

**CASE REPORT**

# Open Anterior Hip Dislocation in A Child: A Rare Mechanism of Injury

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*Research performed at Arad Hospital, Tehran, Iran**Received: 24 August 2015**Accepted: 16 November 2016***Abstract**

Traumatic anterior dislocation of the hip is an extremely rare condition in children and open dislocation is even rarer. This is usually caused by high-energy trauma. In the current study, we present a case of an eight-year-old child suffering from an open anterior–inferior dislocation of the right hip concomitant with pelvic ring disruption and an ipsilateral open distal femoral fracture (Salter-Harris type 4, Gustilo type IIIA) caused by a traffic accident. The patient underwent successful emergent open reduction due to the buttonholed femoral head after appropriate irrigation and debridement. Successful recovery was achieved and the patient was discharged after two weeks. After nine months of follow-up, the X-ray images showed slight changes related to the osteonecrosis of the femoral head. Long-term follow-up over a period of six years showed sufficient range of motion. The patient's gait was normal and he was satisfied with the outcome. In addition, slight non-progressive osteonecrotic changes were obvious in the right hip.

**Keywords:** Dislocation, Hip, Open fracture**Introduction**

Traumatic hip dislocation presents a rare injury in children; studies report an incidence rate of 0.6% to 11.1% during childhood (1). Anterior dislocation is encountered less often (7.5%–17.8%); in addition, open dislocation is very rare (2, 3). To our knowledge, only 6 cases of traumatic open anterior hip dislocations have been reported in the literature (4–8). We present a case of traumatic open anterior dislocation of the hip associated with an ipsilateral distal femoral fracture and concomitant unstable pelvic ring fracture in an eight-year-old boy.

**Case presentation**

An eight-year-old boy was brought to the emergency department of a level I trauma hospital 12 hours after a traffic accident. The patient was in shock and in a drowsy state with an exposed, apparently visible femoral head in the inguinal region [Figure 1]. The primary trauma assessment revealed no associated visceral injury. The examination showed an abducted, flexed, and externally rotated right hip; the knee was flexed and deformed. Although the neurological status of both extremities



Figure 1. The patient was in shock and the femoral head was exposed in the inguinal region.

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Figures 2; 3. CT scanning revealed the anterior-inferior dislocation of the right hip concomitant with pelvic ring disruption.



Figures 4; 5. The anteroposterior and lateral knee X-ray showed a distal femoral fracture of the ipsilateral side.

was intact, the distal pulses of the right lower limb were undetectable. The secondary survey, radiographs, CT scan, and magnetic resonance imaging revealed anterior-inferior dislocation of the right hip [Figures 2; 3] concomitant with the pelvic ring disruption and an ipsilateral open distal femoral fracture (Salter-Harris type 4, Gustilo type IIIA) [Figure 4; 5].

The soft-tissue injuries included an 8-cm transverse laceration in the groin region just lateral to the scrotum and a 3-cm oblique wound just above the lateral epicondyle of the right femur; there were multiple small lacerations over the face, trunk, and

other extremities.

Surgical incision was done to incorporate the traumatic wound and the hip joint was approached anteriorly. After reaching the joint, the traumatic antero-inferior capsulotomy (about 3.5 cm) was extended superiorly to release the femoral neck and reduced afterward. The hip joint was stable after reduction and, after a while, the distal pulses were palpable symmetrically. The capsulotomy was repaired over a drain and the wounds were primarily closed.

The following reduction of the right open distal femoral fracture and unilateral upper tibial skeletal traction was



Figure 6. A photograph showing the normal range of hip motion after six years.

applied. Broad-spectrum antibiotics that had been started upon the patient's arrival were continued for seven days after the surgery. One day after the surgery, the right sacral fracture and the sacroiliac joint disruption were fixed by a percutaneous procedure with two cannulated screws. During the first three post-operative days, the patient developed a low-grade fever, without any primary source of infection, which quickly improved. After the second post-operative week, the skeletal traction was removed and immobilization with a spica cast was continued for four weeks. The patient was discharged two weeks after the surgery.

After the sixth post-operative week, the cast was removed and the rehabilitation begun. As the patient's strength gradually returned and better control was achieved in the limb, weight-bearing was increasingly permitted. Full weight-bearing was achieved by the sixth week.

Follow-up was continued in three-month intervals



Figures 7; 8. A plain radiography of the pelvis and right knee six years after surgery.

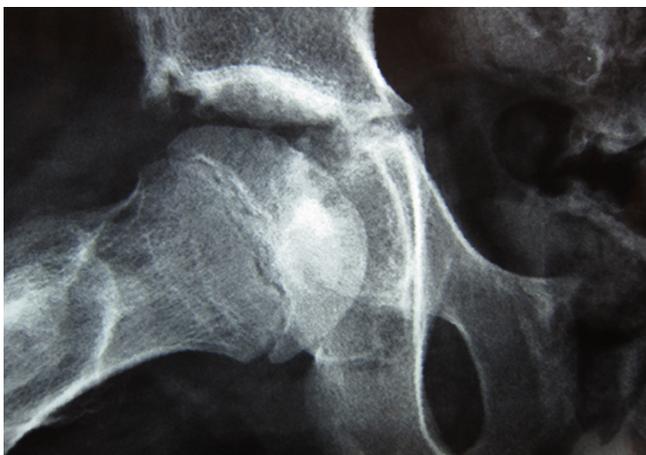


Figure 9. The X-ray shows that after six years, the spherical shape of the femoral head has been preserved.

during the first year, six-month intervals during the second year, and then yearly. At the nine-month follow-up, the X-ray images showed slight changes related to the osteonecrosis of the femoral head. These changes were non-progressive in the further follow-up. In the follow-up done after six years, the range of motion and gait was clinically normal [Figure 6]; the patient was satisfied and had no complaints despite the slightly non-progressive osteonecrotic changes in the right hip [Figures 7-9].

