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Complicated Fracture and Resorption of an Osteochondroma

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Author's contribution

The only author performed the whole research work. Author NKS wrote the first draft of the paper. Author NKS read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aims: To describe two unusual complications of a typical solitary pedunculated femoral osteochondroma that included a distal fracture of the exostosis and a missed fragment following surgical treatment as well as to evaluate the progress of the untreated free fragment at follow-up.
Case Presentation: A 13-year-old boy consulted for a painful bruising of the medial side of the right knee following injury. Radiological survey indicated a pedunculated osteochondroma of the distal femoral metaphysis but there was no evidence of a fracture line. Surgical removal of the lesion was uncomplicated but the post-operative radiographs indicated an osteocartilaginous portion of the osteochondroma missed in the thigh musculature. No further surgical intervention was undertaken. Radiographic follow-up revealed gradual regression and complete resorption of the free fragment 3 years later. No complications have been recorded at the most recent follow-up, 10 years later.
Discussion: Fracture through the base or stalk of a pedunculated osteochondroma is a rare complication but the diagnosis of a distally fractured exostosis has not been previously reported. Regression or resorption of a solitary pedunculated osteochondroma following a fracture is also very rare. Although recurrence of the lesion in the reported patient would be very likely, complete resorption was evident instead within 3 years.
Conclusion: An obscure distal fracture of a penduculated osteochondroma may be suspected in cases that a clinical diagnosis of a fractured exostosis is not associated

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with the radiographic detection of a fracture line through its stalk. Radiographic control during surgery is necessary to ensure complete removal in cases with a clinically, or even radiologically, diagnosed fractured exostosis. Surgical excision of a distally fractured osteochondroma may be avoided, since complete resorption of the distal fragment may be evident in a few years.

Keywords: Osteochondroma; complications; fracture; resorption.

1. INTRODUCTION

Fracture of a solitary pedunculated osteochondroma has been described as a rare complication. Diagnosis is based on the history of an acute traumatic injury, the clinical examination and the radiographic detection of a fracture line through its base or stalk [1].

In addition, regression or resorption has already been reported in a few solitary osteochondromas as a usually spontaneous event [2].

A case complicated by both a distal fracture of a pedunculated osteochondroma and a missed distal fragment following surgical resection is presented and discussed. The review also focused on the fate of the free untreated fragment of the exostosis.

2. CASE PRESENTATION

A 13-year-old boy was evaluated for a 6-hour history of pain and swelling on the medial side of his right distal thigh following a forceful kick received from another child's elbow while playing. His medical history indicated a fracture of the right femoral diaphysis that was treated conservatively and healed uneventfully 6 years ago and a solitary osteochondroma of the distal femoral metaphysis diagnosed 2 years ago (Fig. 1).

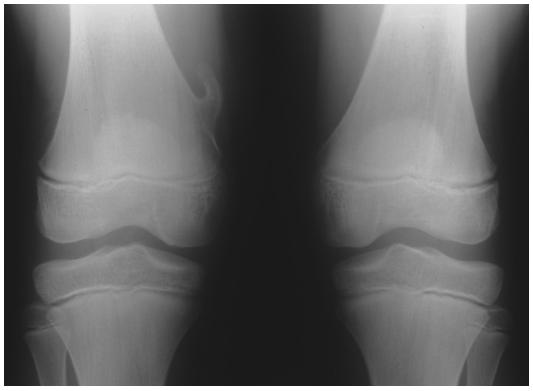

Fig. 1. An 11-year-old boy with a femoral osteochondroma at the time of initial presentation.

The physical examination showed a healthy child with an extensive bruising and tenderness to palpation over the distal and medial aspect of his right thigh. A sensation of crepitus vibrations was also evident on palpation. Knee range of movements was painful and restricted. Neurovascular examination was within normal limits.

Plain radiographs showed a solitary pedunculated osteochondroma of the distal femur that was associated with a large, calcified soft-tissue mass (Fig. 2). There was no radiographic evidence of a fracture line of the base or stalk of the exostosis. Growth of the osteochondroma as well as extensive calcification of the cartilaginous cup was evident comparing the recent with the initial plain radiographic images. Three-dimensional computed tomography (Fig. 3) also indicated no evidence of a fracture line. It displayed continuity between the marrow space of the underlying bone and that of the exostosis as well as no irregular calcification, representing characteristics consistent with a typical osteochondroma. There was no evidence of a bursa formation between the osteochondroma and the surrounding soft tissues.

