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Case Report

Simultaneous Total Hip Arthroplasty for Delayed Management of Bilateral Acetabular Fractures due to Alcohol-Withdrawal Seizures

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ABSTRACT

Bilateral acetabular fractures after seizure activity are rare, as most of these injuries are associated with high-energy trauma. It is hypothesized that rapid forceful contracture of hip musculature during a seizure can lead to the femoral head fracturing the medial wall and driving in proximal and medial directions. Absence of standardized surgical treatment algorithms and literature-reported outcomes makes this fracture pattern challenging to orthopedic surgeons. To the best of our knowledge, no published data describe delayed simultaneous total hip arthroplasty for treating seizure-induced bilateral acetabular fractures with protrusio. We present a patient that sustained bilateral acetabular fractures after an alcohol-withdrawal seizure. The patient underwent delayed simultaneous total hip arthroplasty 3 months later with excellent functional outcomes at the 6-month follow-up.

Introduction

Seizures remain a rare but recognized cause of fractures [1]. A report by Finelli and Cardi suggested that 1.1% of patients admitted to the hospital with a seizure diagnosis had sustained a fracture [2]. Commonly injured bones include the proximal humerus, spine, facial bone, femoral neck, ankle, and distal radius [1,3,4]. Conversely, acetabular fractures due to seizure activity have been scarcely reported, with bilateral fractures being extremely rare [5]. It is hypothesized that rapid forceful contracture of hip musculature during a tonic-clonic seizure can lead to the femoral head fracturing the medial wall and driving in proximal and medial direction [6]. The treatment alternatives for acetabular fractures include nonoperative management, osteosynthesis (ie, open reduction with internal fixation [ORIF] or percutaneous fixation), or total hip arthroplasty (THA) [7]. However, the absence of standardized surgical treatment algorithms and literature-reported outcomes makes this fracture pattern challenging to orthopedic surgeons. To the best of our knowledge, there are no published data describing delayed simultaneous THA for treating seizure-induced bilateral acetabular fractures with protrusio.

We report the case of a 65-year-old male who sustained bilateral acetabular fractures secondary to alcohol-withdrawal seizures to highlight its unusual fracture mechanism and describe our delayed management with simultaneous THA. Written consent was obtained from the patient to use deidentified medical information for publishing this case report.

Case history

A 65-year-old male with a past medical history of hypertension, type 2 diabetes mellitus, hypothyroidism, and alcohol abuse presented to the joint reconstruction clinic with bilateral acetabular fractures diagnosed over 3 months ago after an episode of alcohol-withdrawal seizures. The patient experienced tremors, flushing, and sweating, followed by a witnessed episode of loss of consciousness and involuntary movements for over 5 minutes. He suffered a fall from a standing height because of the event. The patient was transported to a community hospital for initial management and stabilization. Yet, he required a medical airlift to a tertiary care center for further management due to prolonged

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refractory seizures requiring mechanical ventilation and multiple pharmacotherapies.

The patient arrived heavily sedated and intubated to the trauma bay. A computed tomography (CT) polytrauma was ordered due to the history of a fall and the prolonged duration of the seizures. Neurology service was consulted. Additional history obtained from the patient's son revealed that the patient has persistent alcohol abuse behavior. The last reported alcohol consumption was 2 days before the episode. Based on this information, the neurology service diagnosed provoked seizures due to alcohol withdrawal.

The radiographic assessment (ie, x-rays and CT) revealed bilateral severely comminuted acetabular fractures involving the posterior wall, medial wall, and the roof with intraarticular extension (Figs. 1 and 2). The orthopedic surgery service evaluated the case and placed the patient on skeletal traction with femoral pins. Physical examination was limited as the patient was sedated. Early surgical management was not feasible as the patient was labile. Additionally, the patient suffered multiple complications during the admission, including an atrioventricular block and ventilator-associated pneumonia, requiring extended intensive unit care. Therefore, the orthopedic service opted for delayed management of the fractures.

