Simultaneous Use of Kocher-Langenbeck and Lateral Window Approaches for Transverse Acetabular Fracture Open Reduction and Internal Fixation

A Case Report

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Abstract

Case: An otherwise healthy 39-year-old man presented after a fall from 30 feet with a right transverse, transtectal acetabular fracture. The fracture was not reducible with an isolated anterior or posterior approach. A simultaneous combined approach was used in the lateral decubitus position. The fracture was appropriately reduced and stabilized.

Conclusions: This combined approach with the patient in the lateral decubitus position was effective without requiring repositioning of the patient during surgery. This technique may be helpful for reduction of challenging transverse acetabular fractures.

Displaced acetabular fractures are routinely managed by open reduction internal fixation[1]. There are many variables to considering when planning the reduction and fixation, and the optimal approach is dictated by the nature of the fracture and associated displacement[2,3]. Transverse acetabular fractures (as described by Letournel and Judet) are unique in that they consist of a single fracture plane, yet they involve both columns[4]. Because of this, transverse acetabular fractures can be directly reduced through either anterior or posterior approach.

The most common anterior approaches include the ilioinguinal and the anterior intrapelvic (AIP) approaches[5]. These approaches are typically performed with the patient in the supine position. Often, the AIP approach is combined with the lateral window of the ilioinguinal approach[5]. The most common posterior approach is the Kocher-Langenbeck approach, although variations have been described including the modified Gibson approach[6]. These approaches are performed in either the prone or lateral position. Collinge et al. found no significant difference in reduction quality based on the patient position when graded using the Matta criteria[7]. It is often discussed that the prone position may help minimize the gravitational deforming force compared with the lateral position[7].

Rarely, combined anterior and posterior approaches can be used[4,8,9]. As previously described, these procedures require patient repositioning or multiple operative teams. Criticisms to this combined method include prolonged operative times and increased blood loss[10]. The case presented is unique in the literature because both the anterior and posterior approaches were used simultaneously without repositioning to reduce the fracture by a single surgical team.

The patient was informed that the data concerning the case would be submitted for publication, and he provided consent.

Case Report

An otherwise healthy 39-year-old man presented after falling 30 feet when scaffolding collapsed at work. His orthopaedic injuries included a right subtrochanteric femur fracture and a right transtectal, transverse acetabular fracture (Fig. 1). Significant nonorthopaedic injuries included a liver laceration requiring operative repair. On presentation, he was taken urgently for an exploratory laparotomy. His orthopaedic injuries were temporized with distal femoral traction.

Two days after admission, he was cleared for orthopaedic surgical intervention. He was positioned supine on a flattop radiolucent table. The subtrochanteric femur fracture was addressed first. After fixation of the subtrochanteric fracture, the lateral window of the ilioinguinal

Disclosure: The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (http://links.lww.com/JBJSCC/A871).

