare, and typically benign condition that presents most frequently in the metaphysis of long bones in women age 30–50 years old. There are only three other instances in the literature describing GCT of the bone presenting in the distal phalanx of the thumb. Although rare, delayed or missed diagnosis can be very debilitating to the patient.

Case Report: A 28-year-old male laborer who is right hand dominant and works with his hands for a living presented to the emergency department (ED) with swelling and pain at the distal aspect of his left thumb with no known injury. The patient was seen 4 weeks previously and was treated for cellulitis of the hand with antibiotics. At that time, no radiographs were taken. Despite this treatment, the patient reported increased swelling and pain over the next 2 weeks. He then sought treatment in the ED where a hand surgeon was consulted and radiographs were obtained that displayed a lytic, disruptive, and mildly expansile lesion of the distal phalanx of the first finger concerning for sarcoma. The risks and benefits of surgery were discussed with the patient and surgical intervention was planned.

Conclusion: Due to how rarely this condition presents clinically, the patient was initially misdiagnosed and definitive treatment was delayed. Although rare, this is an important diagnosis to consider in patients presenting similarly. The patient ultimately received adequate treatment, but the delay in diagnosis in combination with the locally aggressive nature of this tumor could have led to extensive surgical intervention with impairment in hand function. As a laborer whose income relies on daily use of his hands a delayed diagnosis; in this case could have had a catastrophic impact.

Keywords: Giant cell tumor, distal phalanx, thumb distal phalanx, curettage, bone tumor, treatment

Introduction
Giant cell tumor (GCT) of the bone is a relatively rare and usually benign condition. It most commonly presents in females between the ages of 30 and 50 years old and is typically located in the metaphysis of long bones [1]. On the one hand, GCTs are most frequently found in the metacarpals, followed by the phalanges and rarely in the thumb [1,2]. Typical surgical treatment involves curettage and reconstruction when possible with the primary aim of removing the tumor, maintaining or restoring function, and obtaining good cosmetic results [3].

The following is a rare report of GCT of the distal phalanx of the thumb in a 28-year-old male treated with wide excisional biopsy due to its aggressive nature and location. To the best our knowledge, this is only the fourth reported case of GCT presenting in this location.

Case Report
A 28-year-old male laborer who is right hand dominant and works with his hands for a living with a body mass index of 45 kg/m2 presented to the emergency department (ED) with...
swelling and pain at the distal aspect of his left thumb with no known injury. The patient reported that he had been seen by a provider over 4 weeks previously and was treated for cellulitis of the hand with antibiotics. At that time, no radiographs were taken. During the 2 weeks before presenting to the ED, the patient stated that the swelling had gradually increased and that his pain level had increased to 8/10. Radiographs were performed in the ED and the hand surgeon was subsequently consulted (Fig. 1). The radiographs displayed a lytic, disruptive, and mildly expansile lesion of the distal phalanx of the first finger which concerned the consulting physician for sarcoma (Fig. 2). The patient was started on Ibuprofen and Tylenol #4 and seen in the office for evaluation. At this time, it was found that the patient had redness, swelling, and weakness performing left thumb pinch. The patient denied any history of trauma, fever, bruising, decreased range of motion, numbness, tingling, and purulent drainage. His quick dash score at this time was 39. Repeat radiographs were performed and again displayed diffuse bone formation of the distal phalanx of the left thumb concerning for a destructive osteolytic tumor. The option of obtaining an MRI for surgical planning and further assessment of the tumor was discussed with the patient, however given the radiographical findings, the patients uninsured status and his desire for a surgery that would allow him to return to work as quickly as possible, an MRI was not obtained. After discussing treatment options and further workup, an excisional biopsy of the lesion was planned.