After discharge, the patient was re-evaluated by a joint reconstruction specialist for definitive management of the bilateral acetabular fractures. He complained of constant pain and bedridden status. Physical examination was remarkable for tenderness to palpation on both hips, a significantly limited range of motion due to severe pain, bilateral lower extremity muscle atrophy, and a sacral pressure ulcer, which was managed by the enterostomal care service. The neurovascular examination was unremarkable. The 3-month follow-up imaging demonstrated bilateral healed acetabular fractures and posttraumatic hip arthritis with protrusio (Fig. 3). The patient was a prior ambulator with a very active lifestyle suffering from bed-confinement complications. A lengthy discussion was done with the patient and family members regarding different treatment options and potential complications. The patient provided consent for simultaneous bilateral THA, if possible, given the benefits of faster mobilization, pain control, and single anesthesia exposure.

A standard posterolateral approach to the hip was used. Dissection was carried out, and the short external rotators were released off the femur, followed by a posterior L-flap capsulotomy which was tagged using a nonabsorbable suture for later capsular repair. The femoral head was fused with the acetabulum, and dislocation was not possible, requiring an in situ femoral neck osteotomy. Visualizing the femoral head showed posttraumatic changes and cartilage erosion in multiple areas. The specimen was then secured on the back table for cancellous bone graft harvest. The acetabulum and the medial wall were healed. The acetabulum was cleared of all soft tissue from the cotyloid fossa. Hemispherical reaming was possible due to intact anterior and posterior columns, and an excellent rim fit was obtained. The femoral head was reamed on the back table, and cancellous bone was harvested. The remaining cartilage of the femoral head was removed until the subchondral bone was appreciated. It was then placed in the medial wall to fill the space medial to the trial cup. The medial acetabulum was filled with the cancellous bone autograft from the removed femoral head. A 56-mm Stryker Trident Hemispherical cup (Stryker, Mahwah, NJ) was placed with excellent intrinsic stability and reinforced with 2 screws. The proximal femoral canal was exposed and prepared in a normal fashion. A standard offset Stryker Accolade II femoral component was implanted after trialing (Stryker, Mahwah, NJ). Limb length, hip stability, and soft-tissue tension appeared adequate. After irrigation, the capsule and the short rotator tendons were repaired anatomically, followed by a layered closure. A dressing was applied over the wound.

Figure 1. Pelvis anteroposterior radiograph.

An intraoperative assessment was performed before the contralateral procedure. The patient had normal vital signs, minimal blood loss with intraoperative hemoglobin of 12.3 g/dL, and surgical time under 90 minutes before closure started. The decision was made to proceed with the contralateral side. The patient was repositioned and draped. A posterolateral approach was used with the same operative technique and findings as the contralateral procedure. However, the contralateral hip required a 60-mm Stryker Trident Hemispherical cup (Stryker, Mahwah NJ) with the same-size standard offset Stryker Accolade II femoral component (Stryker, Mahwah NJ) to achieve adequate limb length, hip stability, and soft-tissue tension. The patient was awakened from anesthesia and transferred to the recovery room with no apparent immediate complications. Fluoroscopy guidance was used during the procedure, and formal radiographs were taken immediately after surgery (Fig. 4).

The patient had standard postoperative care and instructions to bear weight as tolerated with standard posterior hip precautions. He was discharged without complications and transferred for inpatient rehabilitation on postoperative day 3 with an uneventful recovery in the hospital. After 2 weeks of intense physical therapy, the patient was discharged home without complications.

The patient was doing well at the first follow-up visit, and his quality of life was already improving. The hip incisions healed, and he was ambulating with a walker without distance limitations. Subsequent follow-up visits were encouraging as he continued to improve on normal activities of daily living. At the 6-month follow-up visit (Fig. 5), the patient regained complete functionality with resolution of bed-confinement complications. He was not requiring assistive devices for ambulation and was very happy with his results.

