CLINICAL REPORT

Thoracolumbar junction lateral spine dislocation

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Summary
The authors describe a case of traumatic lateral spine dislocation at the thoracolumbar junction level, without fracture, in a healthy young adult, complicated by a complete neurological deficit. The main aspects of surgical management are discussed based on a review of the literature. Control of the spinal cord is a mandatory first step, before reduction, independently of neurological deficits considerations. Instrumented stabilization and fusion are achieved thereafter; levels selection for instrumentation and fusion depends on the injury location.

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Introduction

Traumatic dislocation of the spine at the lumbar and/or thoracic levels is often due to high-energy traumas, usually accompanied by fractures and complicated by neurological deficits that vary in severity [1–3]. We report a case of complete lateral dislocation of the thoracolumbar spine, without fracture, and provide a review of similar cases in the literature to define the main surgical management strategies in this type of injury.

Clinical case

A 24-year-old young woman with no prior medical history, presented to our unit following a road accident — she was a motorcycle passenger thrown from the vehicle. Initial X-ray examination showed complete lateral dislocation at the T12-L1 level. Radiographic and preoperative CT scan with reconstruction showed the right side of the L1 vertebral body positioned against the left side of the T12 vertebral body (Figs. 1–3). The T12-L1 disc was still united to the lower endplate of T12, as seen by the presence of bone fragments from the upper endplate of L1 in the lower end of this disc (Fig. 1). No other vertebral fractures were identified on initial images, in particular at the level of the posterior arch. The neurological examination showed a complete neurological deficit, stage A in the Frankel classification,
flaccid paraplegia — L1 level —, as well as a complete perineal deficit. [3,4]. There was no sign of direct injury to the skin in the area of the thoracolumbar spine.

We consulted our colleagues in vascular surgery regarding the retroperitoneal hematoma (Fig. 3), who advised simple clinical monitoring, in the absence of any vascular complications further up.

Vascular reconstruction with 3D contrast enhanced CT showed that the aorta and the vena cava were in an anatomical position in relation to the T11 and L1 vertebral bodies T11 et L1 (Fig. 3, image upper left, white arrow), on the other hand, it was no longer in an anatomical position at the T12 level). The two renal arteries and the mesenteric vessels were uninjured. The retroperitoneal hematoma had two sources: first vertebral bleeding from the upper end plate of L1 (Fig. 3, image to the right) and the other vascular, from a bilateral lesion of the segmental vertebral vessels of T12, while those for T11, L1 and L2 were uninjured.

Emergency surgery was decided, and was performed within hours after the accident. The patient was placed in the prone position and the posterior approach was used. The different anatomical injuries could be seen from back to front. [5]: tears in the paravertebral muscles, complete

Figure 1 Preoperative X-rays, frontal view on the left and lateral view on the right. On the frontal view, fragments of the superior endplate of L1 can be seen — white arrow.

Figure 2 3D Reconstruction of the CT scan. Left: anterior view; right, posterior view.
Preoperative CT scan. On the left, top and bottom: axial view showing complete lateral dislocation (T12 on the left of image, and L1 on the right). Retroperitoneal hematoma in front of T12 and L1 vertebral body — white dashed line. Aorta — white arrow — located in front of L1 vertebral body. On the right: frontal view showing lateral dislocation (T12 on the left of image, and L1 on the right), and partial fracture of superior end plate of L1 - white arrow.

Tear in the inter- and supraspinous ligaments between T12 and L1, complete bilateral tear of the articular capsules of the interapophyseal joints T12-L1; tears in the ligamentum flavum between the lower edge of the T12 lamina and the upper edge of L1. In relation to the anterior and middle columns defined by Denis [2], and because of the use of a posterior approach, it was difficult to identify the exact lesions of the anterior longitudinal ligament, of the intervertebral disc and of the posterior longitudinal ligament: associated and varying degrees of pulling, tears and complete tears were possible.

