CASE REPORT

Central acetabular fracture with dislocation treated by minimally invasive plate osteosynthesis

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Abstract

Central acetabular fractures with dislocation are usually the result of high-energy trauma, resulting in joint incongruity, and are frequently associated with other injuries. Open reduction and internal fixation has been the standard treatment for acetabular fractures, but it is associated with extensive surgical trauma, and complications such as haematoma formation, iatrogenic nerve injury, and heterotopic ossification. We present the case of a 63-year-old female who sustained a central acetabular fracture of the hip with dislocation as a result of an automobile collision. Closed reduction of the dislocation was performed, and the fracture was managed by minimally invasive plate osteosynthesis using a specially prepared plate. At 01 year postoperatively, radiographs showed the fracture to have been well-healed with good congruity of the joint. However, heterotopic ossification of the joint was noted. The technique allowed reduction of the fracture with minimal surgical trauma.

Keywords: Acetabular fracture, Fracture, Hip, Minimal invasive surgery, Plate osteosynthesis.

Introduction

Central acetabular fractures with quadrilateral plate comminution are usually the result of high-energy trauma, resulting in joint incongruity, and such fractures are frequently associated with other injuries.[1,2] Fracture-dislocations typically have a poor prognosis as in many cases there is an extensive degree of articular injury, and the condition is associated with a 22% incidence of sciatic nerve injury.[1,2] There are many surgical approaches for the treatment of acetabular fractures, and treatment depends on the fracture type, surgeon preference, and the general health and age of the patient.[1-3] The management of such fractures and dislocations includes conservative methods such as skeletal traction, open reduction with plating, iliofemoral external distraction, or one-stage total hip arthroplasty (THA).[1-3] Here we report a case of a central acetabular fracture and dislocation treated with closed reduction of the dislocation and minimally invasive plating of the acetabular fracture.

The study was approved by the Institutional Review Board of Tungs' Taichung Metro Harbor Hospital, Taiwan, and patient's consent was obtained for publication of case details and radiographic images.

Case Report

A 63-year-old female was in the front seat of a car when the vehicle was involved in a collision, and was seen at the emergency department with left-leg weakness and numbness. She was alert and oriented, with a Glasgow Coma Scale score of 15, and her vital signs were stable. Her abdomen was soft with local tenderness in the left lower quadrant without rebound tenderness. She reported pain with movement of her left leg, and shortening and left foot drop was noted. Focused Assessment of Sonography in Trauma (FAST) revealed no internal bleeding, and catheterisation of the urinary bladder was negative for haematuria. Plain radiographs showed a central fracture dislocation, inner wall type (Figure-A), which was confirmed by computed tomography (CT) (Figures-B, C). Because of the fracture type and sciatic nerve compromise, urgent surgery was performed.

After endotracheal general anaesthesia, the patient was placed in supine position on a fracture table. Under traction, the dislocation of the hip was reduced, but the inner wall fractured bone remained in the left lower abdomen. An incision was made on the left anterior iliac crest, about 4cm in length, and extended along the inner surface of the ilium. A blunt Hoffman's retractor was used to realign the fractured bone under fluoroscopic guidance. Next, a reconstruction plate was bent to produce a hook-like plate to hold the fractured bone to the inner wall, and the plate was fixed on the ilium (Figure-D). The total operation time was less than 1 hour, and blood loss was about 10ml.

The patient's postoperative recovery was unremarkable, and at 1-year follow-up, radiographs showed union and

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Figure: A) Plain radiograph revealed a left-side central acetabular fracture and dislocation. B, C) Central acetabular fracture and dislocation confirmed by computed tomography (CT). D) Minimally invasive plate osteosynthesis was used to reduce the fracture dislocation. E) One year after surgery, radiograph showed the fracture was healed, but grade III heterotopic ossification of the joint was present.

good congruity of the left hip joint. However, grade III heterotopic ossification (Brooker classification) was noted (Figure-E), which resulted in joint stiffness. In addition, foot drop as a result of sciatic nerve injury from the original trauma persisted.

Discussion

Anterior dislocations of the hip comprise approximately 10-15% of all dislocations, are classified as superior (type 1) and inferior (type 2), and can generally be treated by closed reduction.[4] Approximately 85% of hip dislocations

are posterior dislocations, are typically classified by the scheme of Thompson and Epstein which takes into account the presence of acetabular and femoral fractures.[4] If the hip is in neutral adduction or abduction when the force is applied, usually only dislocation occurs, whereas if the hip is in slight abduction, a fracture of the posterior acetabular wall results. Closed reduction may be performed, but surgical management is typically needed if an acetabular/femoral head fracture is present.[4] While the exact incidence of acetabular fractures is unknown, posterior wall fractures are the most common, and comprise approximately 24% of acetabular fractures.[4]

The goals of treating an acetabular fracture are to obtain anatomic reduction to restore the congruity and stability of the hip joint, and there is a positive association between the accuracy of reduction and long-term results.[5] Open reduction and internal fixation (ORIF) has been the standard treatment for acetabular fractures for many years, and has reduced the incidence of post-traumatic arthritis and has improved overall outcomes. However, the procedure is associated with extensive surgical trauma, complications such as haematoma formation and iatrogenic nerve injury,[1,2] and heterotopic ossification with a reported incidence of approximately 20% to 90%.[6,7] Displaced fractures in the weight-bearing area of the acetabulum generally should be treated with ORIF, and intra-articular fragments must be removed if present.[8] However, many types of fractures are being treated by more conservative methods.[1-3]

To reduce the morbidity associated with ORIF, percutaneous techniques for the fixation of pelvic fractures have received increasing attention.[9] Percutaneous techniques may offer a shorter surgical time, decreased soft tissue disruption, and decreased surgical morbidity, and may be especially of value in patients with polytrauma and the elderly. Acetabular fractures which can be managed by percutaneous fixation include non-displaced and slightly displaced (up to 5mm) injuries that can be reduced by lag-screw fixation, displaced fractures in which an acceptable closed reduction can be achieved, and displaced bicolumnar fractures with acceptable secondary congruence.[9] Generally, fractures of the posterior wall of the acetabulum cannot be managed by a percutaneous approach because reduction of marginal impaction is often necessary.

While most reports of the percutaneous management of acetabular fractures involve the placement of screws, in the case reported herein we successfully treated an inner wall type acetabular fracture with minimally invasive plate osteosynthesis and avoided a major surgical procedure. A standard plate was uniquely modified to match the contour of the pelvic bone, and the procedure was relatively quick and without complications. At 1-year follow-up, the patient could walk without assistance. Though heterotopic ossification occurred, we do not believe it was related to the surgery, but to the extent of the original injury. Unfortunately, the sciatic injury that occurred as a result of the original trauma did not resolve despite prompt surgical treatment.

Conclusions

In managing a case of acetabular fracture by minimally invasive plating using a specially prepared plate, it was found that the technique allowed reduction of the fracture with minimal surgical trauma.

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