Discussion

We have described a case of bilateral complex acetabular fractures secondary to alcohol-withdrawal seizures. Initial management was centered on seizure control requiring aggressive therapy and supportive measures. It was not until the trauma bay imaging request that the bilateral acetabular fractures were diagnosed. Early intervention was not feasible due to the patient's numerous complications, imposing delayed management.

After a seizure episode without direct trauma, fractures have been reported in only 0.03% of the cases [2,8] with bilateral acetabular fractures being exceedingly rare [5]. High-energy trauma has been historically associated with acetabular injuries,

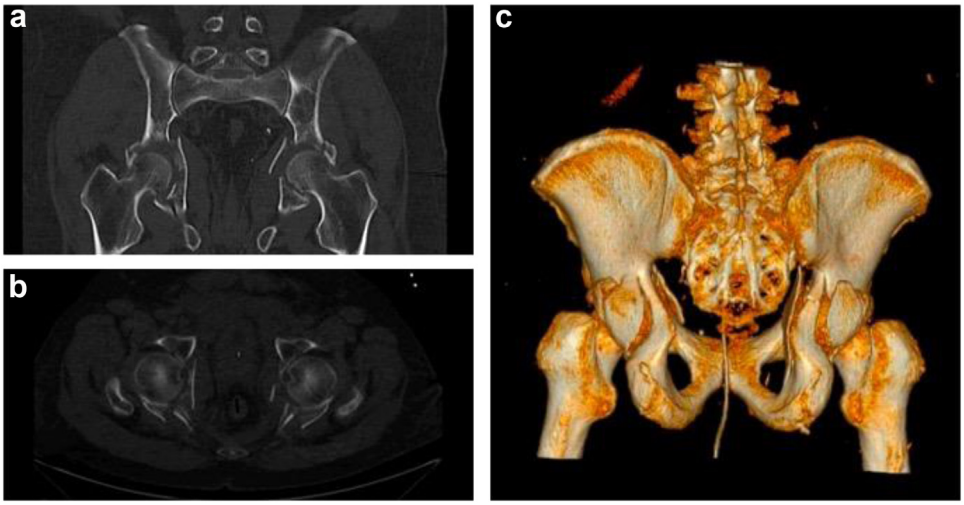

Figure 2. Computed tomography of the pelvis: (a) coronal view, (b) axial view, (c) 3D reconstruction.

commonly observed with mechanisms such as motor vehicle accidents, high-altitude falls, or pedestrians hit by a vehicle [9]. However, the association of tonic-clonic activity with acetabular fractures is poorly known [10]. Consequently, a delayed diagnosis could occur even for well-educated and experienced physicians familiarized with common seizure-associated trauma but unaware of this atypical manifestation [8,10].

A high index of suspicion for acetabular fractures should be demonstrated toward postictal patients complaining of groin pain, inability to ambulate, or pelvic bruising [6,11]. Pelvis radiographs are usually enough to reveal most acetabular fractures [6]. However, a pelvis CT is frequently obtained to assess fracture complexity, surgical planning, or when radiographs are negative, but the clinical suspicion remains [6,12].

Decision-making regarding the best treatment approach for acetabular fractures remains challenging due to the variability in treatment algorithms and the literature-reported outcomes [13]. Traditionally, conservative management consisted of prolonged bed rest for minimally displaced fractures or patients who are poor surgical candidates [14]. However, special precautions are needed in the elderly population as bed confinement can lead to poor outcomes and increased mortality due to bed-confinement complications [14]. Among the surgical alternatives, osteosynthesis (ie, ORIF) is considered the standard of care for young and middle-aged patients with displaced acetabular fractures, with the goal of an anatomic reduction [13]. However, multiple studies report that ORIF provides inferior outcomes in the elderly, with many patients requiring conversion to THA [13,15-18]. Patient-specific factors such as age >40 years, nonanatomic fracture reduction, prolonged hip dislocation, articular cartilage injury, acetabular impaction, severe posterior acetabular wall involvement, posttraumatic osteoarthritis, and previous contralateral hip arthroplasty have been associated with an increased risk for THA conversion [7,19,20].