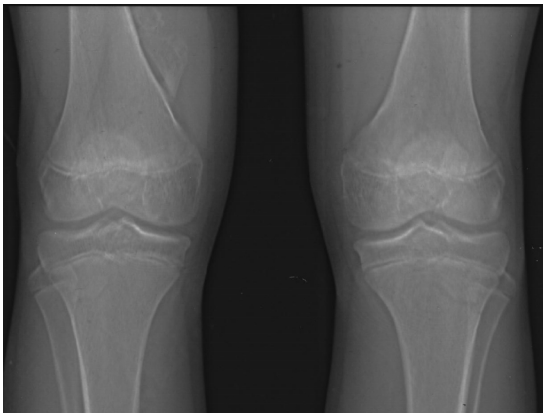

Fig. 2. Anteroposterior radiograph obtained at 13 years of age immediately after the injury

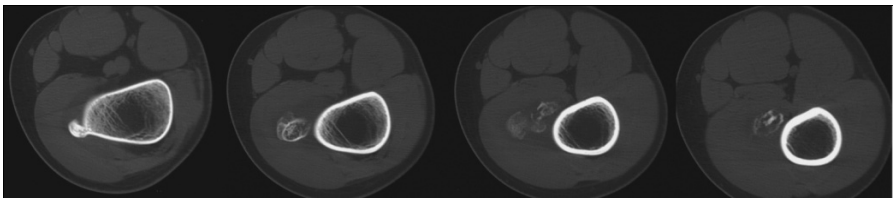

Fig. 3. Axial three-dimensional computed tomography showed continuity of the marrow space into the lesion, no irregular calcification and no evidence of a fracture line

Under general anesthesia excision of the osteochondroma was performed through a medial incision. Surgical excision at its base was uncomplicated. There was no evidence of an overlying bursa. Radiographic control was not performed while the patient was in the operating theatre. Post-operative radiographs indicated a missed portion of the osteocartilaginous cup in the thigh musculature (Fig. 4). It most likely represented the non-radiologically diagnosed distal fragment of the fractured exostosis. Histologic examination revealed typical features of an osteochondroma. No further surgical approach was decided after discussing treatment options with the patient and family. The post-operative period was uneventful and the patient reported complete pain relief and returned to his previous level of activity within 6 weeks. The free fragment was palpable but showed no tenderness to palpation over the lesion. Recommendation was observation with follow-up at 3-month

intervals provided that the lesion would not be associated with any local symptoms and signs. A noticeably smaller lesion was evident clinically and radiographically at 1 year follow-up (Fig. 5). Continued observation with 6-month intervals was arranged after the first year. After a 3-year follow-up clinical examination and radiographs confirmed complete resolution of the lesion. At the most recent follow-up, at age 23 years, there were no abnormal clinical or radiographic findings

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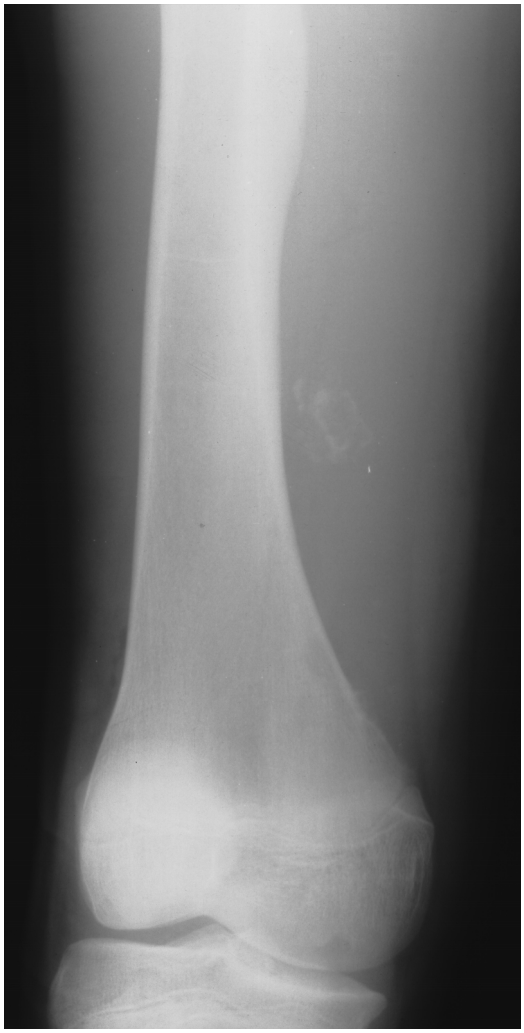

4(a)

4(b)

Fig. 4. Post-operative anteroposterior (a) and lateral (b) radiographs indicated a missed free fragment of the osteochondroma.

