Case reports

TRANSEPIPHYSEAL FRACTURE OF THE FEMORAL NECK WITH DISLOCATION OF THE FEMORAL HEAD AND FRACTURE OF THE POSTERIOR COLUMN OF THE ACETABULUM IN A CHILD

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We describe a 15-year-old boy with a posterior dislocation of the hip, fracture of the posterior column of the acetabulum and separation of the femoral capital epiphysis. To our knowledge no previous case in a child has been reported. Such high-energy injuries are extremely rare, and a poor outcome is expected.

We advocate early referral to a specialised tertiary centre, and the use of a modification of Delbet's classification to reflect the complexity and displacement which may occur with this injury.

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Case report

A 15-year-old boy who was travelling as an unrestrained passenger in the rear seat of a car was involved in an accident and thrown out of the vehicle. He was admitted to the local hospital, assessed and resuscitated. He had sustained a posterior dislocation of the left hip with a fracture of the posterior column of the acetabulum and separation of the proximal epiphysis of the right humerus which was lying outside the acetabulum (Fig. 1). Other injuries included separation of the proximal epiphysis of the right humerus and a right Galeazzi fracture. He was transferred to a tertiary referral centre under the care of the senior author (RJM) and arrived approximately 20 hours after the injury had occurred.

There are few reports of the separation of the capital femoral epiphysis associated with dislocation of the hip,¹⁻⁶ and some cases are believed to have been caused by attempted closed reduction.³ Separation of the epiphysis associated with a fracture of the posterior acetabular wall is very rare^{4,7} and is reported to have a poor outcome. To our knowledge no fractures of the posterior column have been reported with dislocation of the hip and separation of the femoral capital epiphysis.

After assessment of the acetabular injury by CT (Fig. 2),

surgery was undertaken two hours after arrival. A posterior Kocher-Langenbeck approach was used. Careful dissection revealed soft-tissue attachment to the femoral capital epiphysis and great care was taken to preserve this. An osteotomy of the greater trochanter was performed midway between the base and tip of the trochanter in order to avoid further damage to the blood supply to the epiphysis.

The femoral epiphysis was first reduced into the acetabulum and then fixed to the neck of the femur using two AO cannulated screws. The posterior column was found to be impacted into the sciatic notch (Fig. 3) and was disimpacted using a hook while protecting the gluteal vessels. After reduction of the posterior column, the acetabulum was stabilised using a pelvic reconstruction plate and screws. The trochanter was then reattached using

Fig. 1

Anteroposterior radiograph of the pelvis.

Fig. 2

CT of the pelvis showing the dislocated hip with the separated epiphysis and fracture of the posterior column of the acetabulum.

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two screws (Fig. 4) and the fractures of the shoulder and forearm treated appropriately.

Physiotherapy was commenced and minimal weight-bearing allowed for the first six weeks. Follow-up radiographs were taken at 3, 6, 12, 18 and 24 months. The final radiograph at 24 months showed evidence of mild avascular necrosis (AVN) (Fig. 5). On examination there was limitation of both flexion and abduction by 20° to 25° each, and of internal rotation by 10°.

The patient was asymptomatic, able to participate in sports such as basketball, and 2.5 years after injury, was working as an apprentice in a shipbuilding yard.

Discussion

Fractures and dislocations around the hip in children are serious, uncommon injuries.^{8,9} Dislocations occur less often in children than in adults, and are mostly posterior.^{8,10,11} Fractures of the

acetabulum associated with dislocations of the hip are rare.^{12,13} There are two peaks in the age of incidence.^{14,15} The first, at four to seven years follows an injury of mild to moderate energy such as an awkward fall or an during sport. The second, at around 11 to 15 years, is associated with more severe injuries such as road-traffic accidents.

The major factors affecting the outcome of the dislocated hip are the energy absorbed^{12,16,17} and the delay in reduction.^{10,11,14,18} The most common and serious complication is avascular necrosis (AVN) of the femoral head,^{1-5,15,19} which is more likely to occur in older children.^{12,14} AVN is radiologically evident within two years of injury.^{3,5,7,14,20} Imperfect reduction is associated with early degenerative change.²¹ In younger children there is a possibility of recurrent dislocation with detachment of the posterior capsule.²²⁻²⁴ Associated acetabular fractures are very rare and occur with high-energy injuries in older children, usually only involving the posterior wall of the acetabulum.^{7,12,14}

Fig. 3

Photograph showing three-dimensional reconstruction of the fracture of the posterior column of the acetabulum which is impacted into the sciatic notch.

Fig. 4a

Anteroposterior (a) and (b) lateral postoperative radiographs showing the fixation.

Fig. 4b

Fig. 5a

Fig. 5b

Anteroposterior (a) and (b) lateral radiographs two years after injury.

Table I. Delbet's classification²⁶ of fractures of the proximal femur

	Type
I	Subcapital
II	Transcervical
III	Cervicotrochanteric
IV	Pertrochanteric

Proximal femoral fractures are less common than dislocations in children and adolescents.¹⁵ These carry an overall incidence of AVN of the femoral head of 40% to 50%,^{2,20,25} apart from other complications such as injury to the growth plate,^{15,25} malunion and nonunion.^{18,19} Delbet's classification²⁶ which is widely used to describe injuries to the proximal femur in children does not necessarily reflect the complexity and the displacement of the injury (Table I). For example in a type-I injury the epiphysis may be minimally or widely displaced and it may be within the acetabulum or lying outside the capsule, but the classification does not acknowledge these factors, which clearly affect the outcome.^{5,19,27} We suggest that the classification should be more comprehensive, taking into account not only the pattern of the fractures on both sides of the joint, but also displacement and dislocation.

The reported incidence of AVN with a type-I injury is 80% to 100%.^{2,6,14} The poor prognosis of this injury is related to disruption of the lateral epiphyseal blood vessels which form the main blood supply to the epiphysis.²⁸

We believe that the surgical approach must preserve any remaining blood supply. The timing of surgery is an important factor and further damage to injured structures must be avoided. Prompt transfer of these complex high-energy injuries to a tertiary centre is important so that experience of such rare injuries is pooled.²⁷

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