DOUBLE-LEVEL SPINAL INJURY RESULTING IN "EN BLOC" DISLOCATION OF THE LUMBAR SPINE A CASE REPORT

F. PELLISE, J. BAGO, C. VILLANUEVA

We report the case of a 21-year-old man with a unilateral lumbosacral dislocation together with a fracture of L1 resulting in "en bloc" dislocation, which is difficult to classify from an anatomopathological and biomechanical point of view. Unilateral lumbosacral dislocation is likewise an infrequent injury with less than 10 cases previously reported. Its association results in an anterior displacement to the left of the whole lumbar spine. To our knowledge, this displacement "en bloc" of the lumbar spine represents a rotatory dislocation of the same, an injury which we have not seen described until now in the literature.

Keywords : unilateral lumbosacral facet dislocation ; double-level spinal injury ; lumbar spine dislocation.
Mots-clés : luxation lombo-sacrée ; fracture L1 ; lésion vertébrale.

INTRODUCTION

The association of two or more major spinal injuries is not infrequent and has already been amply described (5, 6). Here we present a case in which two exceptionally rare injuries occurred together by means of a mechanism which is just as infrequent. This combination brought about a dislocation of the whole lumbar spine, an injury which, to our knowledge, has not until now been described in the literature.

CASE REPORT

A 21-year-old man was admitted to the emergency department of our center after a traffic accident in which he was driving his car without a seat belt. Physical examination on admission disclosed the existence of an incomplete L1 paraplegia (grade B on Frankel's scale), as well as pain and swelling in the lumbar region. Plain radiographs showed in the anteroposterior view (fig. 1), an L1 fracture and a severe misalignment of the lumbar spinal processes with respect to the thoracic and sacral ones, as well as a counterclockwise rotation of the vertebral bodies of L2, L3, L4 and L5. There was also evidence of a dislocation of the last right costovertebral joint and a fracture of the right transverse processes of L2, L3, L4 and L5. The lateral view (fig. 2a, b) showed a horizontal fracture line in L1 which comprised body, pedicles and laminae, and an L5-S1 olisthesis. With the diagnostic hypothesis of an L1 fracture and a unilateral dislocation of the right lumbosacral facets, computed tomography was carried out (fig. 3a, 3b). It confirmed the existence of both injuries and gave evidence of myeloradicular compression at the first lumbar level. At the lumbosacral junction, the CT scan showed the L5 right inferior facet locked anteriorly to the right superior facet of S1. The association of these two lumbar injuries resulted in an anterior displacement to the left of the whole lumbar spine. No further traumatic skeletal or visceral injuries were noted.

Scoliosis and Thoraco-Lumbar Spine Unit, Servicio de Cirugía Ortopédica y Traumatología, Hospital de Traumatologia i Rehabilitació Vall d'Hebron, Barcelona, Spain.
Correspondence and reprints : F. Pellise, Calle Massens 49-51, ático 2ª, 08024 Barcelona, Spain.

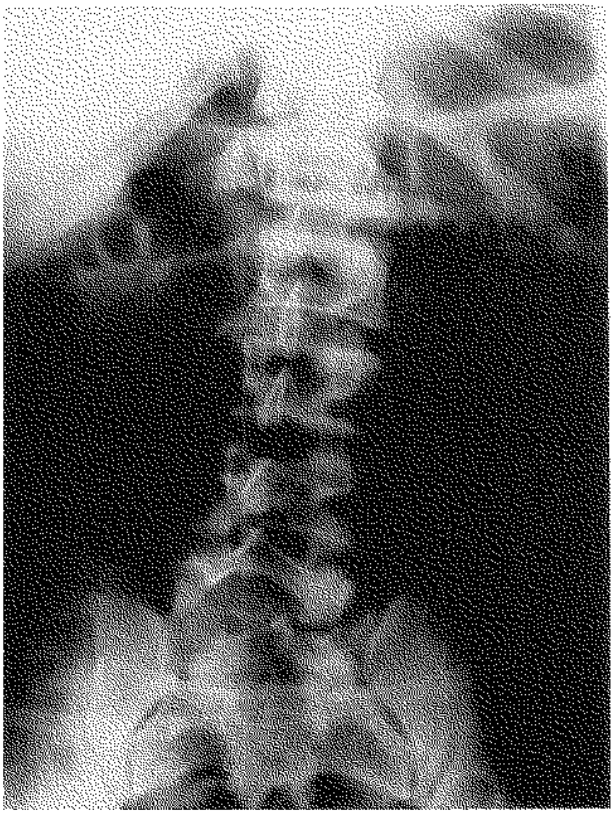

Fig. 1. — Anteroposterior radiograph made on admission showing the fracture of L1, a sharp malalignment of the lumbar spinous processes with respect to the thoracic and sacral ones and an anticlockwise rotation of the vertebral lumbar bodies.

