

## Missile wounds of the femoral head in children

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Missile trauma in children is uncommon, but its incidence has risen over the past decade primarily owing to the increased availability of guns and the many armed conflicts occurring in various parts of the world.<sup>1,2</sup> Such injuries in children are frequently compounded by damage to the adjacent physis, resulting in complete or partial growth arrest. Treatment of such osseous injury must be directed to preserving both the adjacent articular cartilage and maintaining the integrity of the physis. One of the most difficult anatomical sites to treat for injuries secondary to missile injury in children is the hip joint, as the wound involves soft tissue, articular surface, physis and femoral head and neck.<sup>3-5</sup> Because of this difficulty and the lack of any literature addressing missile wounds of the hip specifically, we

felt that our experience with 2 such children would benefit other surgeons who might have to treat similar injuries.

### Case reports

#### Case 1

An 8-year-old girl was injured in a landmine explosion. Radiographs revealed that shrapnel had passed through the neck and head of the hip joint resulting in a fracture of the neck of femur as well as a shearing fracture of the femoral head (Fig. 1). She was treated with bed rest for a few days and then sent home. Five weeks later she was transferred with a number of other war-injured children to the United Arab Emirates for more definitive treatment. On her arrival at the Shaikh Khalifa Medical Center, 6 weeks

after the injury, the neck of femur had not united and the hip was drifting into varus (Fig. 1). At surgery, nonunion of the femoral neck fracture distal to the physis was confirmed. The fragments of the head were placed into an acceptable position and maintained by 0 Vicryl sutures. Traction was applied to the leg, and an improved neck-shaft angle of about 110° was obtained. Three Kirschner (K) wires were inserted across the neck and physis into the femoral head fragments (Fig. 2), and iliac graft was added to the femoral neck nonunion. A hip spica cast was applied and changed at 1 month and 2 months postoperatively. At the time of writing, the child was doing well with no evidence of head collapse, and the femoral neck was uniting.



FIG. 1. Fracture of the neck and head of the femur in an 8-year-old child struck by a piece of shrapnel.

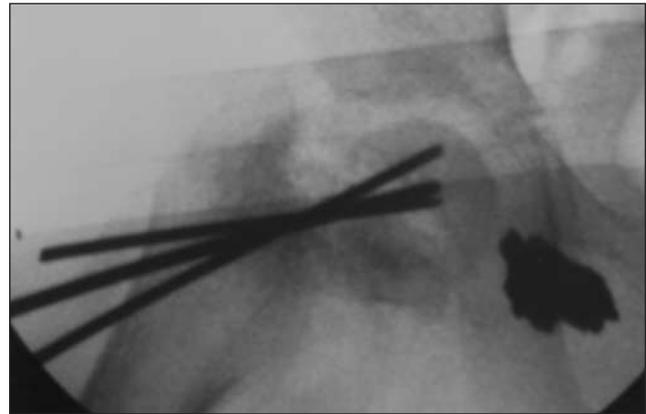


FIG. 2. Postoperative view after open reduction of the fragments of the femoral head and neck maintained with 3 Kirschner wires.

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Accepted for publication Apr. 16, 2004.

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FIG. 3. Radiograph of the right hip of a 4-year-old boy after he had been shot through the buttock, resulting in a comminuted fracture of the femoral head.



FIG. 4. Radiograph after open reduction of the fragments with suturing and use of Tisseel (Baxter Corp.) augmented by 2 Kirschner wires.

### Case 2

A 4-year-old boy sustained a gunshot wound to his right hip with an associated partial sciatic nerve paresis involving the tibial component of the nerve. The femoral head was comminuted with 1 superior lateral fragment displaced (Fig. 3). Two weeks after injury the hip was explored through a posterior incision, and the femoral head was found to be in 3 major fragments. The posterior capsule had been torn open by the missile. The peripheral fragments were aligned with K-wire fixation, and the central fragment was sutured to the others with 0 Vicryl suture facilitated by drill holes in the head and fast-setting Tisseel (Baxter Corp.) (Fig. 4). The articular surface was very congruent, and the fragments were stable with normal movements of the head in all planes. The capsule was closed with 0 Vicryl suture. The sciatic nerve was then explored and a neurolysis performed. The bullet had partially severed the nerve. This was repaired using a sural nerve graft. A hip spica cast was applied after wound closure. The femoral neck healed, and the femoral head fragments maintained their reduction. At 14 months' follow-up, the child was ambulatory with some residual weakness of dorsiflexion of the right foot.

### Discussion

There is little in the orthopedic and surgical literature on missile wounds to the hip in children.<sup>3,5</sup> Our 2 case reports illustrate the difficulties encountered by the surgeon in treating such fractures and ensuring the integrity of the joint structure itself and that of the adjacent physis and articu-

lar cartilage. Ideally, reconstruction of the femoral head fragments should be undertaken within 7–10 days, once the wound is clean, and while the fragments are still mobile. An anterior Smith-Petersen approach to the hip is recommended to avoid the posterior retinacular vessels, but if there is an associated sciatic nerve injury a posterior approach is more practical to facilitate nerve repair, which can be done under the same anesthetic, as was done in our case 2. In this case, the use of Tisseel to reconstruct the burst fragments of the femoral head was an effective method to reconstitute the anatomy. In case 1, although intervention was later — 6 weeks after the injury — and the femoral head was already in a varus position, improvement in the femoral head and femoral neck fracture was still possible. Since initially it is not apparent how much physeal injury has resulted from a missile wound to the hip, the physis should not be violated with use of a screw; smooth K wires should be used to avoid further damage to the growth plate. If the physis has been disrupted, reconstitution in an anatomical configuration with sutures, Tisseel or K wires is recommended to minimize the development of a physeal bar. Because there may be physeal damage from the shock waves of the missile, these children should be followed up for at least 3 years after the injury with anteroposterior and lateral views of the hips every 6 months to detect any growth abnormalities of the proximal femoral physis. In our 2 cases, the initial explorations were helpful in aligning the heads and facilitating union and are recommended for children who have sustained this type of missile injury to

the femoral head. Although it may not change the outcome with regard to avascular necrosis, the congruity and motion of the hip are at least preserved.

Missile wounds of the hip in children, although rare, have the potential for serious hip disability due to injury to the adjacent articular cartilage and physis. Early aggressive surgical exploration of the hip with reconstitution of the head by suture, Tisseel and K wires is recommended to avoid further damage to the physis and maintain the congruity of the growing hip.

**Acknowledgements:** We acknowledge the compassion and generosity of President His Highness Sheikh Zayed Bin Sultan Al Nahyan for funding the medical care of these children in the United Arab Emirates. We are grateful for the facilitation of the transfer of these children to the Shaikh Khalifa Medical Center by Dr. Chris Whately.

**Competing interests:** None declared.

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