Reduction of the dislocation

After total laminectomy extended from T11 to L2, associated with arthroectomy of the inferior articular process of T12 to the left and the superior articular process of L1 to the right, eight pedicle screws — CDHT implant (Medtronic™, Minneapolis, Minnesota, USA) — were placed from T11 to L2. Indeed, ablation of the left pedicles of T12, and the right pedicles of L1 was not necessary to visualize the dural sheath, and all the pedicles could be used for instrumentation. Reduction was then obtained by distracting the T12-L1 space with the help of a forceps pressing upon the pedicle screws, while visualizing the dural sheath. After reduction, there was no residual compression, but a posterior, longitudinal dural tear several centimeters long revealed a spinal cord tear, which was not completely sectioned. After suturing the tear, posterolateral instrumented fusion of T11 and L2 was performed (Fig. 4).

After five years of follow-up, the neurological deficit remains unchanged, X-rays do not show any secondary displacement or slipping of the thoracolumbar spine. No spinal curve was observed above and below the instrumented spinal segment; the procedure left four mobile areas under the instrumented area.

Discussion

Anterior [6] and even lateral [7] dislocation of the thoracolumbar spine have been described in the literature. To date only one article has described lateral thoracolum-
Thoracolumbar junction lateral spine dislocation, however these authors presented a case of incomplete dislocation with no neurological deficits, reduced by fusion without neurological complications [8]. Only one case of complete lateral dislocation of the thoracic spine has been published by Korovessis et al. [9], which nevertheless included associated fractures of the middle column. To our knowledge, this is the first reported case of complete lateral dislocation of the thoracolumbar spine, without any damage to the vertebral bodies and to the posterior arch at the injured level. Without any rotational components in the initial images, this dislocation can be classified as type B according to Magerl’s classification [10]. An indirect mechanism of distraction, as defined by Chance [11], was probably the cause in all three columns [2]. The clinical examination did not suggest direct trauma, because the skin in the injured area was normal. We did not perform an MRI which could have specifically identified spinal cord damage and also spine injuries. However, to avoid delaying surgery, and also to avoid excessive mobilisation of the injured area, MRI was decided against.

In relation to the surgical management, all authors agree that emergency surgical treatment is indicated, whatever the direction or level of dislocation [1,6–9], with the double aim of reducing and stabilising the dislocation and freeing all dural compression. The techniques used for reduction are also clear: most authors recommend reduction after laminectomy in the area of dislocation and ablation of any bony elements of the middle column that could traumatize the spinal cord during the reduction procedure [1,6–9]. The posterior approach provides the best visualisation of the spinal cord, and is therefore recommended by these authors. It may not be indicated in cases of complete paraplegia with complete perineal deficits, because there is nearly no chance of neurological recovery [3,4]. In addition to the “mechanical” trauma, the possibility of ischemic cord trauma is also possible due to traction of the vertebral vascular pedicles at the level of the dislocation, in this case at the T12 level. However, despite these negative elements, preventing further injury to the spinal cord must be the priority before any reduction procedures.

The cases of dislocation without neurological deficits or with partial deficits described in the literature are all associated with fractures of the posterior arch and/or the middle column [2], causing widening of the vertebral canal and separation of the anterior column from the posterior arch, allowing significant movement of the anterior column while minimizing that of the spinal cord [8]. This probably explains the absence of neurological deficits despite the significant vertebral displacement in these cases. On the other hand, our patient had no fractures and significant spinal cord injury.

Complementary anterior interbody fusion was not performed in T12-L1 in this case. Although certain authors recommend this procedure at the lumbosacral level [6], there is no consensus about the thoracolumbar spine, especially if complete reduction is achieved.

Conclusion

The present case describes a rare lesion, associating complete lateral dislocation of the thoracolumbar spine without fracture; corresponding to a mechanism of distraction of the spinal motion segment. The goal of surgical treatment was to reduce and stabilise the dislocation while avoiding additional injury to the spinal cord. Even in the presence of a complete neurological deficit, visualisation of the spinal cord should always precede reduction procedures. Although MRI can be considered preoperatively to identify spinal cord lesions, it should not delay surgical management.

Conflict of interest

For all authors, none.

References