

Case Report

L4-L5 Total Dislocation with *Cauda equina* Syndrome: A Case Report

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Background: There are very few reports in the literature that describe total anterolateral fracture dislocation of L4 and L5. To present a case report of L4-L5 total dislocation with major neurological deficit and open fracture of left distal femur.

Case Report: A 45-year-old Thai woman was transported to hospital with severe trauma, low back pain, a shallow lacerated wound on her back, and ecchymosis around waist and trunk. Closed reduction was initially performed and followed with posterior decompression, fusion, and instrumentation with pedicular screws and rod systems from L3-S1. Open reduction and internal fixation of distal femur was then performed.

Conclusion: At 1-year follow-up, the patient could ambulate with left ankle-foot orthosis (AFO) using a walker.

Keywords: Dislocations, Spine, *Cauda equina* syndrome, L4-L5 lumbar dislocation, Double vertebral bodies sign, Total dislocation

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Total lumbar dislocation, which is a high-energy injury, has not been commonly reported in the literature. Most reports in this clinical sub-domain describe fracture dislocation of the thoracic and thoracolumbar junction. There are a few reports of lumbar subluxation or dislocation⁽¹⁻⁷⁾; however, there are very few reports describing total lumbar dislocation.

Case Report

Here, we report the case of a 45-year-old Thai woman was transported to our hospital with severe trauma to her back and upper left leg. She had severe low back pain, a shallow lacerated wound on her back, and ecchymosis around her waist and trunk. She also had open wound and deformity at her left thigh.

On physical examination, the patient had normal findings of the chest, pelvis, and both upper extremities. She was unable to move both ankles and both feet. Neurological examination of the lower extremities revealed grade 4/5 muscle strength in right quadriceps and bilateral iliopsoas muscles. The patient had grade 2/5 muscle strength in the right hamstring

muscle. The left hamstring and quadriceps could not be evaluated due to severe pain from open fracture of distal femur. Paralysis of bilateral tibialis anterior, gastrocnemius-soleus, extensor hallucis longus, extensor digitorum communis, flexor hallucis longus, and peronei muscles was observed. Patient sphincter tone was loose and no voluntary sphincter contraction was observed. Bulbocavernosus reflex was positive. Strength of all muscles of the upper limbs was normal. There were sensory disturbances below L4 dermatome bilaterally. Femoral, popliteal, dorsalis pedis, and posterior tibial arterial pulses were intact. No blunt abdominal or thoracic injury was found.

At the start of treatment, intravenous cefazolin and tetanus prophylaxis were administered in the emergency room. Initial plain radiographs revealed L4-L5 dislocation (Fig. 1). CT whole abdomen and lumbosacral spine revealed presence of total L4-L5 anterolateral dislocation, and the axial view showed double vertebral bodies at the same level. There was no intra-abdominal organ injury (Fig. 2). Open fracture of distal femur was systematically debrided in the operating room and skeletal traction was applied at proximal tibia.

The patient underwent surgery under general anesthesia on day 2 of admission. She was placed in the prone position on the radiolucent operating table to perform manual gentle closed reduction (Fig. 3). Gentle

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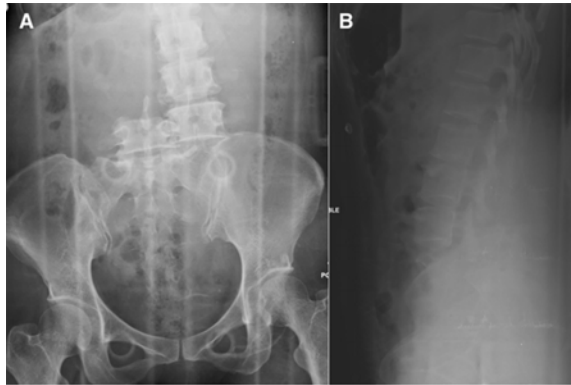


Fig. 1 Initial plain radiographs of anteroposterior view (A) and lateral view (B) demonstrating the total L4-L5 lateral dislocation.

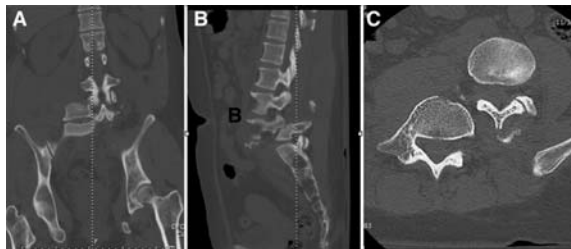


Fig. 2 Computed tomography of the lumbosacral spine coronal view (A), sagittal view (B), and axial view (C) demonstrating the presence of total L4-L5 anterolateral dislocation with fracture of facet and transverse process and sign of double vertebral bodies.



