



Case report

Bilateral acetabular fractures treated with delayed total hip arthroplasty

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ABSTRACT

Acetabular fractures after seizures are uncommon, and fewer than 30 cases are described in the literature. We present a patient with bilateral acetabular fractures after a seizure, with bilateral quadrilateral plate destruction and protrusio deformity. The patient underwent delayed staggered bilateral total hip arthroplasty 3 months after initial injury, with use of the femoral head as autograft for the protrusio deformities.

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Introduction

Bilateral acetabular fractures after a seizure are rare, with less than 30 cases in the orthopaedic literature. An estimated 0.25%–2.4% of patients admitted to the hospital for seizures have a concurrent fracture; only a quarter of these fractures are sustained due to the seizure alone, and most of these were of the proximal humerus [1,2]. Forceful contraction of the muscles around the hip during a seizure can cause the femoral head to drive medially and proximally, leading to a central fracture dislocation of the hip with medialization of the femoral head. Most prior case reports have treated seizure-induced bilateral acetabular fractures nonoperatively, with prolonged periods of traction or with internal fixation [2–6]. We present a case of a 76-year-old man who sustained bilateral acetabular fractures after a seizure and was treated with delayed bilateral total hip arthroplasty using acetabular impaction bone grafting.

Case history

A 76-year-old formerly active man presented to orthopaedic clinic with bilateral hip pain for 5 weeks. Five weeks before

presentation, the patient underwent a transurethral prostate resection at an outside hospital; postoperatively, the patient became hyponatremic and had a seizure that required him to be medically sedated. Once no longer sedated, he complained of groin pain and was unable to ambulate. Radiographs of the pelvis were obtained (Fig. 1), which demonstrated bilateral anterior column acetabular fractures with quadrilateral plate destruction and with medialization of the femoral heads and Paprosky 2C acetabular defects bilaterally. The fractures were through the quadrilateral plates bilaterally and the columns were noted to be intact. The patient was treated nonoperatively and discharged to a rehabilitation center but continued to have difficulty ambulating and was largely wheelchair-bound. He was seen by an orthopaedic surgeon after discharge from the rehabilitation center and was referred to the traumatologist at our hospital. On presentation to our orthopaedic clinic 5 weeks after injury, repeat imaging demonstrated worsening protrusio (Fig. 2). He had progressed to being able to ambulate short distances with a walker. On examination, the patient had significant pain with passive hip motion, log roll, as well as limited external and internal rotation. He was seen by both the trauma and arthroplasty specialists. A computed tomography was obtained for further operative planning. His options were discussed, including open reduction internal fixation followed by hip arthroplasty or allowing the fractures to heal followed by delayed total hip arthroplasty. Given that he had been gradually improving and tolerating his nonoperative treatment up to this point with minimal pain, patient and surgeon elected for delayed total hip

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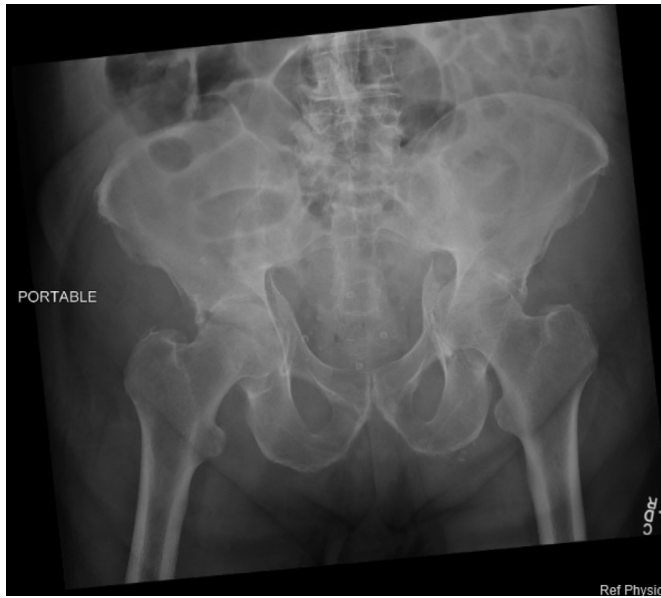


Figure 1. Anteroposterior radiograph of the pelvis, taken immediately after initial injury.

arthroplasty of his bilateral hips as to have only a single reconstructive surgery for each hip rather than fixation followed by delayed arthroplasty.

