Pediatric femoral shaft fractures secondary to tombstone uprooting – Two case reports

Malik Ali, Kedar Padhye*, Luke Gauthier

Division of Orthopedic Surgery, Dalhousie University, IWK Health Centre, Halifax, NS, Canada

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ABSTRACT

Case: Two cases are reported of femoral shaft fractures involving tombstones. A four and six year old child had similar histories of uprooting of tombstones during play, toppling them and causing injury. Treatment included non-operative and operative approaches, with both patients yielding bony union at the three month follow up.

Conclusion: We present the involvement of tombstones as a unique mechanism of injury for femoral shaft fractures in two pediatric cases. From our review of the literature, we believe this to be a first report. We hope to highlight the associated safety implications for the primary prevention of a similar traumatic injury.

Introduction

Before the age of walking, up to 80% of femoral fractures may be caused by physical abuse [1–3]. Older children are unlikely to have a femoral shaft fracture secondary to abuse, as their bones are able to tolerate forceful blows and resist torque without fracture. As such, femoral fractures in the oldest children are likely caused by high-energy injuries with motor vehicle accidents [4–6]. Pathologic fractures may occur in patients with concurrent neoplasms and are most often associated with benign bone lesions: [7].

We report two cases of a femoral shaft fracture involving a tombstone; a unique mechanism of injury. Both patients provided informed consent for inclusion and submission.

Case reports

Case 1: A four year old boy was seen playing around tombstones outside of a church. As described by the boy’s mother, he was seen climbing down a tombstone while actively holding the top of the stone. This caused the stone to uplift off the base and cascade on his left leg. Bystanders helped in lifting the stone and attending to the boy initially. Emergency health services were contacted and he was brought to the emergency department for medical attention. The tombstone was reported to weigh 2001 lbs.

Radiographs showed a left mid shaft femur fracture with complete displacement and posterolateral angulation of the distal segment...
He was treated non-operatively with a hip spica for a period of 6 weeks. Bony union was seen at 3 months follow-up with no notable deformity and he had returned to all activities (Fig. 2).

Case 2: A six year old boy was walking with his mom to the cemetery. He casually touched an old granite tombstone which loosened from the base, and descended upon him. A man walking by promptly lifted the stone and described that the boy’s left lower extremity was “buried beneath the stone”. He was brought to the emergency department and radiographs showed a spiral fracture of the left femur with a medially displaced distal segment and varus angulation. (Fig. 3). He underwent surgical intervention with a closed reduction and submuscular plating. Again, bony union was seen at the 3 month follow up with no discernable deformity and the boy resumed activities (Fig. 4).

Discussion

Femoral fractures in the pediatric population can be the result of various mechanisms of injury. While the involvement of physical abuse is mainly observed in children before the age of walking, traumatic fractures in the older patients are generally related to high-energy injuries [1–6]. Neoplastic causes and fractures secondary to genetic conditions, such as osteogenesis imperfecta, have also been described [7]. We comment on a unique mechanism of injury of two femoral shaft fractures involving uprooted tombstones.

Despite the difficulty of both children in recollecting the exact events of the fall, witnesses described child play near the tombstones leading to base uprooting. With such a forceful mechanism, there is a high level of concern for major injuries and as such we have two cases of major proximal long bone fracture. The tombstone may have fallen and injured any other part/limb of the body. There are anecdotal reports of deaths occurring due to this mechanism.

To our knowledge, there is no report of a tombstone fracture injury of the femoral shaft in the literature. However, there have been five reports of tombstone related injuries of the lower limb among different patient series [8–12]. Eberl et al. [8], described the involvement of a tombstone as a mechanism of a complex foot fracture in a seven-year-old girl. Myers et al. [9], reported a falling tombstone as the cause for a tibial fracture in their external fixation treatment cohort. Langenskiöld [10], described a distal tibial fracture secondary to a tombstone leading to premature closure of the distal tibial epiphyseal plate. Rieger and Brug [11], reported one pelvis fracture as a result of a crushing tombstone injury. Lippert et al. [12], described a Salter-Harris III fracture of the distal femur caused by a falling tombstone in their patient series.

Although our patients suffered no serious complications of their injuries, femoral shaft fractures from externally exerted force should always be considered serious with potential for open injury, neurovascular injury, and a close potential relationship to serious injuries to other body systems [13]. We believe our two cases to be the first report of a femoral shaft fracture in the literature resulting from a tombstone uprooting incident. It was interesting to note that the injuries occurred during the summer season and that the associated soil changes may have triggered base loosening.

We report these cases keeping public safety in mind as well as the cost burden on the healthcare system. Additionally, the burden caused from these injuries is completely preventable. We advocate the need for periodic inspections of tombstones for their structural integrity by the appropriate public authorities. Additionally, this may inspire a possible design change of the future tombstone, giving them an inherently stable base.

Fig. 1. Plain radiographs showing a left mid-shaft femur fracture with complete displacement and posterolateral angulation of the distal segment. A) AP view B) Lateral view.
Conclusion

Our case report highlights two femur fractures sustained secondary to the uprooting of tombstones. One patient was treated operatively and one non-operatively with bony union observed at 3 months. We present these cases not only the public safety concerns due to a major injury associated with such a mechanism, but also to consider the preventable cost burden on any healthcare system.

Declaration of competing interest

Dr. Ali, Dr. Padhye and Dr. Gauthier have no conflicts of interest to declare.
Fig. 4. Plain radiographs showing bony union at 3 months follow up for case 2. A) AP view B) Lateral view.

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