Fig. 3 Intraoperative positioning before closed gentle traction.

traction between shoulder and counter traction at pelvis was performed under fluoroscopic guidance. After successful closed reduction, we performed posterior decompression, spinal canal exploration, and

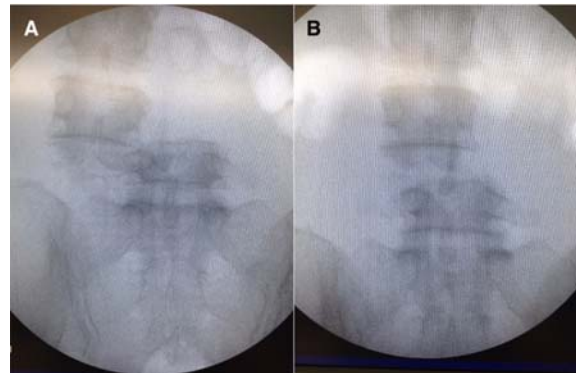


Fig. 4 Intraoperative fluoroscope during manual closed reduction.

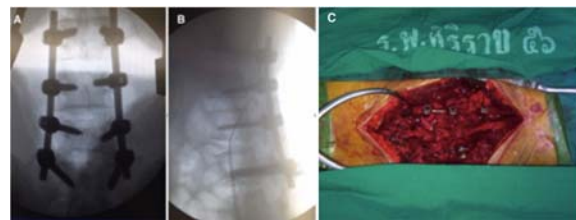


Fig. 5 Intraoperative fluoroscopic images (A, B) and photographic image (C) of posterior decompression, spinal canal exploration, and internal fixation with pedicular screws and rod systems from L3 to S1.

internal fixation with pedicle screws and rod system from L3 to S1 with one cross-link. We found total disruption of all posterior structures, including supraspinous ligament, interspinous ligament, and bilateral articular facets of L4 and L5. Traumatic dural tear and nerve root injuries were managed with duraplasty and fibrin sealant. Postoperative radiographs revealed anatomical alignment and appropriate position of implanted instrumentation (Fig. 4). Open reduction and internal fixation with locking plate and screws of left distal femur was performed on day 3 of admission (Fig. 5).

There were no persistent cerebrospinal fluid leakage and other post-operative complications. Bilateral ankle-foot orthoses were applied. Rehabilitation program was initiated for ambulation training and muscle strengthening. At 1-year follow-up after surgery, our patient could walk with a walker and muscle strength in her lower extremities had recovered to grade 4/5, except left tibialis anterior, gastrocnemius-soleus, extensor hallucis longus, extensor digitorum communis, flexor hallucis longus, and peronei-all of which were grade 0-1/5. She had to use clean intermittent catheterization (CIC) for urinary

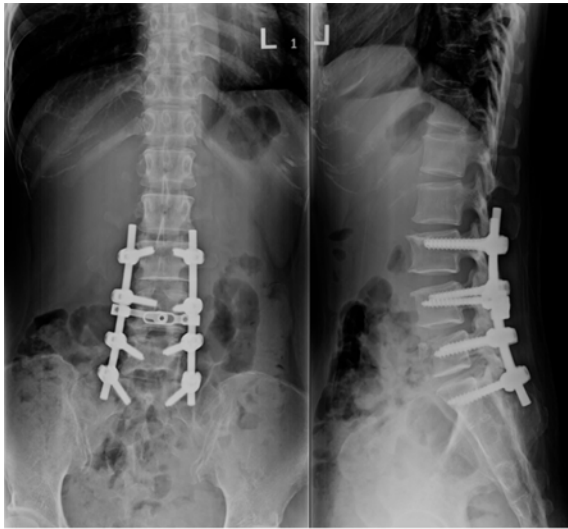


Fig. 6 Postoperative plain radiographs at 1-year follow-up.



Fig. 7 Preoperative (A, B) and follow-up (C, D) plain radiographs of left distal femoral fracture.

dysfunction and required suppositories (e.g., active ingredient bisacodyl with vegetable base) for bowel dysfunction. Radiographs revealed no implant-related complication (Fig. 6). Pre-operative and follow-up radiographics of left distal femoral fracture are shown in Fig. 7.

Discussion

Total dislocation of the lumbar spine is an uncommon injury due to the anatomical orientation of the facet joints, which contributes to resistance to anteroposterior translation. This condition, which generally results from hyperextension mechanism, is usually caused by high energy trauma, such as severe traffic accident, falling down from height, or air plane crash⁽⁷⁾. Some of these injuries have been associated with other medical connective tissue problems, which could then be the result of less severe injuries⁽⁸⁾. In addition to spinal injuries, these patients may also sustain vascular or other organ injuries in the abdomen.

