Case Report

Traumatic Femoral Neck Fracture in a Child After a Motor Vehicle Accident: A Case Report

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ABSTRACT

Femoral neck fractures in children are extremely rare. They are usually unilateral and the product is of a high-velocity impact. The presence of a femoral neck fracture in a child should prompt the attending physician to look for other serious injuries and continuous monitoring should commence in a high care setting. Early surgery (open reduction and internal fixation) is key to preventing avascular necrosis. We present an 11-year-old, previously well, female who sustained a right hip dislocation and femoral neck fracture after a motor vehicle accident. The patient was stabilized at a nearby peripheral hospital and a closed reduction under sedation was attempted. An x-ray taken after the reduction showed a neck of the femur neck fracture, Delbet 2 and the femoral head was displaced posteriorly. After consultation with the on-call orthopaedic surgeon, the patient was placed in skin traction and referred to our hospital for further management.

On the next available theatre list, the patient was booked for an open reduction and internal fixation. A posterior approach to the hip was taken and the femoral head was reduced. Under fluoroscopy, AP and Lateral correction of the femoral head and neck was achieved. Two cannulated screws were inserted for internal fixation (Figures 5 & 6). The capsule was repaired (as well as the gluteus medius and tensor fascia lata). Blood loss during the operation was minimal. The patient remained in skin traction for six weeks post-operatively.

1. Case Presentation

An 11-year-old female was referred to our orthopaedic unit after sustaining a femoral neck fracture. The patient was previously well and had no known hip disease prior to the accident. She was a passenger in a motor vehicle that was involved in a head-on collision with another motor. EMS services took her to a peripheral hospital, where she was stabilized. Initial x-rays showed a right hip dislocation (posterior) but no appreciable neck of femur fracture. Closed reduction under conscious sedation was attempted. An x-ray taken after the reduction showed a neck of the femur neck fracture, Delbet 2 and the femoral head was dislocated and displaced posteriorly. After consultation with the on-call orthopaedic surgeon, the patient was placed in skin traction and referred to our hospital for further management.

On arrival at our hospital, the patient was reassessed and cleared according to ATLS principles. Appropriate analgesia was given and the patient was sent for x-rays (she was not sent with her x-rays). AP (Figure 1) and Lateral x-rays of her right hip confirmed a neck of femur fracture with the femoral head still displaced posteriorly. She was admitted to the ward for monitoring and to await surgery. A CT scan (Figures 2, 3 & 4) of the hip was done to assist with pre-operative planning.

FIGURE 1: X-ray (AP-view) on arrival.
2. Discussion

Femoral neck fractures following trauma in children are rare. High energy trauma is required and usually include a fall from height, motor vehicle accidents and (but not limited to) pedestrian-vehicle accidents [1-3]. Because of their rarity, femoral neck fractures are not often searched for during the initial x-ray survey and can cause a possible delay in diagnosis [2]. The child-to-adult femoral neck fracture ratio has been reported to be 1/130 [4]. The most common cited complications include avascular necrosis (AVN) of the femoral head and neck, coxa vara, non-union, delayed-union, premature physeal arrest and infection [5]. Various theories have been postulated as to the difference in pediatric femoral neck fractures when compared to the adult population. The two main differentiating factors are anatomic variations. Firstly, pediatric femoral bone, excluding the physis, is exceptionally strong. Therefore, a significant amount of force is needed to fracture it [5].

The second differentiating factor has to do with the blood supply around the pediatric femoral head. The blood supply to the adult hip is via intraosseous blood vessels. In children, the blood vessels cannot cross the open physis [5]. If the blood supply is however disrupted, this often leads to devastating AVN of that hip. AVN of the femoral head is the most common complication and microscopic changes, in the form of necrosis, can be visible within the first twelve months after injury [6]. AVN, and eventual femoral head collapse, is often unavoidable and its management does very little to change or alter the natural history of this sequelae [7]. Ulukan et al. revealed that AVN has the largest negative impact on femoral neck fractures. Their study showed that 91% of the patients with an unsatisfactory outcome had AVN of the affected hip [5].

Several factors have been identified as key role players in the development of AVN of the femoral head and neck. Moon et al. reported patient age and fracture type to be the two most important [8]. Age below eight years was considered a better prognosis, with the risk of AVN increasing 1.14 times for each year thereafter. Various figures have been quoted when it comes to the risk and rate of AVN in cervicotrochanteric, transcervical, transepiphysial and intertrochanteric fractures. The risk of AVN is 15, six and four times higher in transepiphysial, transcervical and cervicotrochanteric as compared to intertrochanteric fractures [8]. Transcervical fractures have the highest rate of AVN (43%), followed by cervicotrochanteric (14%) [8].

Currently, no absolute management plan exists. The American Academy of Orthopaedic Surgeons (AAOS) has not yet published Appropriate Use Criteria for this. The management of traumatic neck of femur fractures remains a challenge. Timing to surgery remains controversial. In the
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adult population, early reduction and fixation of fractures have been proven to improve the outcome and reduce complications. A systematic review by Yeranosian et al. of 935 children reported that the rate of AVN was 4.2 times higher in patient with delayed treatment compared to those within 24 hours [9]. The nature of the fracture type and the surgeon’s ability will ultimately determine whether the procedure will be an open reduction and internal fixation or a closed reduction and percutaneous pinning. Anatomical reduction (or as close as possible to it) should be the aim. Evidence comparing the incidence of AVN in open vs. closed procedures are still lacking [3]. Both open and closed procedures have their benefits and drawbacks and should be considered on a case-by-case basis. If an open procedure is needed, access to the hip joint can be obtained via an anterior approach (Smith-Peterson), anterolateral approach (Watson-Jones) or lateral approach (Hardinge). Capsular decompression remains controversial, with little evidence providing any form of support. The capsular hematoma can be drained with a large bore needle after closed reduction or during an open procedure and capsulotomy. Theoretically, this should reduce the incidence of osteonecrosis, but has not been backed by statistically significant evidence [9].

The ultimate goal of surgery in a pediatric neck of femur fracture is to provide good stability, allow for a pain-free range of movement and cause as little growth retardation as possible.

REFERENCES