Three months after the initial injury, imaging showed healing of his bilateral acetabular fractures (Fig. 3). He continued to have difficulty to ambulate and had significant pain and he was scheduled for a staggered bilateral total hip arthroplasty.

The patient underwent a left total hip arthroplasty first, given that his left hip was more painful and worse radiographically than the right. The patient was positioned in the right lateral decubitus position on a peg board. A posterior approach was used, the short external rotators were released, and a capsulotomy was performed, exposing the head neck junction maximally. The hip was able to be dislocated and a standard neck cut was made. The head was noted to be nonspherical, with deformity matching the nonspherical structure of the post-traumatic acetabulum. On visualization of the acetabulum, there was a small defect in the superomedial wall, as well as a ridge superiorly. On palpation, the acetabulum was not mobile and the fractures appeared healed; the anterior and posterior columns were assessed and determined to be stable.

The acetabulum was curetted to clear soft tissue from the floor. The acetabulum was then gently reamed to create bleeding bone while avoiding any further medialization. The reamers were then used on the rim of the acetabulum to obtain a rim fit. The femoral head was reamed using small reamers to obtain cancellous bone graft (Fig. 4a and b). The bone graft was packed into the acetabulum and reverse reamed. The remaining cortical shell of the femoral head was denuded of cartilage and used as a medial buttress in the acetabulum. It was placed inside the acetabulum (Fig. 4c), over the cancellous bone graft, and then additional cancellous bone graft was packed within the shell and reverse reamed. A DePuy Synthes GRIPTION porous multi-hole cup (DePuy Synthes, Johnson & Johnson, Raynham, MA) was placed into the acetabulum and positioned using intraoperative landmarks (Fig. 4d). The cup was found to have

