This report describes a rare case of concomitant ipsilateral pelvic disruption, hip dislocation, a femoral shaft fracture, supra and intercondylar fracture of the femur, and tibial shaft fracture in a young man who suffered a fall from a moving truck. The hip dislocation was reduced under general anaesthesia with a closed procedure. Both femoral shaft and distal femoral fractures were reduced and stabilised with a Judet screw-plate via a posterolateral approach to the femur. The other fractures were treated conservatively. Emphasis was placed on the complex injury around the hip.

The surgical management of this constellation of injuries combining a floating knee and a variant of floating hip is discussed in the light of the current principles of management of a multiply injured patient. The authors propose the inclusion of the peculiar injury pattern occurred around the hip in the existing classification systems for floating hip.

**Key words:** Damage control orthopaedic, Floating hip, Floating knee, Polytrauma

**Introduction**

Combined injuries to the lower limbs are almost always indicative of high energy injury and associated with life threatening conditions for which damage control orthopaedics should be considered in most cases. Various patterns of combined skeletal injuries have been reported. Current literature suggests that both floating hip and floating knee injuries are uncommon and severe. The case report presented here describes a patient who sustained in the same limb mainly a pelvic disruption, a hip dislocation, a femoral shaft fracture, a supra and intercondylar fracture of the femur, and a tibial shaft fracture. Since the long-term prognosis after any hip dislocation, especially in polytrauma patient must remain guarded, and it has been suggested that lower extremity fractures have a major impact on a patient's functional recovery following polytrauma, the purpose of this report was to analyse the patterns of lesions encountered and highlight the relevant principles necessary to allow a sound surgical management in our context of this multiply injured patient by focusing on sequencing of fracture reduction and implant selection.

**Case Report**

A 24-year-old male injured his pelvis and left lower limb when he fell off a moving truck. He could not recall the exact mechanism. Five hours later he was transported from the scene of the accident to the emergency room of the author's institution. Upon admission, he was conscious but haemodynamically unstable. The left lower limb was short and exhibited abduction and external rotation. He had a marked swelling and pain through the hip to the leg. The dorsalis pedis was palpable. Plain radiographs performed after an intensive resuscitation revealed a bilateral iliosacral dislocation, the left obturator ring fracture, an iliac dislocation of the left hip (Fig. 1).

Other radiographic findings located on the left side were a transverse diaphyseal femoral fracture, a supra and intercondylar fracture of the distal femur, a nondisplaced fracture of the patella, a comminuted fracture of the tibial shaft (Fig. 2 and 3), and a fracture of the medial malleolus. Surgery was...
undertaken within 12 hours of assessment by the orthopaedic team. Under general anaesthesia, the patient lying in a supine position, the hip dislocation was reduced with a closed procedure (Fig. 4). Then, the noncontiguous fractures of the femoral shaft and distal femur were addressed via a posterolateral approach to the femur and fixed with a Judet screw-plate (Fig. 5). The patellar fracture was not fixed and the fracture of the tibia and the medial malleolus were stabilised with a plaster splint. Radiographs of the knee after operation revealed a superior proximal tibiofibular dislocation (Fig. 3) that was not seen on the initial X-ray. Postoperatively, a skin traction was applied to the right lower limb. He was progressing well so far, but the operation of the tibiofibular dislocation had not been considered yet.

Discussion
The overwhelming lesions sustained by our patient involved several different skeletal units in the same limb. A host of combined injuries patterns can be inferred from this case. It is our opinion that the striking lesions exhibited by our patient were: (a) the floating knee injury with intra-articular extension; (b) the ipsilateral hip dislocation associated with a pelvic disruption and a femoral diaphyseal fracture. This extremely rare constellation of injuries seems not to have been previously reported in the literature. Such a distribution of lesions enables one to discuss the type of injury around the hip. Floating hip injuries tend to cluster into two groups. In the first pattern, a pelvic fracture is associated with an ipsilateral femoral fracture. In the second group, the “true” floating hip injury, an acetabular fracture is associated with an ipsilateral femoral fracture. Our patient’s hip injuries can be considered as a complex form of the floating hip, which to our knowledge does not fit into the existing classification. The intermediate segment was disconnected proximally by the pelvic disruption and the dislocation of the hip. Distally, the separation occurred through the femoral shaft fracture. “The posterior” type acetabular fracture (i.e. posterior wall or transverse with posterior wall fractures) as reported by Liebergall et al was not encountered in our case. Such lesions are frequently seen in the setting of a posterior dislocation of the hip. We assume even if “the posterior” type acetabular fracture lacks that the iliac dislocation sustained by our patient fuels this kind of fracture. Interestingly, the diaphyseal location of the femoral fracture in a transverse fashion and the associated patellar fracture lend credence to the possibility of “a posterior” injury pattern. The superior proximal tibiofibular dislocation, rare event sustained by our patient and associated with tibia fracture indicates high energy injury. The management of each of these injuries in isolation has been well described, however when managed together there are unique challenges. The goal of modern trauma in multiply injured patients with hip dislocation is early reduction of the dislocation with stable fixation of the fractures.
Closed reduction of the hip dislocation under general anaesthesia prior to fixation of the femoral fracture as outlined by Liebergall et al\textsuperscript{1} along with Harper\textsuperscript{15} was performed successfully. This has allowed us to draw up carefully the plan of treatment of the remaining fractures. Since the patient was critically injured and found unable to withstand a prolonged surgical procedure, those fractures that were thought to be associated with poor outcomes if left untreated, or without rigid fixation were prioritised.\textsuperscript{16} Thus, femoral fractures were addressed surgically. The other fractures, particularly the tibial fracture were treated conservatively. We are however aware that a more aggressive approach to floating knee is currently advocated. This can be attractively achieved in most cases via simultaneous retrograde femoral and antgrade tibial nailing through the same incision in the knee.\textsuperscript{10,14} External fixator is the favourite tool of trauma surgeons to achieve temporary stabilisation of the femur in the protocol of damage control orthopaedics. This procedure minimises the impact of surgery on the already traumatised patient.\textsuperscript{2,4,6,19} Managing both sites of femoral fractures with external fixator would be technically problematic. Regarding noncontiguous femoral fractures, their orthopaedic management becomes increasingly complex because the preferred treatment for one fracture may jeopardise the reduction and stabilisation of the other.\textsuperscript{16} Due to pelvic fractures, the retrograde nailing though fraught with operative difficulties and poor outcome in the event of distal femoral fractures with involvement of the knee joint\textsuperscript{14} is regarded as one of the well- tried methods to tackle such a combination of fractures.\textsuperscript{7,20} The Judet screw-plate occupying a firm place in the armamentarium of techniques in the management of distal femoral fractures in our context\textsuperscript{21} was therefore used for both shaft and distal femoral fractures. In conclusion, after coming across what we believe to be a unique case of ipsilateral floating knee and hip dislocation associated with a femoral shaft fracture, we have pointed out the countless dilemma the surgeon will be faced with, when dealing with this peculiar injury pattern. Although the general principles of damage control surgery have been followed in the management, it is crucial to stress that the treatment protocol we described is inherently our team approach with the surgeon as the team leader. The optimal treatment of both floating hip and floating knee injuries should be undertaken without compromising the treatment of either. We suggest inclusion of injury around the hip featured by our patient as a variant in the classification systems for floating hip injuries.

References

Fig 5. Fixation of the femoral fractures with a Judet screw-plate