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Case Report

Traumatic Hip Dislocation with a Transphyseal fracture: A Case Report

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Abstract

Introduction: Traumatic hip dislocations are very uncommon in children. A unique combination of injuries consisting of a traumatic hip dislocation in combination with an ipsilateral transphyseal fracture of the femoral head is presented in a 12-year-old child who was involved in a motor vehicle accident. It was unclear as to whether these injuries occurred simultaneously during this single traumatic event, or if the dislocation occurred at the time of the accident and the transphyseal injury occurred during closed reduction. The emergent open surgical management, short term follow up, and the factors which affect the prognosis of this patient are all discussed.

Case presentation: A 12-year-old girl was an unrestrained backseat passenger in a motorcar, involved in a head on collision. Severe right hip pain as well as an inability to weight bear was her major complaints. She presented initially to another health facility and was subsequently transferred to our institution some nine hours post injury for definitive care.

On examination, her lower limb was flexed, adducted, and internally rotated at the hip. There were no distal neurovascular deficits. A posterior hip dislocation was diagnosed clinically as well as radiologically at a peripheral institution prior to transfer. The sole X-ray however was a very poor quality anteroposterior view. After transfer, immediate closed reduction under conscious sedation was performed in the emergency room. Post manipulation films revealed a persistent hip dislocation and an associated transphyseal fracture. Emergent open reduction and internal fixation was subsequently performed. She had intermittent pain and stiffness in the right hip when she last presented to our clinic 6 months post-surgery.

Conclusion: Obtaining appropriate pre-manipulation films prior to a hip reduction attempt is always ideal to rule out associated fractures. If missed, an undisplaced fracture may become displaced and cause considerable subsequent morbidity. Also, one would not be able to determine whether or not the fracture was caused by the manipulation.

Keywords: *Hip Dislocation; Transphyseal; Traumatic*

Abbreviations

AVN: Avascular Necrosis

Introduction

Traumatic hip dislocation in children is a rare injury [1-7]. The annual incidence has been calculated at 0.75 cases per 940,000 in children below 14 years of age [2]. Complications following traumatic hip dislocation are also rare [5], however when they do occur, they are life altering events [3]. A case of a transphyseal fracture of the femoral head in combination with a posterior hip dislocation is discussed. Due to poor quality pre-manipulation X-rays, it was unclear as to whether or not the associated transphyseal fracture was as a result of the initial trauma during the head on collision or during the manipulation.

Post dislocation, careful urgent reduction is necessary to avoid subsequent severe morbidity. Additionally, when a traumatic displaced transphyseal fracture of the femoral head occurs, a careful emergent closed manipulation guided by appropriate X-ray views is mandatory. Emergent surgical management is required if closed manipulation fails, in order to minimize this superimposed morbidity. The goal of treatment is to achieve a congruent, stable hip joint in a timely manner in order to minimize the risk of avascular necrosis.

Case Report

A 12-year-old girl, who was an unrestrained backseat passenger in a motorcar, was involved in a head on collision. Her complaints were severe right hip and knee pain as well as an inability to weight bear. She presented initially to another health facility and was subsequently transferred to our institution some nine hours post injury for definitive care.

Examination saw a distressed child with normal vital signs. Her mucous membranes were pink. There was a 4cm sutured laceration over her right knee. Her lower limb was flexed, adducted, and internally rotated at the hip. There were no distal neurovascular deficits. An anteroposterior view of the pelvis confirmed a right posterior hip dislocation as the only apparent injury.

Emergent closed reduction using conscious sedation was attempted despite poor quality radiographs because at that time, the injury was 9 hours old and there were also challenges in the X-ray department resulting in timely repeat radiographs being unavailable. Post manipulation, the limb remained shortened, and there was pain during range of motion. Post manipulation radiographs obtained 4 hours post procedure, revealed a transphyseal fracture separation (Figure 1).

Figure 1

Emergent surgery was performed via a posterior approach 14 hours post injury. Intraoperative findings included an intact sciatic nerve, and a contused but otherwise grossly normal articular surface of the femoral head. The epiphysis was reduced onto the metaphysis and two 4mm smooth pins were passed percutaneously to maintain the reduction (Figure 2). The hip was then reduced. Her immediate post-operative period was uneventful and ambulation was commenced via non-weight bearing with crutches on day four. This was maintained for three months following which partial weight bearing was allowed. The pins were removed at eight weeks.

Figure 2

Six months post-surgery; she began to complain of pain and stiffness in the right hip. Examination findings of the right hip at that time revealed a twenty-degree flexion contracture and very limited active range of motion. For passive range of motion, there was ten degrees of abduction and external rotation, five degrees of adduction and zero degrees of internal rotation. Radiographs were normal. An MRI was not available due to financial constraints. She subsequently defaulted from clinic.

Discussion

Traumatic hip dislocations occur in all ages, but are uncommon especially in children. It is 25 times less common in children than adults [5]. It is said that no one orthopaedist will see enough cases to become an authority on this subject [4, 5]. On review of the literature, the evidence is collected either from isolated case reports or case series [6]. Vialle., *et al*. [1] in a large series reported on 35 cases over a 22-year period from three major paediatric trauma centres.

Complications in children consequent to this injury include avascular necrosis (AVN) of the femoral head, myositis ossificans, post traumatic osteoarthritis, coxa magna, premature physeal fusion, sciatic nerve injury and recurrent hip instability [6,7].

Hip dislocations occur predominantly in boys probably due to their high traumatic morbidity [8,9]. Most reported cases in the literature of traumatic hip dislocations are posteriorly directed following a low energy mechanism of injury [6].