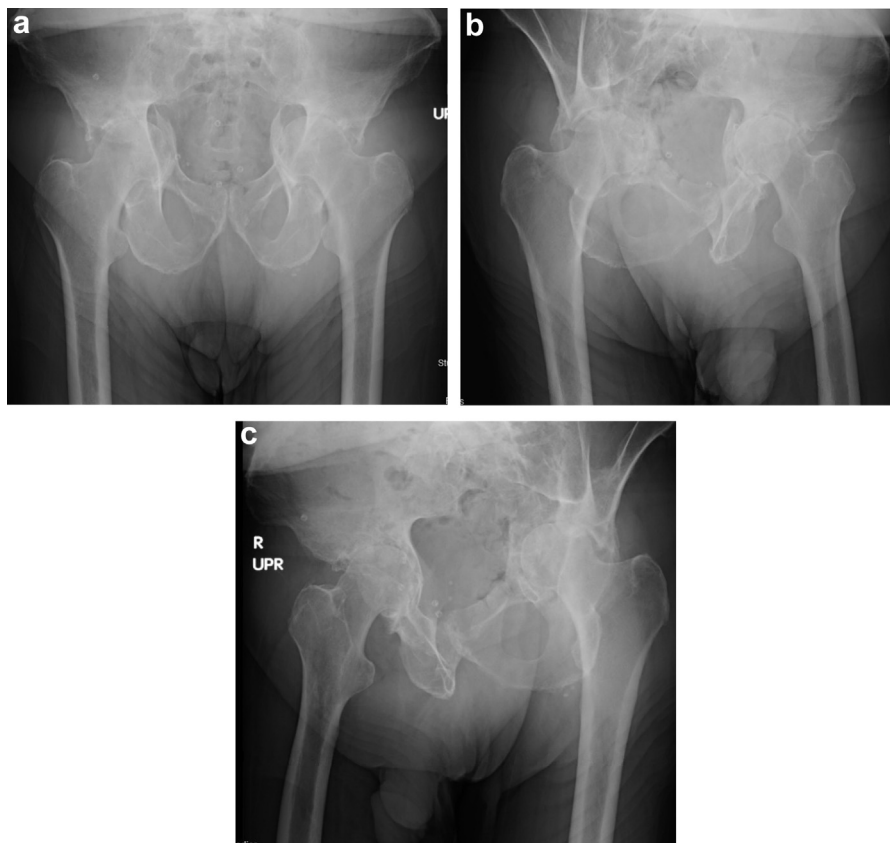


Figure 2. Radiographs taken 5 wk after injury at first clinic appointment. Panel (a) is an anteroposterior radiograph of the pelvis, and panels (b and c) are Judet views of the pelvis.



Figure 3. Low anteroposterior radiograph of the pelvis, taken 3 mo after injury.

good press fit and rim fit, and 3 screws were used as supplemental fixation. The femur was prepared in a standard fashion and a standard offset DePuy Synthes Summit stem (DePuy Synthes, Johnson & Johnson, Raynham, MA) was used; the hip was reduced and gently trialed. He was placed on bed rest, as to prevent dislocation due to altered gait mechanisms before his second-stage surgery. On postoperative day 1, the patient received one dose of enoxaparin 40 mg, which was then suspended for his second surgery on postoperative day 2.

On postoperative day 2 from his index procedure, the patient underwent a right total hip arthroplasty. A similar technique was used to prepare the acetabulum. The patient tolerated the procedure well and leg lengths were equal postoperatively. Radiographs were taken postoperatively (Fig. 5). He was made weight bearing as tolerated bilaterally with posterior hip precautions, with restriction of flexion past 70 degrees, adduction past midline, and internal rotation past 0 degrees. Enoxaparin 40 mg daily was administered for deep vein thrombosis prophylaxis for a total of 6 weeks postoperatively. The patient was started on standing gabapentin 300 mg 3 times a day and acetaminophen 650 mg every 4 hours, in addition to tramadol 50 mg every 8 hours as needed for

pain. He worked with physical therapy starting on the day of his second procedure and was recommended for acute rehabilitation given his bilateral lower extremity surgery and recent debilitated state secondary to his fractures. He had an uncomplicated postoperative course and was discharged to an acute rehabilitation unit on postoperative day 7 from the index procedure.

At 3 weeks postoperatively, the patient was discharged from his rehabilitation unit to home; he was doing well at that time, using the walker for ambulation. He was recommended for a total of 6-week enoxaparin for venous thromboembolism prophylaxis and 2 months of physical therapy. At 6 weeks postoperatively, he was ambulating comfortably with a cane. Approximately 2 months postoperatively, the patient was diagnosed with a nonocclusive deep vein thrombosis in his left common femoral vein and was treated with 3 months of 20 mg Xarelto (Janssen Pharmaceuticals, Titusville, NJ). His imaging at 3-month postoperative follow-up shows consolidation of his fracture sites (Fig. 6). At that time, he continued to ambulate with a cane, did not require pain medication, and continued to do outpatient therapy; he was very happy with his progress.

Discussion

Although acetabular fractures after seizures are rare, it is important to have a high index of suspicion in postictal patients who complain of groin pain, have inability to walk, or have pelvic bruising [4]. Plain radiographs of the pelvis will demonstrate most acetabular fractures, but a computed tomography can be obtained if radiographs are indeterminate or negative but suspicion is still high. Bilateral acetabular fractures secondary to seizures are associated with high rate of mortality, reported as high as 18.5% [3]. Mortality may be due to massive blood loss from the pelvic fractures, or from sepsis secondary to sacral ulcers sustained during prolonged periods of bedrest [3,4]. The literature on acetabulum fractures after seizures mostly describes nonoperative management using a period of traction, followed by progressive weight bearing around 3 months [2–9].

