

CASE REPORTS

Posterior Fracture Dislocation of the Hip from a Warrior Turret Injury

A Ramasamy, TPS Bhullar

ABSTRACT

Fracture of the femoral head after hip dislocation is a relatively rare injury and is often associated with a poor functional outcome. Most result from high impact motor vehicle accidents. We report the case of a soldier who trapped his foot in a traversing Warrior turret and suffered a severe abduction injury to his hip. He sustained a Pipkin Type I fracture-dislocation of the hip not amenable to closed reduction and required transfer to the American Hospital in Baghdad where he underwent emergency open reduction and internal fixation of the fracture. This case report illustrates an unusual mechanism of injury resulting in a posterior fracture-dislocation and reviews the literature pertaining to the presentation, treatment and prognosis of this condition.

CASE REPORT

A 20yr old infantry soldier was in the Gunner's chair of a Warrior armoured fighting vehicle. When the commander traversed the turret to the right, the soldier's left foot was trapped in the turret resulting in a severe abduction injury to his left hip. On admission to the emergency department of British Military Hospital, Shaibah, he was in severe pain with his left leg shortened and held in external rotation. He was unable to lie flat. There was no associated neurovascular deficit. The initial hip radiographs showed a posterior dislocation of the hip with the suspicion of a fracture (Figure 1).

The patient was transferred to the operating theatre for closed reduction of the hip under general anaesthesia with radiological screening. Unfortunately, closed reduction was unsuccessful and inspection of the intra-operative radiographs revealed a Pipkin I fracture-dislocation of the femoral head with a large fragment caudad to the fovea capitalis. In view of the need for prompt definitive surgical treatment of this injury, the patient was transferred to the American Hospital in Baghdad.

Pre-operative CT scan confirmed a Pipkin I fracture dislocation with the caudal fragment rotated 180 degrees within the joint making closed reduction impossible. Under general anaesthetic the fracture

dislocation was reduced and stabilised with three 3.5 mm countersunk cancellous screws (Figure 2). The patient was later evacuated to the Royal Centre for Defence Medicine (RCDM), Birmingham. He has since been discharged from hospital and he is currently mobilising on crutches 5 months after the injury.

DISCUSSION

The Warrior Armoured Fighting Vehicle (Figure 3) is a 24 tonne tracked vehicle capable of transporting 10 troops around the battlefield. It includes a 2.5 tonne turret in which the gunner and commander are seated. The turret can be traversed either manually or with power assistance. When the turret is power-traversed, it is capable of completing a full rotation in less than 10 seconds. Inside the turret, the gunner and commander are not protected by a cage and are at risk of being entrapped within the traversing mechanism. The turret mechanism can therefore exert a considerable force on an entrapped limb and cause significant injury.

Fracture-dislocations of the hip are relatively rare and the most common mechanism of injury is the 'dashboard' injury, whereby the driver or front seat passenger of a vehicle is thrown forward and the impact of the knee with the dashboard transmitting the force along the long axis of the femur(1). Femoral head fractures have been reported in 4-17% of these dislocated hips(2). The degree of force required to produce this type of injury results in over 50% of patients suffering multiple injuries(3). The presence of these other injuries means that the hip fractures can be missed during initial evaluation. Posterior fracture dislocations of the hip usually occur when the hip is in the adducted, flexed position. The force transmitted through the hip then causes the femoral head to dislocate posteriorly. The leg is usually shortened and internally rotated. When the hip is in the abducted position, the resulting force often levers the femoral head forward leading to an anterior fracture dislocation which account for only 10% of all hip dislocations. In our case the patient presented with a shortened externally rotated limb with an abduction mechanism of injury. This initially led to the suspicion of an anterior dislocation and the case demonstrates the need to evaluate all

*Maj A Ramasamy MA
MRCS(Glas), Surgical
SHO.

Wg Cdr TPS Bhullar
FRCSG FRCS (Ed
Orth), Consultant
Orthopaedic Surgeon

BMH Shaibah, Iraq, Op
TELIC 8, BFPO 645.

*Corresponding Author:
Maj Arul Ramasamy,
RAMC
3 Broad Garth,
Quayside,
Newcastle Upon Tyne
NE1 3HE
Tel: 0191 2611511/
07968 147007
Email: arul49@doctors.org.uk