Two days later, the patient underwent an excisional biopsy of a 22 mm × 22 mm tumor of the left thumb with a 1–2 mm subcutaneous tissue margin and bone sampling. Pre-operative photographs demonstrate the left thumb mass with erythema and nail deformity (Fig. 3). Intraoperatively, an incision was made along the glabrous versus non-glabrous margin of the distal phalanx along the axis of the left thumb to remain in the appropriate orientation of the incisions. This was done in case the patient required further amputation or resection. The dissection was then carried into the subcutaneous tissue with a fish-mouth design of opening. On approach to the periosteal tissue, it was found that the patient had a large tumor resting within the site that should normally be occupied by the shaft of the distal phalanx. There was complete loss of the cortical surface with a well-contained mass that did not seem to invade into the subcutaneous tissue. The identified tendinous tissue, nail bed tissue, and remaining bone appeared to be otherwise healthy. Using a bone cutter, a portion of the bone was excised out and the skin margin was carefully dissected making an excisional biopsy of the mass. The curette was then taken to carefully clear and scrape questionable appearing tissue which was gathered and sent to pathology. The wound was then thoroughly irrigated, and the fish-mouth flaps were loosely re-approximated with interrupted nylon suture.

The pathology demonstrated features of GCT of the bone including numerous osteoclastic giant cells associated with polygonal stromal cells with areas of spindle cell differentiation and hemorrhage (Fig. 4). The stromal cells showed scattered mitotic figures and mild nuclear atypia; however, they showed no evidence of malignant cytology (Fig. 5). In addition, there were areas of reactive bone formation found within the tumor (Fig. 6). This was confirmed by a tertiary care center. The patient was then evaluated 10 days later in the office and his

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**Figure 1:** Anteroposterior radiograph of the left thumb demonstrating an expansile lytic lesion of the distal phalanx with loss of cortical borders.

**Figure 2:** Lateral radiograph of the left thumb demonstrating an expansile lytic lesion of the distal phalanx with loss of cortical borders.

**Figure 3:** Pre-operative photograph demonstrating left thumb mass with erythema and nail deformity.

**Figure 4:** Hematoxylin and eosin stain at ×10 magnification demonstrating giant cell tumor formation.

**Figure 5:** Hematoxylin and eosin stain at ×40 magnification demonstrating giant cell tumor formation.

**Figure 6:** Hematoxylin and eosin stain at ×10 magnification demonstrating reactive bone formation.
Discussion

GCT accounts for 3–5% of all primary bone tumors and is most commonly found in the metaphysis of long bones of 30–50 years old women. While it is usually benign, it can be locally aggressive and has a tendency to recur when only curettage is performed for treatment. Therefore, it has been well established that wide surgical excision of the lesion is the standard of care in attempts to prevent recurrence [2].

In this specific case, proper care was not initially received as the patient was treated for hand cellulitis for >4 weeks without any imaging of the thumb being completed. While we realize that this is a very rare tumor in an even rarer location, the thumb has an increased importance in comparison to the other digits and this is especially so in a laborer who relies on his hands for his livelihood. In the case of any orthopedic evaluation, an X-ray radiograph is a cost-effective means to aid in potential diagnosis and help with the eventual diagnosis. Therefore, any clinician who has a patient present with isolated pain and swelling in the thumb with no history of trauma should remain clinically suspicious and consider a basic radiographic evaluation.
Conclusion

The locally aggressive nature of GCT in combination with its location in the thumb could have been very costly for this patient or any patient who works with their hands. Having the initial misdiagnosis could have led to the tumor spreading proximally and necessitated the need for a more extensive amputation. This patient ultimately had an amputation just distal to the interphalangeal (IP) joint, which has been associated with good functional outcomes [13]. Any amputation proximal to the IP joint may require more extensive reconstruction such as toe-to-thumb transfer, distraction lengthening, and Web space deepening to prevent significant loss of hand function [13,14]. While we are happy to report that a good outcome was achieved with the patient able to complete hand therapy and have a full return to work, this could have not been the case with the delay in care.

Clinical Message

Although GCT of the phalanges is a relatively rare diagnosis, it is important to consider, particularly in the case of a patient with persistent, localized pain, and swelling with no recent history of trauma. This may be a difficult case to diagnose, but the implications of a delayed or missed diagnosis of GCT, especially of the thumb distal phalanx can be extremely debilitating. It is important that clinicians maintain a high index of clinical suspicion when dealing with similar presentations and have a low threshold for radiological exam.

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Conflict of Interest: Nil
Source of Support: Nil
Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Wren E, Goodwin TM, Brazier BG, Marinas E, Katranji A. A Case Report of Giant Cell Tumor in the Thumb Distal Phalanx. Journal of Orthopaedic Case Reports 2020 November;10(8): 84-87.