Only 3 case reports have described the use of total hip arthroplasty for treatment of centralized acetabular fracture dislocations after seizure. Tempelaere et al. [6] described a 76-year-old patient who had a left shoulder fracture dislocation and bilateral acetabular fractures after a seizure; he was treated with an immediate

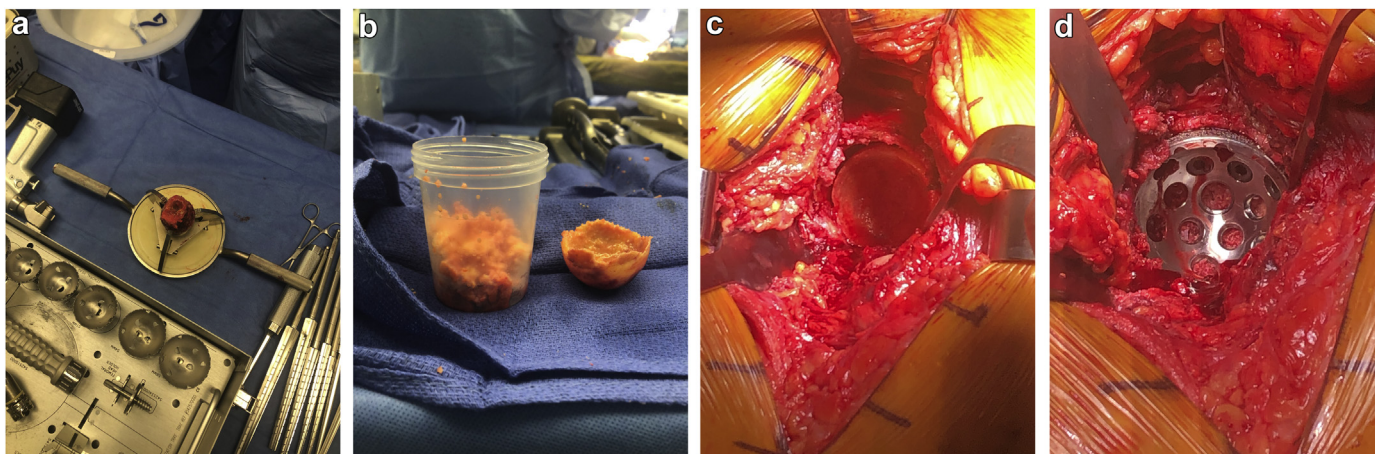


Figure 4. Intraoperative photos. Panel (a) demonstrates the DePuy Allo-Grip Bone Vise System (DePuy Synthes, Johnson & Johnson, Raynham, MA), which holds the femoral head to allow for reaming. Panel (b) shows the bone graft taken from the femoral head in a cup, and the shell of the femoral head that has been reamed out and denuded of cartilage. Panel (c) shows the femoral head shell bone graft placed inside the prepared acetabulum, as shown from a posterior approach. Panel (d) demonstrates the right acetabular cup in place, with 3 screws in place and bone graft deep to the cup.

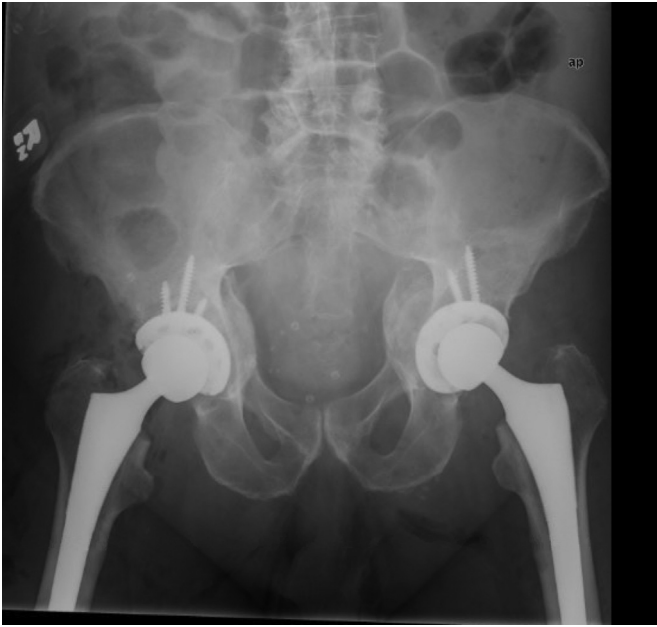


Figure 5. Low anteroposterior radiograph of the pelvis, taken after staged bilateral total hip arthroplasty.

