



CASE REPORT

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Traumatic lumbar spondylolisthesis without facet fracture at L4/L5. A case report and literature review

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Abstract

L4–L5 traumatic spondylolisthesis has been rarely reported in the literature. At lumbar spine level traumatic dislocation lesion realizes “traumatic spondylolisthesis or traumatic bilateral lumbar facet locked syndrome”. The aim of the present paper is to report this rare lesion and discuss its mechanism and management.

A case report is followed by Literature review made on Medline and scholar google database from 2000 to 2015. The case report concerned a 33-year-old man, who refused to wear a seat belt, injured his lumbar spine following a motor vehicle accident. L4–L5 spondylolisthesis occurred after the vehicle rolled over several times. Sixteen months after the accident the patient had a favorable outcome. Literature review on Medline and scholar google database from 2000 to 2015 was carried out and five cases of traumatic spondylolisthesis were found. The Sex ratio was 3/2. Surgical treatment consisted of posterolateral interbody fusion.

Traumatic lumbar spine spondylolisthesis is rare. When it occurs, it is always associated with vertebral lumbar fracture. L4–L5 traumatic spondylolisthesis was caused by a high-energy mechanism and improper use of seat belt.

Keywords: Spondylolisthesis at L4–L5, Bilateral facet locked syndrome at L4–L5, Lumbar spine trauma

Background

Traumatic spondylolisthesis is an uncommon entity reported in the literature. Watson-Jones described the first case in 1940 and about hundred cases reported [1]. All reported cases are traumatic lumbosacral dislocations; this represents a dislocation on L5–S1 level. The lumbar spine pure traumatic spondylolisthesis realizes “traumatic bilateral lumbar facet locked syndrome.” Wearing a seat belt reduces the risk of severity. It is most often associated to lumbosacral joint fracture dislocation. Spondylolisthesis was classified by Wiltse and al. into dysplastic, isthmic, degenerative, pathologic and traumatic types [2]. Acute traumatic type is very rare [3]. The aim is to report a rare case of Traumatic spondylolisthesis at L4–L5 level and discuss its mechanism and management.

Material methods

The case report is followed by Literature Review. Literature review is made on Medline and scholar google

database from 2005 to 2015. We focused our interest on the number of cases, the Sex, the mechanisms, the level L4/L5 and the outcome.

Results

Case report

A 33-year-old patient, a driver of a tow truck, was admitted to the Neurosurgical Emergency unit for lumbar spine trauma. The injury was consecutive to a road traffic accident, which caused the vehicle to roll over several times. The patient was stuck inside the truck. Transportation to the neurosurgical emergency unit was not medicalized. Neurological examination revealed a paraparesis predominantly distal scored 3/5 and urinary incontinence. Lumbar spine CT scan revealed spondylolisthesis at L4–L5. The spondylolisthesis was not associated with facet fracture (Fig. 1).

Operative procedures and intraoperative findings

After a reduction maneuver laminectomy of L4 and L5 vertebrae was performed. The laminectomy was completed by osteosynthesis. Osteosynthesis was realized

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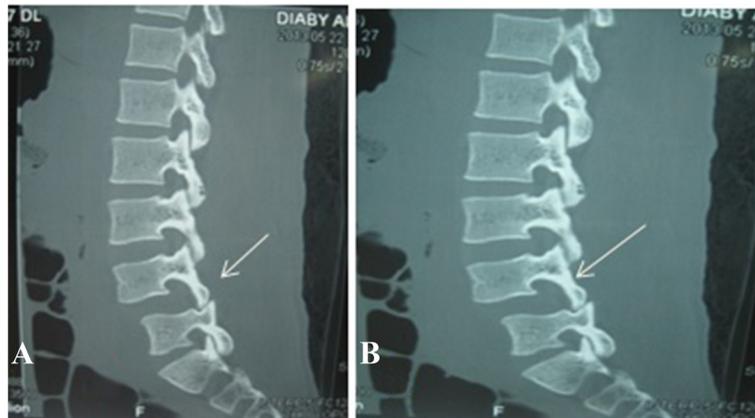


Fig. 1 Sagittal and CT scan view showing bilateral luxation **a** the right **b** the left view

with four screws connected by parallel rods. An intersomatic cage was set up after a discectomy L4-L5 (Fig. 2). Surgical treatment showed the ruptured L5 disc and posterior ligaments. Several physiotherapy sessions were prescribed.

Post operative course

Two months later the patient was walking using a walking frame. After decline in the disease 16 months later, the patient had a complete autonomy walking. Radiographic control revealed ruptured lower screws and of the upper screw head and nut (Fig. 2). The cage was still in place.

