CASE REPORT

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Femoral Traction-Assisted Percutaneous Iliosacral Screw Fixation for Neglected Vertical Shear Pelvis Fracture: A Case Report

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Abstract

Background: Vertical shear open pelvic fractures are severe, unstable injuries that often require definitive posterior stabilization beyond external fixation. We report a case of a 20-year-old male, two months after a road traffic accident, presenting with bilateral pubic rami fractures, superior displacement of the right hemipelvis. Femoral traction-assisted reduction was performed using a temporary external fixation construct by connecting iliac Schanz pins to a distal femoral traction pin to apply controlled axial traction, followed by percutaneous S1 and S2 iliosacral screw fixation under fluoroscopic guidance. At three months, the patient was pain-free, walking independently, and showed minimal limb shortening, demonstrating that femoral traction-assisted reduction with percutaneous screw fixation is a minimally invasive and effective approach for neglected vertical shear pelvic fractures.

Keywords: External fixation, Femoral traction-assisted reduction, Neglected open pelvic fracture, Vertical shear pelvic fracture

Introduction

Pelvic fractures are uncommon, accounting for 3–8% of skeletal injuries, and usually result from high-energy trauma such as road traffic accidents or falls from height.[1,2] They carry a high risk of hemodynamic instability, associated visceral and neurovascular injuries, and mortality rates up to 20% in unstable patterns.[3] Vertical shear (VS) fractures represent one of the most unstable types, caused by vertically directed forces through one hemipelvis, resulting in vertical and posterior displacement due to disruption of both anterior and posterior pelvic ring elements.[4,5] These injuries are associated with significant bleeding and require rapid recognition, resuscitation, temporary mechanical stabilization, and definitive fixation.

External fixation provides initial anterior stability but is insufficie nt to control vertical displacement, particularly in neglected cases.[6] Definitive posterior stabilization is essential once the patient is hemodynamically stable, with options including percutaneous or open iliosacral screws, posterior plating, or spinopelvic fixation. Anterior fixation is often combined with posterior fixation for optimal reduction.[4,5] We present a case of a neglected vertical shear fracture initially managed with

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external fixation alone, treated at our center with minimally invasive percutaneous sacroiliac screw fixation for posterior stabilization, combined with anterior external fixation and distal femoral skeletal traction.

Patient and Methods

A 20-year-old male, weighing 57 kg and measuring 5 feet 6 inch in height, presented to the hospital 2 months following a road traffic accident. Imaging studies, including plain radiographs and subsequent computed tomography (CT) scans, demonstrated bilateral superior and inferior pubic rami fractures associated with right-sided superior hemipelvic displacement with foot drop. The patient had a suprapubic catheter in situ for a urinary bladder injury. Initial management at the referring center included application of an external fixator and distal femur skeletal traction.

Surgical Technique

Following induction of general anesthesia, the patient was positioned supine on a radiolucent operating table, with the body placed close to the table edge