shoulder arthroplasty and then bilateral one-stage total hip arthroplasty at 3 weeks after injury. They describe the use of morselized bone graft from the resected femoral head and then a subsequent cemented acetabular component. Khalily et al. [10] performed cementless bilateral total hip arthroplasty 12 days after initial fracture but did not describe use of impaction bone grafting in the case report. No study, however, has previously described treating this patient population with a period of nonoperative management of the acetabular fractures out of traction to allow for mobility of the patient and healing of the fractures, with a subsequent planned bilateral total hip arthroplasty.

There are few studies that discuss acute total hip arthroplasty after acetabulum fractures. Mears and Velyvis looked at 57 patients who underwent acute THA for acetabular fractures with an average of 8-year follow-up [11]. In this series, some patients required concurrent ORIF of the fractures, but morselized femoral head autograft and a structural graft were used for the acetabular defects. At the end of follow-up, 79% had good or excellent Harris hip scores, and no cups required revision [11]. Borg et al. [12] compared acute THAs combined with ORIF to ORIF alone for acetabular fractures. At 3 years, there was 100% survival for the combined procedure group and only 28.6% in the ORIF group. Weaver et al. [13] also looked at THA vs ORIF for acute management of acetabular fractures and found that the ORIF group had a higher rate of



Figure 6. Radiographs taken 3 mo postoperatively. Panel (a) is a low anteroposterior radiograph of the pelvis. Panels (b) and (c) are frog leg lateral views of the right and left hips, respectively.

reoperation (30% vs 14%) and worse pain scores compared to those with THA at a mean follow-up of 22 months.

Although there is limited literature on treatment of acetabular fractures with acute THA, there is more robust literature describing outcomes of remote THA after acetabular fractures treated both with open reduction internal fixation (ORIF) and nonoperatively. Late THAs can be complicated by malunion, nonunion, or heterotopic ossification [11]. A study by Morison et al. [14] looked at the 10-year survival of THA for posttraumatic arthritis after pelvic fracture and compared it to THA for avascular arthritis or osteoarthritis. THAs done for posttraumatic arthritis had 70% 10-year survivorship compared to 90% for non-posttraumatic arthritis patients. However, they found no difference in survivorship between the trauma patients treated operatively with ORIF or nonoperatively [14]. A study by Mears [15] noted a 5–20 times increased rate of early failure for delayed THAs done for fracture compared to THAs done for osteoarthritis. Mode of failure for delayed THA is commonly cited as acetabular loosening [16]. There are mixed data on whether the blood loss and operative data are higher in the patients who received a THA after ORIF vs nonoperative management of their acetabular fractures [17,18]. More patients in the nonoperative group required reconstruction of their acetabular defects [18]. These studies reported 88% survival at 11 years and 93% survival at 7 years [17,18].

The use of impacted autologous morselized bone graft with cementless acetabular components has improved the survival of the acetabular components [16,19,20]. A literature review by Mullaji et al. [20] found that use of impacted morselized bone graft with cementless cups had a 100% survival between 2 and 7.8 years. In comparison, the studies that used cemented components had 73%–94% survival at 12–20 years. These numbers may be skewed because of differences in follow-up but at least indicates comparable and promising results with cementless techniques for acetabular components.

Summary

Bilateral acetabular fractures resulting in Paprosky 2C defects bilaterally are rare and have historically been treated with prolonged bedrest and traction. We present a novel treatment option of delaying total hip arthroplasty until the fractures have healed and using autograft from the femoral head to fill the protrusion defect in the acetabulum. Although this type of treatment requires a patient who can tolerate the delay in fixation, it is an option for a patient who can tolerate mobilization in the interim between injury and arthroplasty.

Conflict of interest

The authors declare there are no conflicts of interest.

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