### Discussion

Traumatic hip dislocation in children is rare, constituting less than 5% of pediatric dislocations (9). The injury patterns tend to vary: Children under six years of age commonly suffer from isolated hip dislocation caused by low-energy trauma. The reduction is usually easy and accompanying injuries are rare, whereas in older children, traumatic hip dislocation approaches the

adult pattern, where high-energy mechanisms are required to dislocate the hip. In adults, reduction is not as easy as in the young, the incidence of accompanying injuries is higher, and complications are more frequent. It is hypothesized that joint laxity, a shallow and flexible acetabulum, and a slight coxa valgum may predispose children under six years of age to experience isolated dislocation after a relatively trivial trauma (10).

Most hip dislocations in children are posterior, like in adults. The anterior hip joint dislocations are rare, comprising only 2%–11% of traumatic hip dislocations (11). Due to the deep placement, bulky muscle, and soft-tissue coverage of the hip joint, open anterior dislocation remains extremely rare. To date, only five such cases have been reported in children and only one case has been reported in an adolescent (4–8, 11). To our knowledge, this is the first case of an open anterior hip joint dislocation associated with the ipsilateral femoral fracture in a child.

The most conceivable theory for the mechanism of injury in our case relates to simultaneous forceful hip abduction, external rotation, and flexion, which results in anterior hip dislocation accompanied by progressive tearing of the antero-medial soft tissues secondary to the extreme rotation and displacement of the hip. The forceful abduction of the tibia on the femur resulted in a shearing-type fracture on the distal part of the femur (Salter-Harris type IV) and finally, the pelvic ring disruption (open book type). The most common cause in the previously reported five cases that we found in the literature was traffic accidents, contributing to over 80% of the dislocations (four out of five cases so far) [Table 1].

In terms of management of the condition, prompt recognition, meticulous debridement, urgent reduction, and proper post-operative care are recognized as the keys to success (4–8, 11, 12).

Closed dislocations are managed by closed reduction, in line with Rieger et al. (13). In this case of open anterior dislocation, closed reduction failed mainly due to the buttonholed femoral head–head protrusion through the capsule that allowed only open reduction.

There has been a recurrent theme that the earlier the reduction, the better is the outlook with regard to the development of the avascular necrosis (AVN). A report from Cincinnati highlighted this principle, showing that delayed reduction after six hours from the time of injury increased the risk of AVN by a factor of 20 (14).

Despite correct treatment, AVN occurred in two of the five published cases [Table 1].

The severity of the initial injury, the occurrence of infection, and the presence of accompanying fractures may play a role in the development of the AVN (5–7).

The most possible cause of AVN in our presented case is ischemia owing to a long exposure of the open femoral head.

Children show better prognosis following traumatic hip dislocation compared to adults (15). This is partly due to the rarity of the associated fractures; the reported rate of the associated fractures in children is between 5%–14.3% (3).

All the reported associated fractures in open anterior hip dislocation in children were proximal, including femoral, acetabular, or pelvic ring fractures (6, 11). However, distal femoral fractures are also possible, as shown in our case. The presence of such a distal fracture may hamper the ability to achieve reduction by manipulation.

Anterior open hip dislocations can be associated with femoral neurovascular injury; once encountered, the prognosis declines. In the present case, the neurovascular structures were compressed by the protruding femoral head but not harmed seriously (4).

Joint infection is a disastrous complication that needs special attention (11). The administration of broad-

**Table 1. Chronological data of 6 other cases of open anterior dislocation of the hip in children in the literature**

Patient number	Age(years) /Sex	Mechanism of Injury	Wound	Follow-up (months)	Treatment	Result
Schwartz <sup>4</sup>	5/M	Traffic accident (TA)	Laceration from ASIS to perineum with femoral vessels injury	12	Reduction and repair of vessels	No AVN No infection
Renato <sup>5</sup>	6/M	TA	Laceration over scrotum	18	Reduction and primary repair	AVN No infection
Rafai <sup>6</sup>	9/M	TA	Laceration in the groin region	15	Reduction and pinning of associated ipsilateral trochanter fracture	AVN No infection
Khan <sup>7</sup>	10/M	Entangled in a water pump	13 cm in the groin region	25	Reduction and primary closure	No AVN No infection,
Garcia <sup>8</sup>	10/M	TA	5 cm over in the groin region	7	Wound debridement and reduction	Deep infection and joint destruction
Sadhoo <sup>11</sup>	15/F	TA	5*3 cm in the groin region	8	Wound debridement and open reduction and primary closure	Deep infection and joint destruction

spectrum antibiotics is necessary, along with prompt and meticulous debridement, and proper wound care. In our case, the early onset of low-grade fever occurred with no sign of a primary origin; therefore, it may be a possible sign of post-aggression. It disappeared rapidly within three days.

In conclusion, open anterior hip dislocation is a high-energy injury that could occur in children and is associated with several other life-threatening injuries. Early, appropriate, and prompt management by open reduction is mandatory due to the buttonholed femoral head and it results in good outcomes. In addition, any frequent manipulation attempts to achieve a closed

reduction should be avoided.

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