Literature review [4–7] (Table 1)

Literature review found five cases of traumatic lumbar locked facet syndrome at L4-L5. The series is composed of two women and four men. Improper use of seat belt was the cause in one case. Surgical treatment consisted

of posterolateral interbody fusion. The post-operative period was even-free.

Discussion

The first case of L4-L5 traumatic spondylolisthesis was reported in 1940 by Watson Jones [1]. L4-L5 traumatic spondylolisthesis are quite unusual. The most frequent reported location is at L5-S1 [4]. In all of these reported cases traumatic spondylolisthesis was caused by improper use of a seat belt. The seat belt was without abdominal strap. Traumatic spondylolisthesis of the spine as a result of improper use of seat belt is considered as pathology of the seat belt without abdominal strap. L4-L5 traumatic ante-rolisthesis and retrolisthesis have similar physio pathological mechanism [8]. The direct shearing force at the lower lumbar area is also a major cause. The high-energy trauma produced disruptions of the posterior ligamentous structures; the facet sand the vertebrae body fractures, and anterior

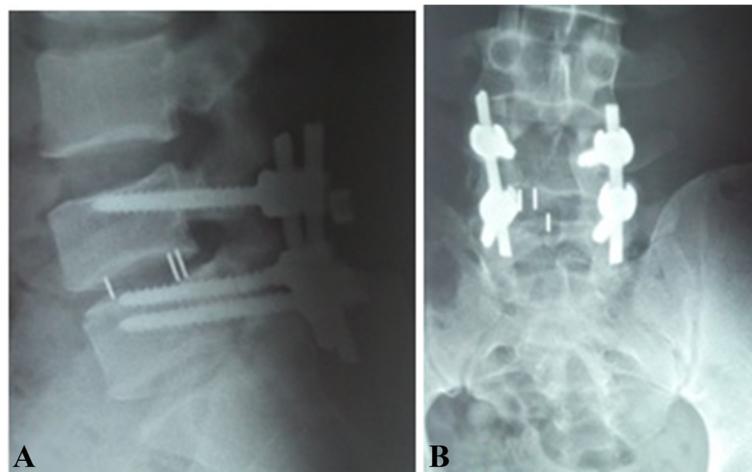


Fig. 2 Lumbar spine x-ray 16 months after lumbar spine osteosynthesis **a** lateral view and **b** front of view

Table 1 Literature review from 2000 to 2015

Nb	References	Age/Sex (years)	Mechanisms	Clinics	Imaging (MRI + CT scan)	Treatment	Outcome
1	Mori et al. 2002 [4]	32/F	Road Traffic accident Seat belt in an improper manner (vehicle driver)	-No motor deficit -Severe pain in her abdomen and lower back -No sphincter disorder	-Disruption of intervertebral disk and posterior longitudinal ligament at L4-L5 -Fracture of the right L4-L5 transverse processes	decompression and posterior stabilisation + lumbar interbody fusion	-Good
2	Lin et al. 2009 [5]	41/M	Work accident (Container fell onto his back)	-Lower limb Hypertonia -hyporeflexia of the knee and ankle reflexes-reduction sensation over his right lateral leg -low back pain -Saddle anaesthesia	-Fracture of the anterior-superior corner of L5 associated with a Chance-type fracture -dislocation through the L4/5 disc space and bilateral perched facets with grade 2 spondylolisthesis of L4 on L5. grade-2 spondylolisthesis of L4 on L5 and a fracture of the left transverse process of L4	Decompression posterior stabilisation + lumbar interbody fusion	-Delayed urinary retention
3	Cordero-Abadía et al. 2012 [6]	18/M	Road Traffic accident	Member deficit motor of inferior	-Spondylolisthesis at L4-L5 grade I -Fracture of transverse + spinous process L4	descompression and posterior instrumentation inferior member motor deficit at 2/5.	-Good
4	Im et al. 2012 [7]	37/M	Work accident (held down by an iron plate weighing 2000 kg)	Grade 4 numbness in his right posterolateral thigh dorsiflexion	-Epidural hematoma at the L2 to L5 level and L4-L5 disc disruption -Bilateral L4-5 facet dislocation in which the L4 inferior articular process was localized to the anterior of the L5 superior articular process	Open reduction and stabilization interspinous ligaments and ligament flavum were partially torn and the L4-5 Facets were locked The dislocation was reduced by resecting the superior facet of L5 and laminectomy of L4 was carried out. -interbody fusion with cages, +Fixation epidural hematoma	-Good
5	Present case report 2015	33/M	Vehicle driver	Motor deficit Urinary retention	-Spodylolisthesis L4-L5 -Facets were locked -No fracture of facet	Reduction by resecting the superior facet of L5 + laminectomy of L4. Posterior fixation interbody fusion with cages	-Good