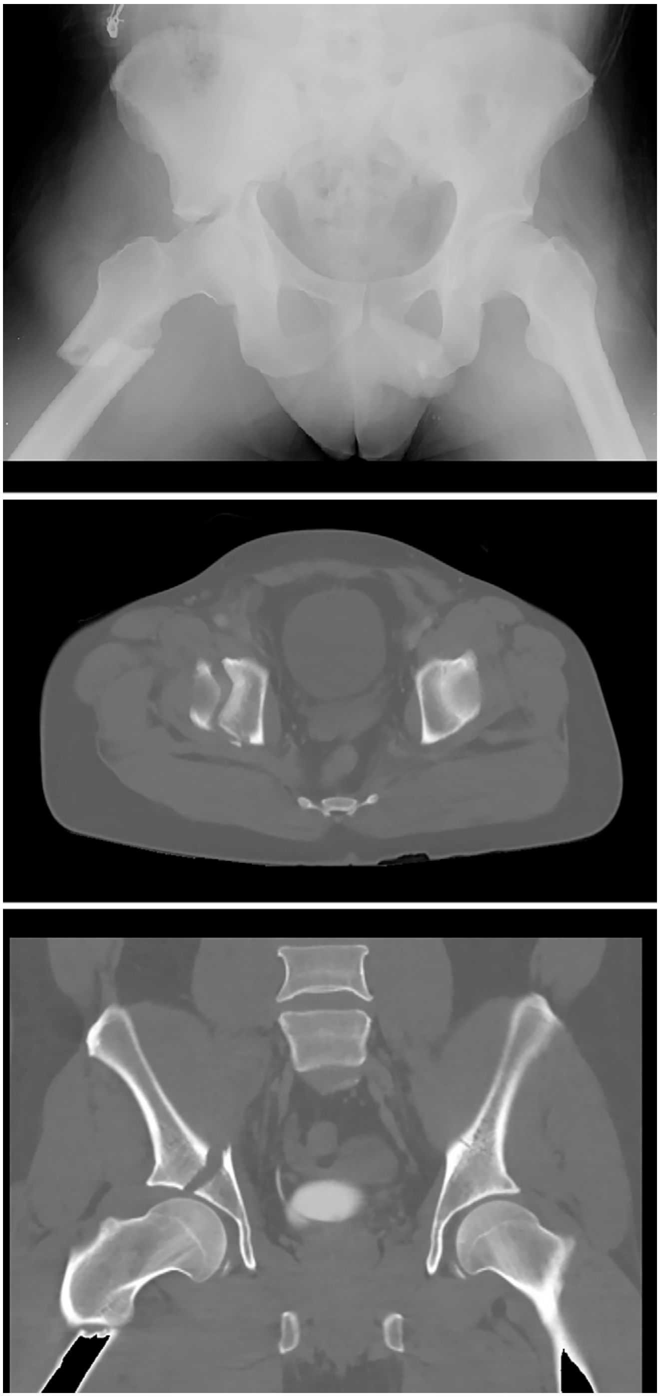

Fig. 1

(Top) Initial Anterior-posterior pelvis X ray from the trauma bay showing a right subtrochanteric femur fracture and a right acetabular fracture. (Middle) Axial computed tomography (CT) showing a transverse acetabular fracture without comminution or marginal impaction. (Bottom) Coronal CT image showing involvement of the weight-bearing dome.

approach was exposed. The preoperative plan was to use the lateral window to place a clamp and then anterior and posterior column screws once the reduction was achieved. The anterior column reduction was evaluated by palpation and fluoroscopy. An offset pelvic clamp (Zimmer) was placed over the lateral aspect of the iliac wing. The inner table and anterior column portion of the fracture seemed to be reduced; however, the posterior column had persistent displacement despite multiple reduction attempts. It was thought that the fracture had a persistent rotational deformity, which would require direct posterior reduction. The degree of displacement and transtectal location may have contributed to the difficulty in achieving an appropriate reduction. Because of concern for complications associated with prolonged surgery (the patient already had laparotomy and abdominal closure), the decision was made to forego further surgery at this point. The patient was placed back into distal femoral traction.

Two days later (4 days after injury), the patient returned to the operating room. He was placed in the left lateral decubitus position, and a Kocher-Langenbeck approach was performed.

Fig. 2

Sawbones pelvic model with reduction clamps in place showing the anterior column clamp (top) and posterior column clamp (bottom).

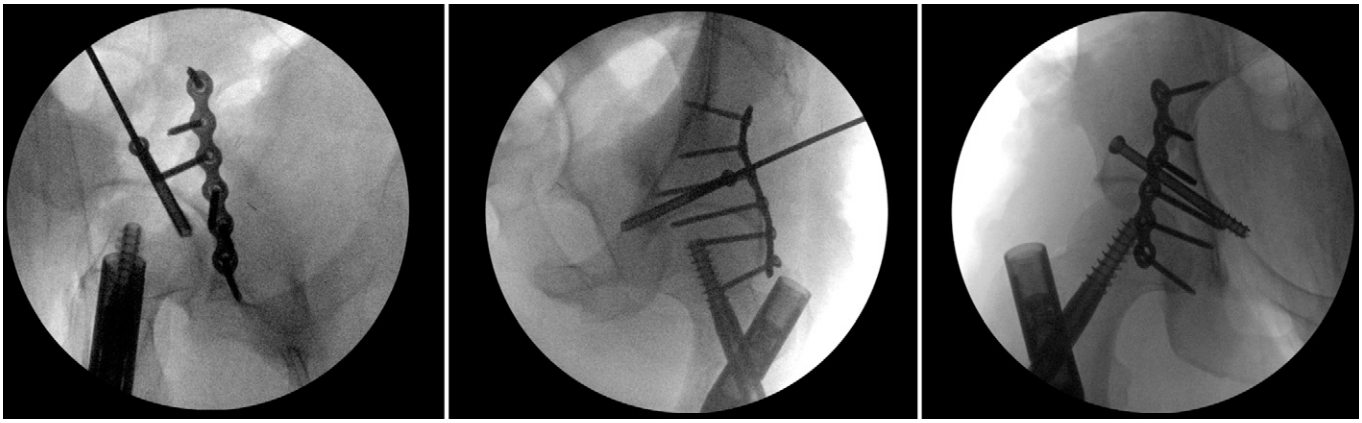

Fig. 3
Intraoperative fluoroscopic images showing the final fixation construct with a recon plate on the posterior column and a 6.5-mm anterior column screw.

