Treatment of a pediatric pathological fracture of the proximal phalanx due to enchondroma using plate and screw: a case report

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ABSTRACT

Introduction: The most typical primary bone tumor of the hand is an enchondroma. A pathologic fracture is a common presentation of this benign cartilaginous tumour. It is common for asymptomatic solitary enchondromas to be discovered during regular x-rays. However, in nearly half of the cases, acute pain, swelling, and deformity indicate a pathologic fracture. For symptomatic lesions, surgical therapy with curettage and bone graft is the norm.

Case Presentation: A 15-year-old girl with chief complaint of pain on her right little finger and history of trauma after playing basketball 5 days before admission. At inspection, the fifth finger was painful around the proximal phalanx. The x-rays showed a minimally displaced fracture at the shaft of the proximal phalanx of the 5th finger of the right hand, and lytic lesion occupying the whole middle third of the phalanx. We assessed the patient with pathological fracture suggestive of an enchondroma. A 1-stage surgical treatment was decided: a curettage followed by open reduction internal fixation using miniplate titanium matrix, and bone graft to fill the defect. Postoperative x-rays showed complete healing of the fracture at 4 weeks.

Conclusion: Enchondromas pose the risk of pathological fracture, recurrence, and, to a lesser extent, malign transformation. We describe an option of surgical management which is simple and results in good and excellent short-term results. Successful treatment of these lesions is dependent on the complete removal of the tumour bed followed by stabilization.

Keywords: enchondroma, pathological fracture, internal fixation, miniplate.

INTRODUCTION

Enchondroma is the most prevalent benign intramedullary cartilaginous tumour of the hand bone. It is frequently situated in the proximal metaphysis of the proximal phalanx and originates from cartilage. It often manifests in the first to fourth decades of life, prefers the ulnar-sided tubular bones of the hand, and is most prevalent in the phalanges and metacarpals. In addition, enchondromas with pathological fractures arise because the affected bone has been weakened by the illness. Frequently, these injuries originate from modest trauma that would not normally produce a bone fracture in a healthy individual. Due to the lack of recognizable clinical symptoms, enchondromas are difficult to diagnose and may go unnoticed until patients undergo radiography after a trauma. Because the thin bone shell may be shattered by minimal force, pathologic fracture is a common complication. Clinicians must thus use care while gathering patient histories, conducting physical exams, and interpreting radiographic results.1–3

Here we present the case of a 15-year-old girl with a pathologic fracture of the fifth proximal phalanx and the relevant literature review regarding diagnosis process and appropriate management.

CASE PRESENTATION

A girl of 15 years old who has a history of trauma after playing basketball five days before admission. Her primary complaint is discomfort on her right little finger. She uses her right hand more than her left. There was no previous record of the implicated finger having any kind of functional impairment. Her past medical history did not reveal anything noteworthy. Upon closer examination, it was determined that the fifth finger was uncomfortable to move and that there was a distinct hematoma around the proximal phalanx. Distinct deformity as well as sensory impairment were not present. The x-rays revealed a fracture at the shaft of the proximal phalanx of the fifth finger on the right hand, which was partially displaced. Additionally, we performed

Figure 1. Preoperative x-ray.
Case Report

Radiographic imaging with an anteroposterior view and oblique views, with the x-rays revealed a lytic lesion that occupied the whole middle third of the phalanx (Figure 1). After examining the patient, we determined that they had a pathological fracture that was consistent with an enchondroma. Because of the precise location of this pathologic fracture, a treatment that only requires one stage of surgery was chosen. This treatment consisted of a curettage, which was then followed by open reduction internal fixation using miniplate titanium matrix (Figures 2 and 3), and synthetic bone graft to fill the defect (Figures 4, Figure 5). The procedure was carried out with the patient under general anaesthesia and with the tourniquet in place. According to the findings of the histopathological examination, the mass was composed of bone and cartilage, and it was covered with perichondrium. This provided evidence that our discovery was an enchondroma. Four weeks after the operation, postoperative x-rays revealed that the fracture had completely healed (Figure 6).

Discussion

Enchondroma is the most common kind of hand tumour, accounting for nearly 90% of all cases. They often originate in the proximal phalanx of the fingers. It may be challenging to distinguish distal phalangeal enchondromas from epidermal cysts, glomus tumours, and osteoid osteomas due to their rarity and similarity to these other conditions. Although the clinical features of these lesions might vary, the glomus tumour is characterized by fluctuating levels of pain intensity in response to variations in temperature. When compared to glomus tumours and enchondromas, epidermoid cysts are responsible for a greater degree of deformation to the nail. Both tumours have clinical characteristics that are more aggressive than those of enchondroma, and they typically appear themselves before producing a pathologic fracture. Enchondromas are treated with either conservative routine monitoring or surgical removal by curettage. The
Figure 6. Postoperative at 4-week follow-up showing complete healing at 4 weeks.

need of surgical excision of isolated enchondromas remains debatable. This approach, however, gives a histologic diagnosis, removes clinical symptoms, and maintains the mechanical stability of the bone by reducing the likelihood of pathologic fractures. In this instance, the purpose of surgical therapy is to confirm the histologic diagnosis, prevent malignant degeneration, and limit the risk of deformity and pathologic fracture that may result from the development of tumour tissue. Curettage alone, curettage and autogenous bone grafting, and curettage with artificial bone grafting or cement injection are among surgical therapies for enchondroma. Curettage alone creates voids and weakens the bone, which may increase the likelihood of fracture.7,8

Lesions of the proximal phalanges are approached via dorsolateral or dorso-midline incisions. Lesions of the middle phalanges may be exposed via a dorsal, dorsolateral, or lateral incision. Avoiding injury to the central slip, lateral bands, and neurovascular bundles should be a priority. In the hand, distal phalangeal lesions are the least prevalent. The dorsal approach is not advised at this location due to the risk of injury to the nail apparatus.7,9

The middiagonal approach may be used, but care must be taken to remain sufficiently dorsal to prevent diminished sensation in the fingertip. Subperiosteal elevation reveals the lesion’s underlying brain once the periosteum has been exposed. A cortical window is thus formed. Intralesional curettage is the gold standard of treatment and is performed until the lesion is completely drained using a range of sizes and shapes of curettes. Typically, the consistency of a tumour is spongy and brittle. Curettage that is overly aggressive, especially in lesions with a thin, brittle cortical shell, might cause an iatrogenic fracture or a cortical perforation, and should be avoided. The purpose of curettage is to remove the whole tumour under direct supervision.5,9

Nine patients with pathologic fractures were treated with miniplate fixation, structural iliac crest autograft, and morcellised cancellous bone in a single step by Zheng et al. After a mean of 30 months of follow-up, the investigators did not observe any malalignment, nonunion, infection, or recurrence. Four patients, however, experienced a PIP joint extension lag of up to 10, and two of these individuals needed implant removal and tenolysis.8,10

CONCLUSION

Enchondromas pose the risk of pathological fracture, recurrence and, to a lesser extent, malign transformation. We describe an option of surgical management which is simple and results in good and excellent short-term results. Successful treatment of these lesions is dependent on the complete removal of the tumour bed followed by stabilization.

ETHICS APPROVAL

The author has secured informed consent from patients to publish clinical photographs and medical data in medical and scientific publications while protecting patient anonymity.

CONFLICT OF INTEREST

We declare that there were no conflicts of interest in this study.

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