

Open Lumbosacral Dislocation: A Case Report

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ABSTRACT

Open injuries in the lumbar spine are rare. We describe a 20-year-old woman who presented with persistent weaknesses due to an associated lumbar plexus injury. She underwent surgical treatment of lumbosacral dislocation with prompt reduction with debridement and stabilization. At 7 months postoperatively, her symptoms showed signs of recovery. We believe the immediate reduction of the dislocation prevented permanent neurological injury, and stabilization helped healing and early mobilization. In keeping with the classical teaching of open fracture treatment, prioritizing early initiation of intravenous antibiotics and prompt debridement and stabilization may have helped decrease the long-term morbidity and overall sequelae of this unique and devastating injury.

Keywords: Open Fracture, Lumbosacral, Spinopelvic, Fracture Dislocation

INTRODUCTION

Traumatic lumbosacral dislocations are uncommon injuries typically caused by high-energy mechanisms. They are often associated with open injuries to the bowel or perineal structures.¹ These dislocations are distinct from spinopelvic dissociations that are typically associated with fractures of the sacrum, categorized by the Denis classification as type 3 fractures with U- or H-shaped patterns. It is suggested that lumbosacral dislocations are due to the extensive ligamentous and muscular anatomy in the lower lumbar region and robust soft-tissue envelope.

Notably, open injuries in the lumbar spine are exceedingly uncommon and have only been reported after projectile or blast injuries.²⁻⁴ We present the case of a crush injury resulting in open lumbosacral dislocation, in which the posterior open wound was independent from the perineum or bowel.

CASE REPORT

A 20-year-old woman presented to our level 1 trauma center after being transported directly from the field by a helicopter. She had been working under a large trailer when the supporting stand failed, which crushed and then rolled her. After about 10 to 15 minutes, her siblings were able to raise the trailer and extract her. Results of initial physical examination indicated an intra-abdominal injury and a small wound about 3 cm over her lower right lumbar spine. Initial neurological examination findings showed motor and sensory deficits consistent with right lumbar plexus injury. Presentation findings were mainly consistent with avulsion of the L4-S1 nerve roots; however, owing to bilateral innervation, she did not have any numbness in the perirectal area or any issues with sphincter tone or voiding.

Computed tomography (CT) scans of the L5-S1 level showed a fracture of the right superior facet, dislocation of left facet joint, and fractures of the L4 and L5 spinous processes. There were left lateral listhesis of L5 vertebral body on S1; however, the spinal canal appeared to remain patent on initial CT scan (Figures 1A through 1C). The soft-tissue injury was extensive, with subcutaneous air and soft-tissue zone of injury extending from the fracture to the posterior lumbar wound.

Because of the urgent nature of her bowel injury and open fracture, the patient was immediately taken to the operating room. Magnetic resonance imaging (MRI) and radiographs were thus not obtained. Laparotomy findings revealed multiple colonic injuries, which the general surgery trauma team treated expediently. During exploration, it was noted that the wound on her lumbar spine communicated with both the retroperitoneal space and the lower posterior laceration. The abdominal injuries were stabilized, and the laparotomy wound was closed. To explore the posterior wound and stabilize the spinal fractures, the decision was made to transport the patient to a new operating room with a sterile field.