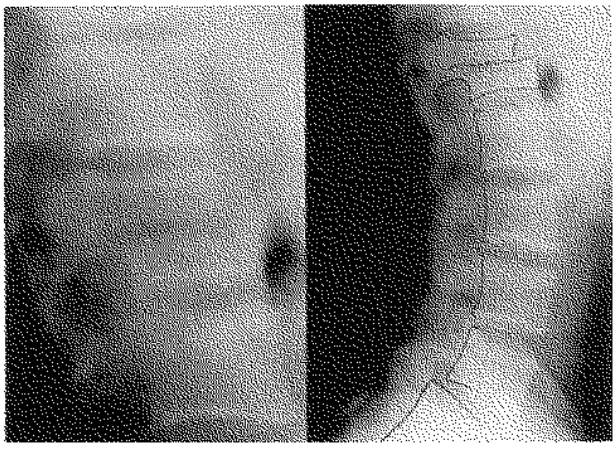

Fig. 2a *Fig. 2b*

Fig. 2a. — Lateral radiograph of L1 showing a horizontal fracture line which comprises vertebral body, pedicles and lamina.
Fig. 2b. — Lateral radiograph showing an anterior displacement of the whole lumbar spine and an olisthesis L5-S1.

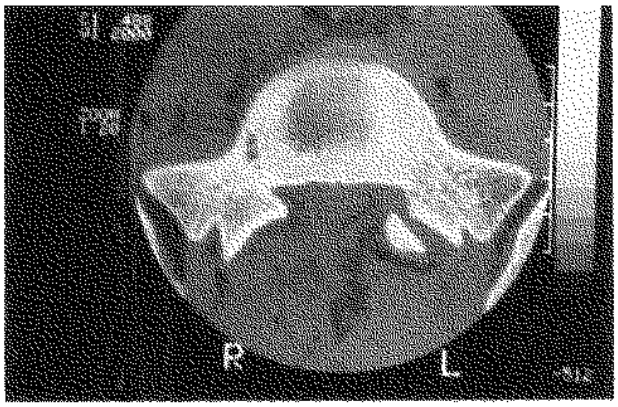

Fig. 3a

Fig. 3b

Fig. 3a. — CT scan showing the naked right S1-facet.
Fig. 3b. — CT scan showing, at the lumbosacral junction, the right inferior facet of L5 locked anteriorly to the right superior facet of S1.

Eight days after the patient's admission, an open reduction was performed through a posterior longitudinal approach from T11 to the sacrum. At L1, the existence of a highly unstable fracture in the transverse plane was confirmed, affecting laminae and pedicles. At the lumbosacral level, a complete dislocation of the right facet joint was noted. At the proximal fracture focus a Cotrel-Dubousset instrumentation was placed, with pedicular screws in T12 and L2 and laminar discharge hooks in T11 and L2. At the distal level, reduction of the lumbosacral dislocation and segmental osteosynthesis with Steffee plates was performed (fig. 4a, b). Finally a posterolateral arthrodesis was carried out between T12-L2 and L5-S1. Ten days after the operation, the patient

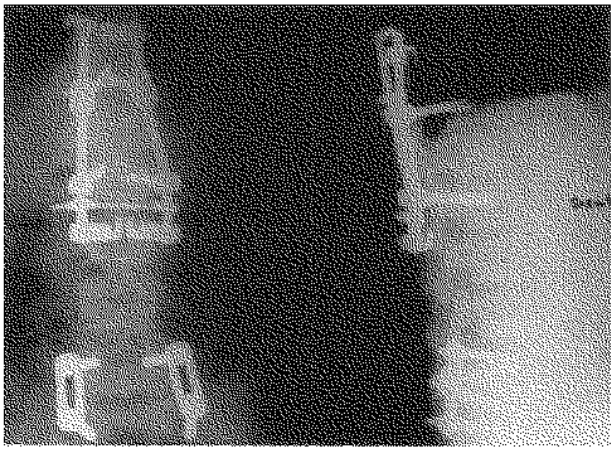

Fig. 4a *Fig. 4b*

Fig. 4a, 4b. — Anteroposterior and lateral radiographs after reduction and fusion showing almost complete restoration of rotational alignment of the lumbar spine.