A combination of Weber and collinear clamps was used in conjunction with traction and lower extremity manipulation to attempt to reduce the fracture. The posterior aspect of the fracture appeared reduced; however, the anterior column remained displaced. At this time, the lateral window was reopened, and a pelvic reduction clamp was placed on the anterior column so that both clamps were on simultaneously (Fig. 2). This additional maneuver resulted in appropriate reduction of both the posterior and anterior columns. The fracture was stabilized using a posterior 3.5-mm 6-hole pelvic reconstruction plate and a 6.5-mm cannulated anterior column screw (Fig. 3).

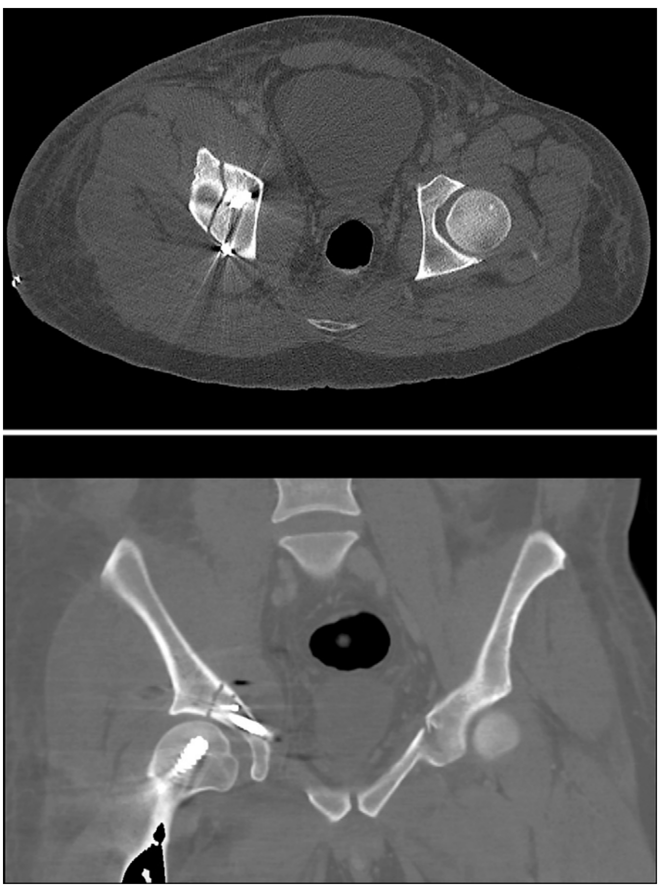

Fig. 4
Postoperative computed tomography with axial (top) and coronal (bottom) images showing interval reduction and fixation.

Following surgery, the patient's weight bearing was restricted to touch-down weight bearing. A postoperative computed tomography (CT) scan was obtained to evaluate for persistent intra-abdominal bleeding, and the acetabular reduction and fixation was visualized (Fig. 4). The patient was discharged 11 days following the initial injury. He was most recently seen in the clinic 13 months after his surgery. He did have a low level of chronic right hip pain; however, it did not limit his normal daily activities. Radiographs from that visit are seen in Figure 5.

Discussion

Acetabular fractures commonly occur due to high-energy trauma, such as motor vehicle accidents or falls from a height[1]. The treatment of these injuries can vary widely based on the injury and must be individualized[2,3]. Classifying the fracture pattern can help conceptualize the anatomy and inform preoperative surgical planning. The case presented was classified as a transtectal, transverse acetabular fracture[4]. Transverse acetabular fractures, such as this one, may be appropriate to address from either an anterior or posterior approach with the expectation that the exposed column is directly reduced and the other column is indirectly reduced.

In this case, the unexposed column was not reducible by indirect methods. Because of the unique circumstances, there was an attempt to directly reduce the anterior column and indirectly reduce the posterior column, as well as a separate attempt to directly reduce the posterior column and indirectly reduce the anterior column. Both of these were unsuccessful. Finally, the columns were simultaneously