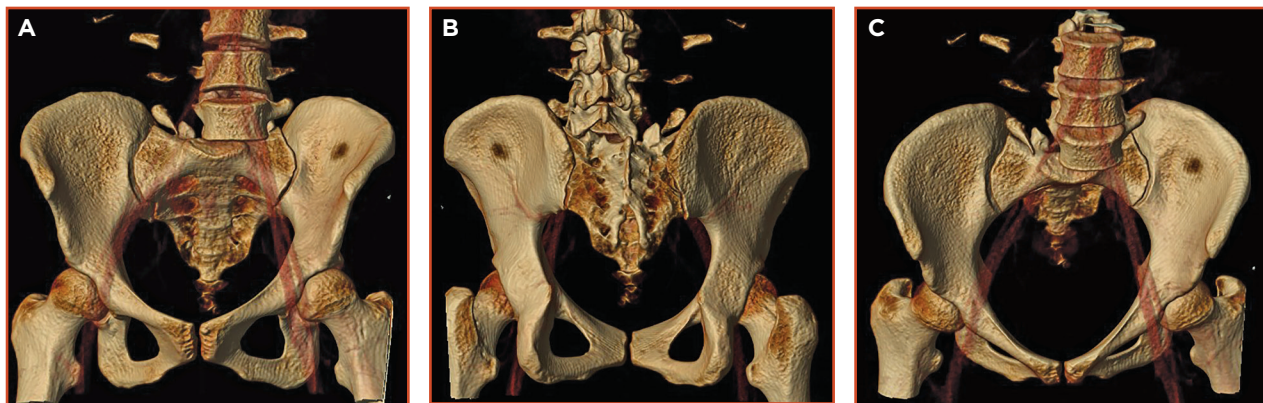


Figure 1. On initial presentation, 3D reconstruction of a computed tomography scan shows fracture dislocation. A) Anterior view. B) Posterior view. C) Inlet view.

The posterior wound was initially explored and found to communicate directly with the lumbar spine fractures. At this time, a separate midline spinal incision was made using a standard posterior approach. This involved the traumatic wound to expose the lumbar spine and proximal sacrum up to the S2 body. The paraspinal muscles appeared to be avulsed off the posterior spinal structures. The wound was thoroughly irrigated with bacitracin saline through cystoscopy tubing; additionally, all devitalized soft tissue was removed. Afterward, the spinal column was reduced and stabilized using a posterior spinal fusion construct extending from the L3 to the pelvis. Surgical fixation of the pelvis was performed by placing S2-alar-iliac screws in the sacrum and L5, L4, and L3. The L3 was chosen owing to the extensive soft-tissue injury, and the stripping of muscle from the lumbar spine on the right and transverse process fractures indicated ligamentous rupture in the lumbosacral region. When the pedicle screws were placed, two contoured rods were used to gradually reduce the dislocation and realign the spine to the pelvis. Fusion was facilitated by using a local autograft, cancellous allograft, and bone sponges (per our institution's protocol). Vancomycin and tobramycin powders were placed into the incisional layers, followed

by a standard layered closure. A small portion of the traumatic wound was unable to close owing to tissue quality; subsequently, a Hemovac drain was placed out of the zone of injury and replaced with a vacuum-assisted closure device.

After the patient awakened from anesthesia, she was transported to the surgical trauma intensive care unit. For 5 days postoperatively, the patient was kept on intravenous antibiotic therapy with Zosyn to cover any possible contamination with bowel flora. At 5 days postoperatively, neurological examination results were consistent with right-sided lumbar plexus injury. Several weeks later as an outpatient, her catheter was removed and she was able to void spontaneously. At 6 weeks postoperatively, her wound had completely healed without concern for infection. She continued to experience right-sided weakness in her L3-5 myotome yet could walk without aides. She was continent in bowel and bladder functions.

At 7 months postoperatively, the patient had mild weakness with dorsiflexion and plantar flexion on the right L4 to S1. She noted stiffness and occasional paresthesias on the right lower leg. A nerve conduction study was not pursued owing to the promising injury healing. She did not use her ankle-foot orthosis because she found it unhelpful as she gradually recovered more strength. The incision that involved the traumatic wound was healed and showed no signs of infection (Figures 2A and 2B, Figure 3).