Fig. 5. Radiographs at 1 year follow-up.

3. DISCUSSION

Fracture through the base of a solitary pedunculated osteochondroma, in children and adults, is a well-recognized clinical entity, but it is rare and few cases have been reported up to date [3-8]. Fractures are sustained during physical exercise, but may be due to direct injury during contact sports or to an indirect muscle or tendon injury [9].

There is also not sufficient data in the literature to predict which osteochondromas will fracture. Progressive growth of an osteochondroma may be evident before physeal closure but its growth may not be equally long to the total growth of the patient. Continued growth after physeal closure may not be indicative of malignant degeneration but it should be carefully monitored in patients older than 30 years of age associated with a greater than 2 cm thick cartilaginous cup [10]. Growing of the exostosis may lead to a relative weakness of the stalk and to a new relationship with adjacent muscles making it more successible to fracture [6].

Treatment of a fractured osteochondroma may be conservative or operative. Some authors' clinical experience suggests that the majority of fractures through the stalk of a pedunculated osteochondroma will heal uneventfully, although symptomatic fibrous non-union, necessitating surgery, may occur [3,4]. Other authors prefer surgical excision, since recovery and return to normal activities is faster [7,9].

The presented patient was on the waiting list for surgical removal of the osteochondroma because of a recent enlargement of the lesion and for cosmetic reasons. After the traumatic injury early surgical removal of the osteochondroma was decided in an effort to reduce the required recovery period.

In the reported case, pre-operative radiographs indicated a larger lesion than the one detected 2 years ago, in association with an extensively calcified soft tissue mass. However, both radiograps and three-dimensional computed tomography disclosed no evidence of a fracture line, as well as no loss of the continuity of the stalk with the underlying bone cortex.

Two unusual complications were evident in the reported patient, the fracture of the distal portion of the osteochondroma and the escape of the free distal fragment from surgical removal. Differential diagnosis referring to the origin of the free fragment included a post-injury fracture or an iatrogenic fracture during surgery. The former diagnosis seemed more likely because of the history, the clinical findings and the uncomplicated surgical removal. The feeling of crepitus vibrations on palpation were also underestimated, since they were thought to be due to an overlying bursa. Both complications could have been avoided provided that the diagnosis of the radiographically obscure distal fracture would have been suspected because of the history and the clinical findings, while the escape of the free distal fragment from surgical resection would have been avoided if plain radiographs or survey with an image intensifier were used during surgical excision.

Regression or resolution of a solitary osteochondroma has already been reported in the literature. It is more likely to occur before skeletal maturity in the sessile than the pedunculated osteochondromas [2,11-13]. It may be secondary to progressive incorporation of the lesion into the enlarging bony metaphysis [14], to an active process of resorption and metaphyseal remodelling [15], to pressure from a neighbouring pseudoaneurysm [16], and it may also be due to interruption of the blood supply following a fracture of the host bone or of the exostosis [17,18]. The latter is the most likely mechanism for the resorption of the free fragment of the fractured osteochondroma seen in the reported patient.

Review of the related literature indicated that regression of a solitary pedunculated osteochondroma following a fracture of the base or stalk has only been reported once so far. It referred to a ten-year-old boy that was treated conservatively following a fracture of the base of a femoral exostosis. The portion of the lesion that had been distal to the fracture line

was completely resorbed 2 years later [18]. The fate of the missed free distal fragment of the exostosis was also complete resolution in the patient presented in this review.

Finally, recurrence of a resected osteochondroma may result because of inadequate excision of the overlying perichondrium or due to myxomatous cartilage tissue remnants following surgery [19]. In the presented patient, the existence of both tissues in the missed fragment indicated that it would be reasonable to expect that the estimated recurrence risk would be significantly higher. On the contrary, this study indicated that complete resorption of the distal fragment of a fractured exostosis may be evident in a few years time.

4. CONCLUSION

This report indicates that a fractured osteochondroma may be suspected when there are sufficient findings from the history and the clinical examination, even if a fracture line is not radiolographically evident. Radiographic control during surgical excision of a diagnosed or suspected fractured osteochondroma is necessary to ensure complete removal of a fragmented lesion. Surgical excision of a distally fractured osteochondroma may not be needed, since complete resorption of the distal fragment may be evident in a few years.

CONSENT

Written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

The author certifies that he has no commercial associations (such as consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article. The author received no financial support for this study.

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