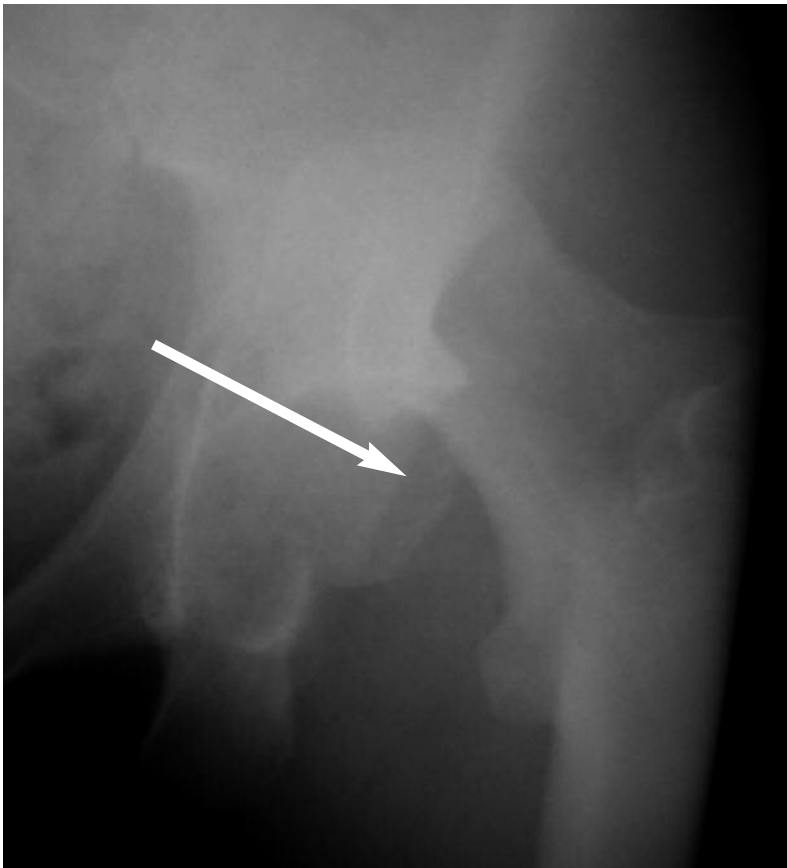


Fig. 1 Initial radiographs taken in the Emergency Department confirmed the dislocated hip. There is a suspicion of a fracture fragment (white arrow). This radiograph illustrates the difficulty of obtaining good quality images when the patient is unable to lie flat.



Fig. 3 A Warrior armoured fighting vehicle

TYPE	DESCRIPTION
I	Hip dislocation with fracture of the femoral head inferior to the fovea capitis femoris
II	Hip dislocation with fracture of the femoral head superior to the fovea capitis femoris
III	Type I or II injury with associated fracture of the femoral neck
IV	Type I or II injury with associated fracture of the acetabular rim

Table 1. Pipkin classification of femoral head fractures (5).



Fig. 2 Post-operative radiograph following open reduction and internal fixation of the femoral head fracture.

radiological information prior to making a diagnosis. The difficulties of obtaining adequate radiographs in these circumstances, especially when the patient is unable to lie flat, are significant.

Birkett first described a fracture of the femoral head associated with a posterior

dislocation of the hip, which he found in a post-mortem examination in 1896(4). Pipkin later classified femoral head fracture dislocation in 1957 (Table 1). Outcome is better in Type I compared to Type IV fractures with most series reporting an excellent result of 60-75% with Type I fractures compared to only 30-40% with Type IV fractures(6).

As one of the few orthopaedics emergencies, reduction of a femoral head fracture-dislocation should be performed immediately to minimise complications. Closed reduction should only be attempted once and with good muscle relaxation to reduce the risk of iatrogenic femoral neck fracture and to reduce the risk of further compromising the blood supply to the femoral head(7). The length of time a hip remains dislocated influences the incidence and severity of sciatic nerve injury(8). Similarly, long-term complications of the injury are reduced in patients who undergo reduction within 12 hours of the injury(3). Prior to attempting open reduction, a CT scan is required to image the fracture and to assess damage to the acetabulum(9). This case further illustrates the utility of a CT capability in a Role 2 enhanced facility.

Closed anatomical reduction appears to give the best results with excellent/good results in 75% of Pipkin I and II fractures, dropping to 64% when open reduction and internal fixation is required. Only 50% of

patients who underwent excision of the fragments achieved excellent results(6). A recent study suggested that maintenance of joint-congruity is a requirement for good outcome(10). Where reduction and internal fixation are not successful and there is a large indentation fracture, the use of an intertrochanteric osteotomy may be useful. If the joint is not salvageable a hip arthrodesis or joint replacement may be more appropriate.

The dislocated femoral head can cause injury to the sciatic nerve and occurs in 7-27% of patients(8). The superior gluteal artery can also be damaged by the dislocated hip and may need to be explored if there is considerable bruising or bleeding posteriorly. Late complications include avascular necrosis (10-15%), post-traumatic arthrosis (25-70%) and heterotrophic ossification(2,3,6,7,9).

In conclusion, traversing warrior turrets can exert considerable force on any entrapped limb and result in serious injury. This case highlights the need to suspect a dislocation of the hip with either a Pipkin type injury or a posterior wall acetabular fracture, when assessing a casualty involved in a turret injury.

References:

1. Funsten RV, Kinser P, Frankel CJ. Dashboard dislocation of the hip: a report of twenty cases of traumatic dislocation. *J Bone Joint Surg* 1938; **20**: 124-32.
2. Armstrong JR. Traumatic dislocation of the hip joint: Review of one hundred and one dislocations. *J Bone Joint Surg Br* 1947; **30**: 430-45.
3. Sahin V, Karakas ES, Aksu S, Atlihan D, Turk CY, Halici M. Traumatic dislocation and fracture-dislocation of the hip: a long-term follow-up study. *J Trauma* 2003; **54**(3): 520-9.
4. Birkett J. Description of a dislocation of the head of the femur, complicated with its fracture; with remarks. *Med Chir Trans* 1896; **52**: 133.
5. Pipkin G. Treatment of grade IV fracture-dislocation of the hip. *J Bone Joint Surg Am* 1957; **39**: 1027-42.
6. Roeder Lf, DeLee JC. Femoral head fractures associated with posterior hip dislocations. *Clin Orthop* 1980; **147**: 121-30.
7. Lang-Stevenson A, Getty CJM. The Pipkin fracture-dislocation of the hip. *Injury* 1987; **18**: 264-9.
8. Hillyard RF, Fox J. Sciatic nerve injuries associated with traumatic posterior hip dislocations. *Am J Emerg Med* 2003; **21**(7): 545-8.
9. Durakbasa O, Okan N, Canbora K, Gorgee M. Factors affecting the results of treatment in traumatic dislocation of the hip. *Acta Orthop Traumatol Turc* 2005; **39**(2): 133-41.
10. Mowery C, Gershuni DH. Fracture dislocation of the femoral head treated with open reduction and internal fixation. *J Trauma* 1986; **20**: 1041-4.