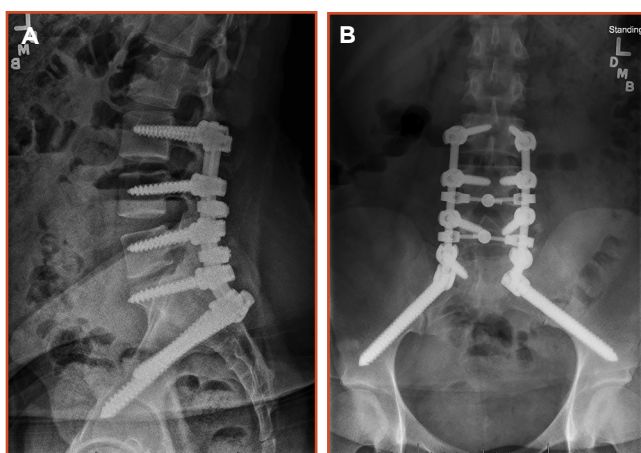


Figure 2. At 7 months postoperatively, radiographs show reduction and posterior spinal fusion from L3 to the pelvis. A) Lateral view. B) Anteroposterior view.



Figure 3. At 7 months postoperatively, surgical incisions are healing alongside the lateral oblique traumatic wound.

DISCUSSION

Open fractures are common with well-documented classification systems, treatment protocols, prognoses, and outcome data.³ However, fractures involving the spine are rarely open injuries.^{5,6} Many studies exist on penetrating trauma (eg, gunshot wounds and spine fractures), but information is limited regarding non-penetrating trauma.⁷⁻¹⁰ In the past 20 years, several case reports have been published involving traumatic spondylolisthesis and open injuries, with most including the thoracic spine.^{6,11,12}

About 75% of lumbosacral dislocations can be attributed to motor vehicle accidents, falls from heights, or pedestrians struck by automobiles.³ Lumbosacral dislocations are often associated with life-threatening, intra-abdominal injuries that are managed before definitive operative fixation of the lumbar spine and pelvis.¹¹ Our patient had promising neurological recovery. Additionally, she had no wound or deep infection issues in her spinal fracture, which was in a setting contaminated by both bowel and external environment. We credit this to multiple factors. First, she received prompt antibiotics immediately on arrival at our facility, which has been shown to decrease infection in open fractures.³ Second, she was taken to the operating room shortly after initial presentation where her bowel injury was treated promptly. Lastly, her open spinal injury was addressed promptly in the same anesthesia setting.

Aihara et al¹³ developed a classification system in 1998 that best fits the injury pattern described in the current case. Their classification is based on L5 dislocation, which is differentiated by unilateral versus bilateral facet dislocation versus fracture. In the current case, the injury pattern was most consistent with type 3 fractures, with unilateral lumbosacral facet dislocation and contralateral facet fracture. This differs from the classification by Wiltse et al,¹⁴ which describes posttraumatic spondylolisthesis occurring in the late term (ie, weeks to months). This injury also differs from spinopelvic dissociations typically seen with Denis type 3 sacral fractures, with a U- or H-shaped pattern.¹⁵

Neurological injury is common in lumbosacral dislocations.¹⁶ Our patient's primary neurologic deficit was weakness with right-sided dorsiflexion and plantar flexion. In a comprehensive review of 70 patient case reviews and reports, Grivas et al¹¹ reported a 58% rate of neurologic deficits in these types of injuries.

Indications for open intervention included the open injury, neurologic deficits, and notable displacement of the lumbosacral junction. Early debridement and stabilization with reduction of the dislocation helped the patient recover safely and comfortably.¹⁷ Conservative treatment of these injuries has shown unsuccessful results in previous case reports.^{11,15} Posterior spinal fusion using pedicle screws has become the standard of care for treating this injury,

with some authors advocating staged procedures with subsequent anterior interbody fusion.¹⁸ We deferred anterior surgical treatment because the patient was young; however, she was notified about the possibility of revision procedures if signs of nonunion developed. The goal of anatomical reduction and solid bony fusion was met for our patient, despite the open injury. The reduction technique helped ensure locked facets existed, and use of symmetric screws and rods helped successfully realign the spine.

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