A combination of several mechanical factors, such as vertical compression, distraction, extension, rotational and shear forces can cause various types of fracture dislocations of the spine.1,2 The injuries sustained by our patient were considered to be caused by shear force.

Case report

A 20-year-old woman was hit on the right side of her back by a truck when she was riding a motorcycle. She was thrown approximately 7.5 m forwards on to her left side. When seen after transfer to our hospital, severe swelling and tenderness was noted around the lumbar sacral area. She had motor weakness of grade 4/5 of the iliopsoas, quadriceps and tibialis anterior on both sides. There was slight generalised sensory loss in both legs. There was no disturbance of urinary or bowel function.

Plain radiographs showed anterior displacement of L5 on S1 which was classified as Meyerding grade II, with multiple fractures of the posterior parts of the lumbar vertebrae from L2 to L5 (Fig. 1a). There were fractures of the posterior arch of L2 and of the laminae appeared normal (Fig. 2a). The root sleeves were not clear and not obstructed; the Queckenstedt test was normal. A myelogram was carried out 12 days after admission. The cerebrospinal fluid passed freely from the L4–L5 interspace. Plain radiographs showed anterior displacement of L5 on S1 which was classified as Meyerding grade II, with multiple fractures of the posterior parts of the lumbar vertebrae from L2 to L5 (Fig. 1a). There were fractures of the posterior arch of L2 and of the laminae appeared normal (Fig. 2a). The root sleeves were not clear and not obstructed; the Queckenstedt test was normal.

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Radiographs of the lumbar spine with a) a lateral view and b) an AP view showing anterior displacement of L5 with fractures of the posterior elements from L2 to L5.

Myelograms of the lumbar spine with a) a lateral view and b) an AP view.

CT myelograms from L2 to L5 indicating bilateral pedicle fractures at a) L2, b) L3, c) L4 and d) L5. The vertebrae were displaced anteriorly and to the left relative to the dye column and the posterior structures.
clearly defined at any level, and there was slight narrowing of the column at L5 on the anteroposterior (AP) view (Fig. 2b). The CT myelogram showed multiple, bilateral pedicle fractures from L2 to L5 (Fig. 3). The vertebrae were displaced anteriorly and to the left relative to the dye column and the posterior structures. No fractures or dislocations of the facet joints were observed.

By two weeks after injury, the neurological deficits were gradually recovering and conservative treatment was continued. She

Plain radiographs two and a half years after injury, with a) a lateral view and b) an AP view showing no deterioration of the position of L5 in relation to S1.

CT images after two and a half years showing bony union of the pedicles at a) L2, b) L3, c) L4 and d) L5.
remained immobilised in bed for five weeks and then the bed was gradually raised. A body cast with a bilateral spica including the upper part of the thighs was applied during week seven and she was then allowed to walk with support. The cast was removed after 13 weeks and a corset was worn until three months after the injury.

When reviewed after two and a half years, she was free of pain and independent in daily living. Flexion of the lumbar spine was to 60˚ and extension to 15˚. The neurological deficits had recovered except for slight hyperaesthesia of the medial aspects of both calves. Bony union was observed on the radiographs (Fig. 4) and the CT images (Fig. 5). There was no further anterior displacement of L5 on S1.

Discussion

Shear fracture-dislocation of the lumbar spine is rare, and only four cases below the level of L2 have been reported.3-5 Denis6,7 noted that the upper vertebrae could be sheared off forwards in relation to the segment below when force was applied in the postero-anterior direction. He observed that fractures of the posterior structures of the spine could also occur in such injuries. In our patient, shear force had been applied directly on the right side of her back as shown by police records, interviews, physical examinations and radiographs. This produced anterior displacement of L5 relative to S1 in association with multiple fractures of the pedicles from L2 to L5.

Traumatic spondylolisthesis at the L5/S1 level, one of the mechanically strongest parts of the lumbar spine, is rare.7 It is possible that there had been a spondylolisthesis prior to the injury, however, there was evidence of bony union at the fracture sites on the radiographs and CT images at follow-up and it is unlikely that this would have occurred in the presence of pre-existing spondylolisthesis.

Fracture-dislocations caused by shear force can be unstable and operative stabilisation must be considered. We decided on conservative management because of a mild neurological deficit with evidence of recovery, the absence of injuries to the anterior and middle columns except at L5/S1 and the expectation that the fracture involving the posterior column would unite.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References