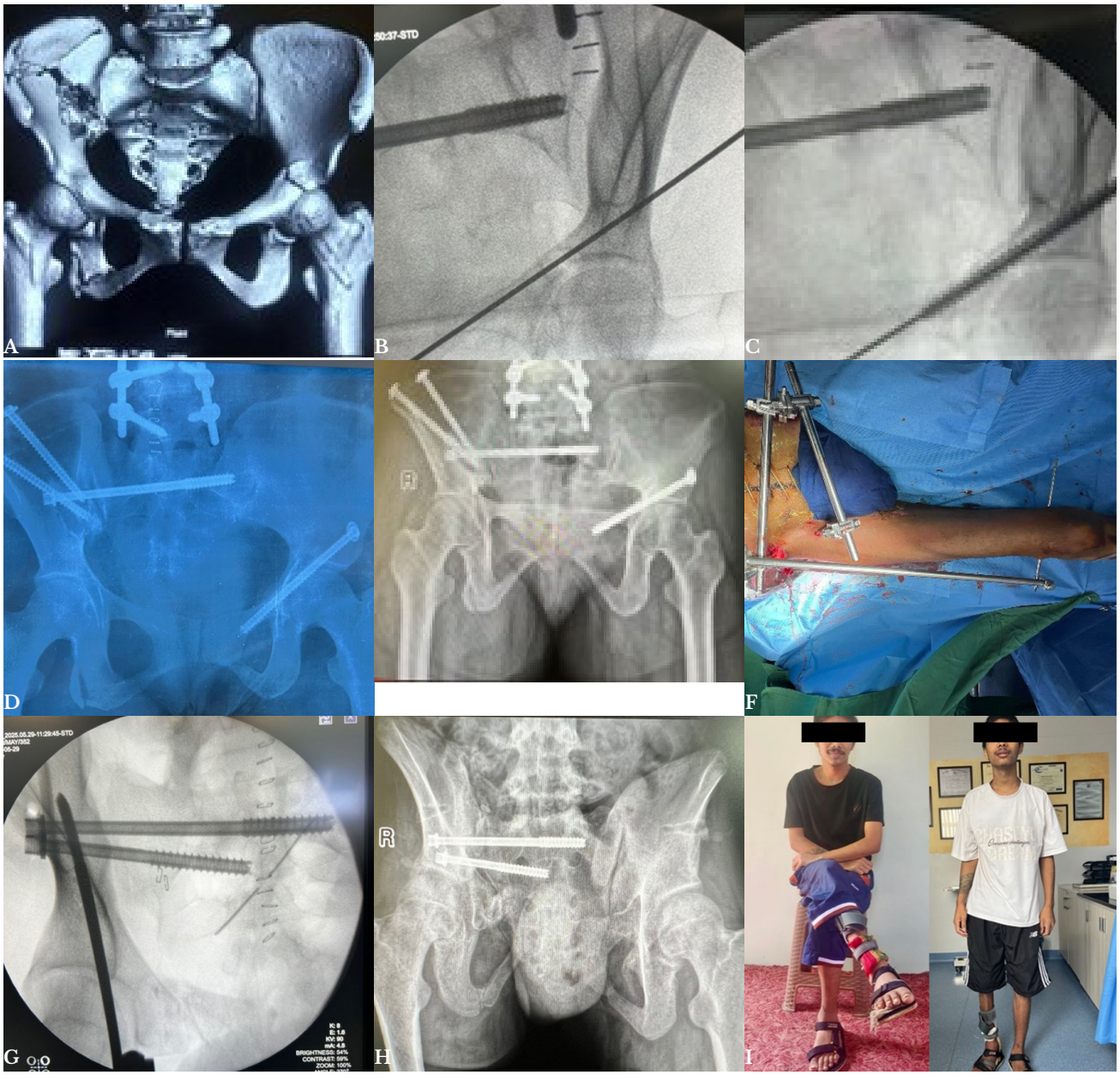

Figure 1 (A, B) Radiographs and CT showing bilateral pubic rami fractures with right hemipelvic displacement; (C) external fixator at referring center with persistent large vertical displacement; (D–F) intraoperative views of iliac crest Schanz pin connected to distal femoral traction pin for sacroiliac stabilization; (G) S1 and S2 screw placement after reduction; (H) post-fixation radiograph with screw fixation and external fixator with only 17mm vertical displacement of right hemipelvis (I) Clinical image at three months demonstrating slight limb shortening while standing and sitting cross-legged on a chair.

to facilitate optimal C-arm maneuverability and permit intraoperative fluoroscopic imaging in multiple planes, including anteroposterior (AP), inlet, outlet, iliac oblique, and obturator outlet views.

Using the lateral window approach, a curved incision was made from the anterior superior iliac spine along the iliac crest, followed by dissection through the soft tissue planes and subperiosteal elevation of the iliacus to expose the anterior sacroiliac joint. After debridement of the SI joint via the lateral window, longitudinal traction was applied via the pre-existing distal femoral skeletal traction pin to reduce the SI joint. The iliac crest external fixator Schanz pin was then connected to the distal femoral traction denham pin with a connecting rod to maintain reduction (Figure 1).

Reduction was confirmed under fluoroscopy in anteroposterior, inlet, and outlet views, following which sacroiliac joint fixation was performed percutaneously. Guidewires were placed for S1 and S2 screws, with trajectories confirmed on inlet, outlet, and lateral views. Cannulated partially threaded screws (7.2 mm × 90 mm at S1; 7.2 mm × 70 mm at S2) were inserted. For additional anterior stability, a supra-acetabular external fixator was applied. Finally, the temporary traction construct (Iliac crest to distal femur) was removed.

Discussion

Vertical shear pelvic fractures are highly unstable injuries, typically resulting from high-energy axial trauma and causing superior hemipelvic displacement with disruption of the sacroiliac joint and pubic rami.[7,8] Delayed or neglected fractures, as in this case, are complicated by soft tissue contractures, fibrosis, and early malunion, making anatomical reduction more challenging.[9] Achieving accurate realignment is essential to prevent leg length discrepancy, chronic pain, and gait impairment.[10]

In this patient, we employed a femoral traction-assisted reduction using a temporary external fixation construct. Bilateral iliac Schanz pins were connected via rods, and a distal femoral pin was incorporated to apply controlled axial traction, facilitating closed reduction of the sacroiliac joint, which was contraindicated due to infection.

Once reduction was achieved, percutaneous iliosacral screw fixation at S1 and S2 provided rigid stabilization and allowed early mobilization.[11,12] This minimally invasive approach preserved soft tissue integrity, reduced operative time, and resulted in favorable functional outcomes, with at three months postoperatively, the patient was pain-free, and was able to sit and ambulate. While promising, further studies are required to assess the reproducibility and long-term efficacy of femoral traction-assisted reduction in neglected pelvic fractures.

Conclusion

Temporary femoral traction-assisted reduction can be used an effective tool to reduce and fix the sacroiliac complex in vertical shear pelvis fractures, and may be invaluable in neglected cases such as the one presented here.

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