According to the results of a case series by Vialle et al, traumatic lumbosacral dislocation is a rare lesion, with dislocation more common at L5-S1 level⁽⁹⁾. They proposed a new anatomical classification, based on injury patterns, that categorizes spinal dislocation patients into three subtypes, as follows: pure dislocation, unilateral articular process fracture dislocation, and bilateral fracture dislocation.

In the present case, hyperextension injury was caused by an elevator (lift) in an out-of-control descent that entrapped the lower half of her body. The injury pattern was classified as type III bilateral fracture dislocation; however, it is extremely rare to encounter anterolateral total dislocation as double vertebral bodies sign (Fig. 1, 2). This three-column injury combined with extensive soft tissue injury is the most unstable spinal injury pattern associated with neurological damage. Surgical intervention for reduction, decompression, and fixation is required. Many surgical techniques have been proposed, including anterior approach, posterior approach, and combined technique. Currently, posterior approach for decompression, instrumentation, and fusion is most commonly performed.

Treatment of lumbar total dislocation with or without neurological deficit should be initiated as soon as possible, although there is currently no consensus protocol regarding time point after injury for surgical decompression and instrumentation. Thongtrangan, *et al* reported that *Cauda equina* lesion should be treated within 48 hours after injury⁽⁹⁾. Transfeldt et al reported improvement of neurological condition within 3 months after injury⁽¹⁰⁾. In our patient, while some nerve root lesions have shown improvement, bowel and bladder dysfunction persists.

Conclusion

The patient profiled in this case report sustained a high-energy L4-L5 total dislocation, with

resulting major neurological deficit. The patient underwent closed reduction, followed with posterior decompression, fusion, and spinal instrumentation. At 1-year follow-up, the patient gained neurological improvement and could ambulate with the help of an AFO and a walker.

What is already known this topic?

Generally the traumatic lumbar subluxation or dislocation is uncommon injury; however, traumatic totally lumbar dislocation is very uncommon injury.

What this study adds?

In traumatic total lumbar dislocation, gentle closed reduction could be performed in the beginning of treatment however this could further damage neurovascular structures. There is some neurological deficit which could be improved after treatment.

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Potential conflicts of interest

None.

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อุบัติเหตุการกระตุกสันหลังบริเวณบั้นเอวเคลื่อนหลุดออกจากกันทั้งหมด ที่บริเวณ L4-L5: รายงานผู้ป่วย 1 ราย ที่มีการบาดเจ็บบริเวณกลุ่มรากประสาทหลายทางมา

จตุพร โชติกวิชัย, รัตนภรณ์ ชำนาญ, ธเนศ อริยะวัตรกุล, ภูวรินทร์ บุญนาค, มนต์ชัย เรืองชัยนิคม, ศิริชัย วิลาศรีศมี

ภูมิหลัง: มีรายงานน้อยมากที่รายงานเกี่ยวกับอุบัติเหตุการกระตุกสันหลังบริเวณบั้นเอวเคลื่อนหลุดออกจากกันทั้งหมดที่บริเวณ L4-L5

รายงานผู้ป่วย: การศึกษาที่ใช้กระบวนการรายงานผู้ป่วยจำนวน 1 ราย โดยใช้ข้อมูลย้อนหลังจากเวชระเบียนและการติดตามทางคลินิกของผู้ป่วยที่ได้รับอุบัติเหตุจากการถูกลีฟต์ขึ้นของทับทิว ทำให้ผู้ป่วยมีปัญหาการกระตุกสันหลังบริเวณบั้นเอวปล้องที่ 4-5 เคลื่อนและมีกระดูกหัก แผลเปิดที่กระดูกพีนอร์ข้างซ้าย ผู้ป่วยได้รับการดึงกระดูกสันหลังกลับเข้าที่และได้รับการผ่าตัดตามหลักยึดตรึงกระดูกสันหลัง จากกระดูกเอวปล้องที่ 3 ถึงกระดูกกระเบนเหน็บปล้องที่ 1 (L3-S1) และได้รับการผ่าตัดยึดตรึงกระดูกข้างซ้ายด้วยแผ่นเหล็กและสกรู

สรุป: จากการติดตาม 1 ปี พบว่าถึงแม้ว่าผู้ป่วยมีปัญหาเรื่องระบบประสาทการสั่งงานและความรู้สึกของขาข้างซ้ายบางส่วน และปัญหาการขับปัสสาวะและอุจจาระไม่ปกติ แต่ผู้ป่วยสามารถเดินโดยใช้อุปกรณ์ช่วยเดินได้