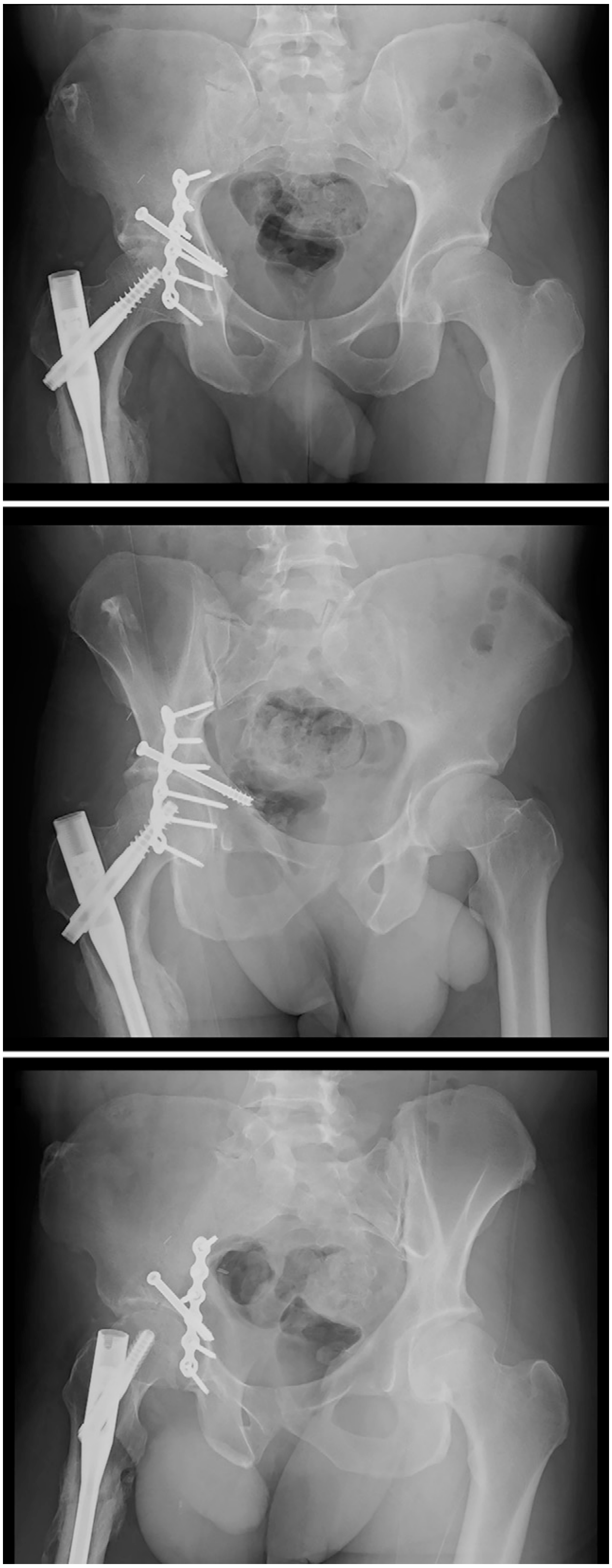

Fig. 5
Final radiographs obtained approximately 10 months postoperatively. From top to bottom: anteroposterior pelvis radiograph, obturator oblique radiograph, and iliac oblique radiograph.

exposed and directly reduced, resulting in an adequate reduction and fixation as evidenced by the postoperative CT scan seen in Figure 3 (obtained to evaluate for persistent intra-abdominal bleeding by the critical care team). It is worthwhile to note that the treating surgeon routinely uses the prone position to approach the posterior acetabulum. In this case, the patient was specifically placed in the lateral decubitus position to have the lateral window of the ilioinguinal approach available if needed. This change from the typical routine was decided on after the difficulty in obtaining a reduction in the supine.

The combination of anterior and posterior approaches has previously been described to stabilize complex acetabular fractures[4,8,9]. Several authors describe the use of the combined anterior and posterior approach, and each publication notes utilization of the combined approach in less than 5% of their cases[4,8,9]. A more recent study is consistent in showing the rarity in utilization of the combined approach[2]. Several of these studies note repositioning of the patients intraoperatively, as well as utilization of multiple surgical teams. There were no descriptions of a single surgical team completing a Kocher-Langenbeck and lateral window approach simultaneously in the lateral decubitus position.

Optimal patient positioning for transverse acetabular fracture open reduction and internal fixation is not well established. A retrospective study looked at a series of patients with transverse acetabular fractures and noted that there was a trend toward worse reductions in the lateral position compared with the prone position; however, the findings were not statistically significant[7]. The patients were a consecutive series with 33 treated from the lateral position, followed by 33 treated in the prone position. The positioning was not selected based on specific fracture characteristics. The authors noted that the study may have been underpowered, and a difference may exist that was not identified. In this case, if the patient was positioned prone during the Kocher-Langenbeck approach, there may have been difficulty obtaining the anterior column reduction. Placing the patient in the lateral position leaves the option of a lateral window approach if the indirect reduction methods are inadequate for the anterior column. However, this must be accounted for preoperatively, and appropriate draping is required.

It is unusual that an acetabular fracture requires simultaneous dual approaches for proper reduction. In this patient, placement of clamps from either approach singularly was insufficient for fracture reduction. There was concern after the first failed reduction that plastic deformity may have occurred; however, this was shown to be false as the reduction was successful from the combined approach. This may have been due in part to plastic deformity through the fracture. However, simultaneous placement of anterior and posterior clamps resulted in appropriate reduction of the fracture. This combined approach with the patient in the lateral position was effective without requiring repositioning of the patient during surgery. This technique was shown to be effective for persistent displacement in this transverse acetabular fracture, and it is a useful tool for surgeons to have available. ■

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