THA has been proposed as a surgical option to manage displaced acetabular fractures as it allows immediate full weight-bearing and potentially reduces the need for further surgery [13]. Current indications for primary THA include poor bone quality, combined acetabular and femoral neck fractures, pathologic fractures, coexistent hip osteoarthritis, significant involvement of posterior wall and comminution, or significant impaction of the femoral head [19,21]. This procedure could be considered in the acute setting with or without ORIF or in a delayed approach for an intentionally staged THA after union, failed surgical fixation, or treatment of posttraumatic osteoarthritis [13]. Previous studies have shown better outcomes with primary THA than performing THA after a failed ORIF as they could be complicated by heterotopic ossification, extensive scar tissue, obstructive hardware, or periprosthetic joint infection [13,22,23]. Moreover, Mears and Velyvis suggest that for those acute acetabular fractures with low likelihood of a favorable outcome irrespective of the initial treatment, the role of a therapeutic alternative such as a primary THA should be considered [22].

In patients with bilateral acetabular fractures, the decision between simultaneous and staged THA could represent another challenge. Previous studies have shown no clinical differences

Figure 3. Preoperative pelvis anteroposterior radiograph.

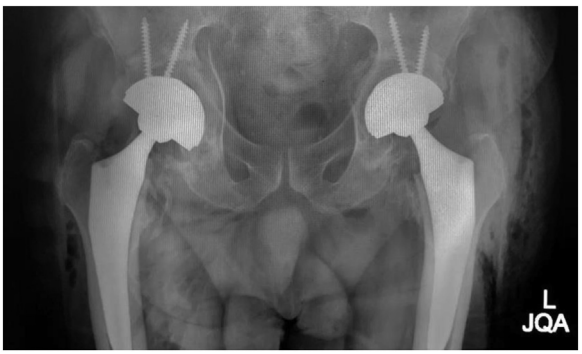

Figure 4. Postoperative pelvis anteroposterior radiograph.

Figure 5. Six-month follow-up pelvis anteroposterior radiograph.

when comparing simultaneous (ie, one-stage) and staged (ie, two-stage) bilateral THA [24]. Moreover, simultaneous THA has several benefits, such as single anesthesia administration, shorter length of stay, faster rehabilitation, and improved cost-effectiveness [8,25]. Yoshii et al. demonstrated no significant differences between simultaneous and staged procedures regarding cardiopulmonary complications, thromboembolic events, stroke, fat embolism, surgical site infection, and rate of allogenic transfusion [8,26]. Therefore, as long as the patient is considered low risk per their American Society of Anesthesiologists classification, a simultaneous bilateral THA represents a safe and feasible alternative [27].

In the presented case, the initial management of the acetabular fractures was nonoperative due to a lack of initial medical clearance. The patient underwent delayed THA 3 months later to restore joint anatomy and provide immediate ambulation capacity to a patient with initial signs of bed-confinement complications. Moreover, considering the potential benefits, the anesthesiology service input, and the patient's perspective, we opted for a simultaneous procedure. To the best of our knowledge, there are no published data describing delayed simultaneous THA for treating seizure-induced bilateral acetabular fractures with protrusio. Our clinical outcomes were excellent, and the patient regained complete functionality.

Summary

This case demonstrates a rare occurrence of bilateral acetabular fractures after an alcohol-withdrawal seizure. Early intervention was not feasible due to the patient's numerous complications. We performed a delayed simultaneous THA for fracture management 3 months later with excellent functional outcomes. Our technique represents an excellent alternative for primary management of acetabular fractures even in atypical and challenging cases, proving effective for anatomic joint restoration and functional recovery.

Conflicts of interest

The authors declare there are no conflicts of interest.

For full disclosure statements refer to https://doi.org/10.1016/j.artd.2022.08.013.

Informed patient consent

The authors confirm that informed consent has been obtained from the involved patient or if appropriate from the parent, guardian, power of attorney of the involved patient; and, they have given approval for this information to be published in this article.

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