was allowed up in a rigid plastic body jacket. Currently, the patient is walking with the aid of crutches and an ankle-foot orthosis for his right lower limb (grade D on Frankel's scale). The last radiological check, 18 months after surgery, confirmed the stability of the osteosynthesis and showed a solid spinal fusion.

DISCUSSION

Associated noncontinuous major spinal injuries are present in 4.2 to 7.6% of the patients who suffer spinal trauma (5, 6). In the case we have described, the interest lies in the characteristics of the two injuries and in the resultant dislocation of the lumbar spine, more than in the association of the two vertebral fractures.

The L1 fracture is difficult to classify from an anatomopathological and biomechanical point of view. The transverse fracture line and the anterior displacement to the left of the lower half of the vertebra direct us towards a combined lesional mechanism of shearing or flexion and rotation. As there was no injury from compression or distraction and the adjacent discs and the interapophyseal joints were undamaged, this fracture does not fulfill the criteria which would allow its inclusion in one of the four types of vertebral fracture proposed by Denis (4). It could, however, be included in the group of injuries with tricolumnal failure by translation described by McAfee (7). Unilateral lumbosacral dislocation is likewise an infrequent injury with fewer than 10 cases previously reported (1, 2, 3, 8, 9, 10). Its association with another major vertebral injury, as in this case, has not been described until now. It may be overlooked on initial examination. The diagnosis should initially be based on indirect radiological signs (8, 9) such as the sudden loss of alignment of the spinous lumbar processes with respect to the sacrum and olisthesis of L5-S1 on the lateral radiograph. The oblique projections and the CT scan (naked-facet sign) confirm the existence of the dislocation (1, 7, 8).

Biomechanically, the L1 injury is equivalent to a fracture of the flexion-rotation type, secondary in this case to a displacement of the lumbar segment, distal to the fracture, the line of which affects only osseous structures. The unilateral lumbosacral dislocation is, according to the majority of authors (1, 3, 8, 9), the result of flexion and rotation of the trunk on a fixed pelvis. By this we understand that in this patient a posterior impact mechanism caused the hyperextension of the lumbar spine with kyphosis at its two ends resulting in an anterior displacement to the left of the whole lumbar segment and lesions at both the thoracolumbar and the lumbosacral junctions (fig. 5). We assume that this displacement "en bloc" of the whole lumbar spine represents a rotatory dislocation of the same.

From the therapeutic point of view, certain authors (10) have proposed closed treatment of the unilateral lumbosacral dislocation. In this case, with incontestable surgical indications for the L1 fracture, it seems rather unreasonable to neglect its reduction and synthesis. The double synthesis carried out resulted in minimal functional loss. The anatomical result was satisfactory and neurological evolution 18 months after surgery has also been favorable, improving from grade B to grade D on Frankel's scale. We believe that the internal fixation of the lumbosacral lesion should be done with pedicular instrumentation, reducing strictly the instrumented area to L5-S1. This construction has been shown to provide sufficient stability and, after 18 months follow-up, the fusion was solid.

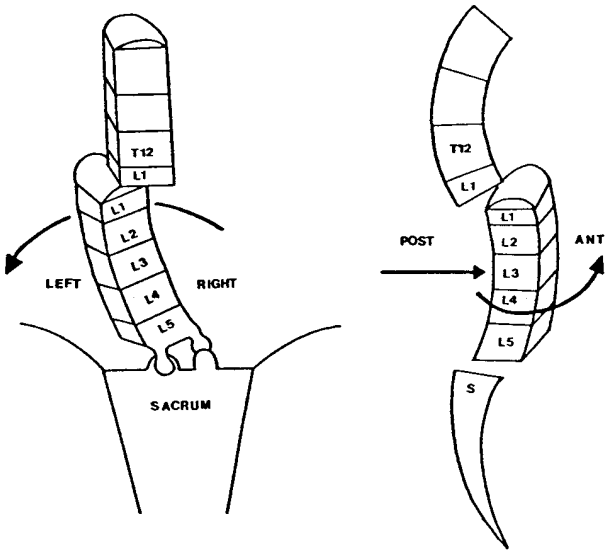

Fig. 5. — Illustration showing the proposed mechanism of injury, the resulting rotatory lumbar spine dislocation and lesions at both the thoracolumbar and lumbosacral junctions.