Hip dislocations may occur in children under age five after trivial traumas since their acetabulum is made up of soft pliable cartilage and have generalized ligament laxity. In older children, dislocations require significant trauma as their ligaments are stiffer and their acetabulum is bony [9,10]. This was the situation with the index case whose posterior dislocation was caused by a motor vehicle accident.

The hip joint is second only to the shoulder joint in terms of the extent of its range of motion, but it is also able to bear body weight. The narrow femoral neck allows for increased range of motion in flexion, extension and circumduction as its shape permits minimal impingement on the acetabulum during extremes of motion.

The spherical femoral head fits snugly in the deep socket of the acetabulum. This is further deepened by the fibrocartilaginous acetabulum labrum. Joint fluid within the socket provides a suction effect. A strong fibrous capsule further confines the hip joint and the muscles

that span the joint provides extrinsic stability. These factors account for the inherent stability of the hip joint and hence a significant force is required in older children to overcome these anatomic restraints [1,4,5,8,10].

Pure dislocations are more likely in younger children because of the plasticity of their hip joint [9]. There are also fewer associated injuries [7]. As in the adult, posterior dislocation occurs in 90% of cases of traumatic dislocation [2,11]. Although the capsuloligamentous strength of the paediatric hip and the short femoral neck protect the normal joint against dislocation, Down's syndrome and other conditions associated with ligament laxity will increase the risk of dislocation in these patients. Recurrent dislocation may occur if the capsule is ruptured by significant trauma [8].

Increasing age of the patient is directly related to the severity of the injury because of the aforementioned anatomic factors [1,4,8-10]. Due to the lower energy aetiology, younger patients generally have better prognosis [12,13].

Funk [4] found that all his patients two to five years had easy closed reductions and all did well. The group aged six to ten years had more severe injuries and complications were more common. The index case sustained a high energy injury and at 12 years old would be at greater risk of developing complications such as avascular necrosis (AVN).

The time interval between injury and successful reduction also affects prognosis. Most patients may be successfully managed by prompt closed reduction via sedation or general anaesthetic [6,7]. Funk [4] found that when reduction was delayed more than 24 hours, permanent changes are expected except in very young children.

Schlonsky and Miller's [5] study, noted that a low incidence of complications may be due to the majority of his patients having successful reduction within six hours of injury. Mehlman., *et al*. [3] observed that the risk of AVN is increased 20 times if the delay is greater than six hours. It is felt that delay in reduction; unsuccessful closed reduction and recurrent dislocation are reasons for a worse prognosis [12]. Delay in reduction may be caused by an initial lack of recognition or a poor general condition of the patient as in polytrauma [13]. The index case had an unsuccessful closed reduction, with an associated transphyseal (type 1) separation necessitating an open reduction greater than six hours post injury, all of which increases her risk for AVN.

Traumatic fracture separation of the capital femoral epiphysis with hip dislocation is very rare [14]. Transphyseal (type 1) separation with or without dislocation of femoral head is the rarest hip fracture in children affecting about ten percent of all hip fractures [15]. Type 1 fractures are usually the result of severe trauma and are associated with high complication rates which include AVN, premature closure of the physis and non-union [15,16]. Physeal instability without displacement occurs at the time of injury and plain radiographs might suggest a simple dislocation [17]. When reducing an apparent isolated hip dislocation, an occult transphyseal injury must always be considered as there is a 100% risk of AVN if it becomes displaced [18]. This may have occurred in the index case. When unrecognised, this places the femoral head at significant risk during manipulation and as such, extreme caution is advised when reducing adolescent patients [17]. High quality multiplanar radiographs or real time fluoroscopic examination showing the femoral head may have aided in identifying a subtle physeal injury prior to manipulation [19]. The manipulation in the index case was performed on the basis of a single poor quality anteroposterior view of the pelvis in addition to the clinical findings. If an associated physeal injury is noted on radiographic examination, gentle closed reduction followed by fixation of the femoral head with a smooth pin has been advocated, and if this fails, then open reduction is performed [20].

Immediate primary open reduction and pinning has also been proposed in order to avoid a traumatic separation [19]. The interval to full weight bearing remains controversial [9]. Funk [4] believed that weight bearing should be prohibited for a minimum of one month to prevent AVN, however, Schlonsky and Miller [5] and Thompson and Epstein [13] stated that there was no evidence that the time when weight bearing commenced in any given type of dislocation affected outcome. If the symptoms of synovial irritation recur after resump-

tion of weight bearing, the patient should return to non-weight bearing status [12]. Skin traction for two to eight weeks has been suggested for dislocations plus or minus associated injuries for children greater than five years old. Taking into account the associated fracture, there are advocates for six weeks in a hip spica post fixation in order to prevent early weight bearing in a paediatric population which is often unreliable. The index case was not immobilised and protected weight bearing was relied upon to protect the fixation.

It is important to follow these children until skeletal maturity is attained because complications may become symptomatic several years post injury [6]. The index case has likely developed AVN and further imaging is ideal in her management in order to plan for future surgical intervention.

The surgeon is in control of recognition of the primary and associated injuries. Urgent reduction is essential. It is essential however, to ensure adequate imaging in children with dislocated hips in order to rule out a concomitant physeal injury. Most complications associated with hip dislocation occur at the time of the injury in the form of cartilage and soft tissue damage. The patients' age, high energy mechanism of injury, the presence of transphyseal injury and delay in reduction greater than six hours all lead to adverse outcomes in terms of AVN with subsequent collapse of the head and secondary arthritis.

Conflict of Interest

There is no conflict of interest.

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