Literature review from 2000 to 2015 CT Scan/ MRI Magnetic resonance imaging

sliding of the L4 vertebrae body, which resulted in a great instability of Denis's 3 columns. Traumatic spondylolisthesis at L4-L5 is associated with incorrect use of a three-point seat belt. Lumbar facet joints anatomy play major role in L4-L5 traumatic spondylolisthesis. The mechanism of injury seems to be forcible hyperextension [8, 9]. However, hyperflexion with varying degrees of distraction is the most frequent mechanism of facet dislocation in the lumbar spine [4, 10, 11]. Hyperflexion alone is able to produce either pure dislocation or fracture-dislocation in the lumbar spine [9]. Therefore, in this case, we consider that, the mechanism of injury was a combination of hyperflexion, distraction, and rotation. The hyper-sagittalisation of superior articular processes could be the main factor that prevents the occurrence of dislocations [11]. Paravertebral lumbar muscles play a potential role in lumbar stability [10]. There are disruptions of the posterior ligamentous complex associated with facet dislocation [5, 7, 12]. Any fortuitous discovery of fractures of the transverse processes should warrant a search for a lumbar dislocation and vice versa. Moreover, the frontal orientation of S1 upper articular process almost always triggers a dislocation to the L5-S1 joint [8]. However, the ilio-lumbar ligament serves as a bulwark to prevent this type of traumatic injury. In our case report the mechanism is different because the driver was not thrown out of his vehicle. Hyperflexion of the trunk could explain the L4-L5 dislocation. The unusual L4-L5 level facet interlocking was attributed to the misuse of the automobile shoulder harness. It is important to recognize this injury and follow up on such clues.

The exploration must be multidirectional with 3D CT scan. A careful clinical examination and analysis of CT scan or MRI result in a diagnosis of lumbosacral dislocations. Meticulous clinical examination and careful imaging assessment, including CT scan and MRI, provide an early diagnosis in cases of lumbosacral dislocation [12]. MRI demonstrates a disruption of the posterior ligamentous [3, 12, 13]. Initially the treatment is conservative and involves hospitalization with bed rest and more analgesics; then surgical treatment is indicated. Lumbar spine trauma occurred during road traffic accident. In our report the transportation of patient to the neurosurgical emergency unit was not medicalized. The injuries initially without gravity could become significant with sensory-motor deficits. They will leave high sequelae despite prompt and adequate surgery. Finally, surgical treatment was a L4-L5 laminectomy, cage, and fixation by four pedicular screws connected by two parallel rods. Open reduction and circumferential bony fusion restored segmental stability and painless function [13]. The patient was mobilized in an armchair after two days of a total resolution of the painful symptoms.

Methods used by most authors lead to a favorable outcome. The introduction of early physiotherapy promotes rapid recovery in the event of a sensory-motor deficit. In our case the patient benefited from therapy sessions from the seventh day of his surgery. Two months later, he could walk with a walking frame. This reinforces hypothesis that early physiotherapy sessions in the event of sensory-motor deficit would promote recovery without sequelae. The sphincter disorders as acute urinary retention are not frequently associated with neurological disorders of lumbar dislocation L4-L5. Sphincter disorders regression are earlier than motor ones. Unlike the present case, acute retention of urine persisted beyond three months before disappearing. Once again the interest of physiotherapy as soon as possible. After 25 months the patient had no neurologic deficit. He was pain-free and had no restriction of mobility of lumbosacral spine. The radiograph revealed the release of a screw head associated with a rupture of one of L5 pedicle screw dislocation. Some authors report early decompression of the spinal cord performed at 24 h in dogs, the improvement in somatosensory evoked potentials was only 26 %, compared to 85 and 72 % improvement achieved when decompression was carried out immediately and one hour after injury, respectively [14].

Conclusions

L4-L5 traumatic spondylolisthesis is rare, when it happens; physicians should always systematically search for fracture of the lumbar transverse processes. Meticulous clinical examination and careful imaging assessment, including CT scan and MRI, assist with an early diagnosis in cases of lumbosacral dislocation. Open reduction and circumferential bony fusion; restore segmental stability and painless function.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

DNO has performed the surgery, evaluated the patient, and drafted and revised the manuscript. SIS evaluated the patient, carried out the literature review. LK assisted the surgeon at the operation room. HY evaluated the patient, carried out the literature review. All authors read and approved the final manuscript.

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