REFERENCES

1. Boger D. C., Chandler R. W., Pearce J. G., Balciunas A. Unilateral facet dislocation at the lumbosacral junction. Case report and literature review. J. Bone Joint Surg., 1983, 65-A, 1174-1178.
2. Carl A., Clair B. Unilateral lumbosacral facet fracture-dislocation. Spine, 1991, 16, 218-221.
3. Das De S., McCreath S. W. Lumbosacral fracture-dislocations. A report of four cases. J. Bone Joint Surg., 1981, 63-B, 58-60.
4. Denis F. The three column spine and its significance in the classification of acute thoracolumbar spinal injuries. Spine, 1983, 8, 817-831.
5. Gupta A., El Marsi W. S. Multilevel spinal injuries. Incidence, distribution and neurological patterns. J. Bone Joint Surg., 1989, 71-B, 692-695.
6. Kewalramani L. S., Taylor R. G. Multiple non-continuous injuries to the spine. Acta Orthop. Scand., 1976, 47, 52-58.
7. McAfee P. C., Hansen A. Y., Fredrickson B. E., Lubicky J. P. The value of computed tomography in thoracolumbar fractures. An analysis of one hundred consecutive cases and a new classification. J. Bone Joint Surg., 1983, 65-A, 461-473.
8. Miz G. S., Engler G. L. Unilateral dislocation of a lumbosacral facet. Spine, 1988, 13, 956-957.
9. Morris B. D. A. Unilateral dislocation of a lumbosacral facet. A case report. J. Bone Joint Surg., 1981, 63-A, 164-165.
10. Zoltan J. D., Gilula L. A., Murphy W. A. Unilateral facet dislocation between the fifth lumbar and first sacral vertebrae. Case report. J. Bone Joint Surg., 1979, 61-A, 767-769.

SAMENVATTING

F. PELLISE, J. BAGO en C. VILLANUEVA. Verplaatsing "en bloc" van de lumbale kolom, als gevolg van een bifocaal vertebraal letsel.

Beschrijving van een geval van een 21-jarige man met een unilaterale lumbosacrale luxatie, geassocieerd aan een fraktuur van L1, waardoor er een "en bloc"-luxatie van de lumbale kolom veroorzaakt werd. De fraktuur van L1 kan moeilijk patholoog-anatomisch en biomechanisch geclassificeerd worden. De éénzijdige lumbo-sacrale luxaties zijn weinig voorkomende letsels ; minder dan 10 gevallen werden in de literatuur beschreven. De associatie resulteert in een verplaatsing van de lumbale wervelkolom naar ventraal en naar links. Deze "en bloc"-verplaatsing van de lumbale wervelkolom is een rotatore luxatie, laesie beeld waarvan wij geen andere beschrijving in de literatuur gevonden hebben.

RÉSUMÉ

F. PELLISE, J. BAGO et C. VILLANUEVA. Luxation "en bloc" du rachis lombaire, suite à une lésion vertébrale à deux niveaux.

Les auteurs rapportent le cas d'un homme de 21 ans, présentant une luxation unilatérale lombo-sacrée associée à une fracture de la première vertèbre lombaire. La fracture de L1 est une lésion difficile à classifier d'un point de vue anatomopathologique et biomécanique.
La luxation unilatérale lombo-sacrée est également une lésion très rare dont moins de dix cas furent décrits dans la littérature.
Leur association provoque un déplacement antérieur et latéral gauche de toute la colonne lombaire. Ce déplacement en bloc de tout le rachis lombaire correspond à une luxation rotatoire de ce segment rachidien dont nous n'avons pas retrouvé trace dans la littérature.