(free of neurologic symptoms), were treated nonsurgically. Improvement in neurologic status was noted in all patients, and spontaneous resorption of bone fragments occurred in all but 2 patients. Spontaneous resorption of retropulsed fragments has been noted by other authors as well.\(^1\)\(^2\) Finn and Stauffer\(^2\) studied 7 patients with burst fractures at the fifth lumbar vertebra, including 2 with minor motor deficits in the fifth lumbar nerve root distribution who were treated by immobilization in a body-jacket cast. The 2 patients with motor deficits exhibited improvement and/or resolution of weakness, and all 7 patients recovered without loss of lordosis, or progression of collapse of the anterior vertebral body.

Operative management of burst fractures in the low lumbar region has presented some unique difficulties when compared to the more typical thoracolumbar burst fractures due in part to differences in the anatomy and biomechanics of this region. Fusion of the motion segments has been reported to cause significant chronic back pain in many patients. Loss of lordosis or "flatback syndrome," also associated with back pain, has been noted in distraction procedures used in treating low lumbar burst fractures.\(^1\)\(^4\)\(^9\) In addition, incidence of implant failure and pseudarthrosis is increased in instrumentation of the low lumbar spine.\(^1\) An et al suggest avoidance of long fusion with distraction in cases where surgery is necessary, using instead short fixation and pedicular instrumentation to avoid the morbidity often associated with surgery in this region.

In summary, the need for surgical decompression in low lumbar burst fractures and burst fractures in general is currently being reevaluated, and nonoperative management is being recognized as appropriate therapy for many of these patients, often with better clinical results than in surgical procedures.\(^4\)

The case reported above is an example of a variant burst fracture of the fifth lumbar vertebra which, like those in the Finn and Stauffer series,\(^2\) responded to nonoperative management with favorable results. An unusual finding in this case was the delay in onset of the neurologic symptoms to the fourth postoperative day. Because repeat CT studies at the onset of neurologic symptoms showed no significant change from previous films, we attribute this unusual presentation to swelling of the nerve root secondary to canal compromise. Inflammation and edema of nerve roots leading to radiculopathy has been observed in acute disk herniation; this may be a reasonable explanation of the delayed neurologic symptoms seen here.

REFERENCES

EDITORIAL DISCUSSION
ORTHOPEDICS: In this case, the neurologic deficit involved only a nerve root. Would you still advocate conservative treatment for a more severe deficit, eg, a cauda equina lesion with a loss of bladder control?

Stambough and Lazio: Absolutely not. Compromise of the cauda equina (cauda equina syndrome) is an absolute indication for urgent or emergent decompression. A more relative indication would have been a progressive neurologic deficit (nerve root compromise). Fortunately, neither of these occurred and the patient improved without surgery. If her root symptoms had worsened or progressed, a surgical decompression would have been contemplated.

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SEAT-BELT-TYPE FRACTURE OF THE LUMBAR SPINE FOLLOWING INSTRUMENTATION AND FUSION

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By focusing the forces of a collision onto the pelvis and lower torso, the lap safety belt has been shown to effectively reduce the severity of injury and the incidence of fatality in persons
involved in automobile accidents. Thirty years ago, Garrett and Braunstein described a constellation of injuries to the abdominopelvic viscera and thoracolumbar spine that have collectively been labeled as the "seat-belt syndrome." Subsequently, Howland et al described a "splitting apart" transverse fracture of L3 in a lap-belted automobile passenger which the authors hypothesized to have been produced by a high riding seat-belt acting as a fulcrum over which the vertebral body was transversely separated into two parts. Later, Smith and Kauper elucidated the pathomechanics of seat-belt associated lumbar spine injuries and noted that an abdominal seat-belt contusion was a usual accompaniment to these peculiar lumbar spine fractures. As mandatory safety belt legislation has resulted in increased use of restraints by automobile passengers, the incidence of seat-belt-type injuries of the lumbar spine has increased.

We present a case report of a 20-year-old male who previously had undergone instrumentation and fusion of the thoracolumbar spine for adolescent idiopathic scoliosis and who subsequently sustained a seat-belt-type fracture of L3. We believe this to be the first such report.

CASE REPORT

A 20-year-old male had undergone posterior spinal fusion and instrumentation from T4 to L3 6 years previously for a 50° lvoxical curve of adolescent idiopathic scoliosis extending from T6 to L2. He was the left rear seat lap-belted passenger in an automobile that struck another car from behind while moving at an undetermined speed. The patient was propelled into the back of the driver’s seat against which his right hand impacted forcefully. His seat belt remained intact. Leavin the vehicle on his own, the patient was able to walk about the accident scene for several minutes until excruciating low back pain forced him to sit down. At no time did the patient experience paresthesias, paresis, or paralysis. There was no bowel or bladder incontinence. He was helped into an ambulance by two attendants and refused to lie on a backboard during his transport to the emergency department.

On admission to the emergency department, the patient was alert and oriented, complaining of low back pain. His blood pressure was 16/95 mm Hg and his pulse was 96 bpm. His vitals remained stable. Physical examination revealed the presence of abrasions and ecchymosis on the anterior and lateral aspects of the abdomen (Fig 1). The abdomen was soft and diffusely tender with bowel sounds present, and hypoactive. Examination of the back revealed a well-healed midline surgical scar from approximately T1 to L4. There was marked edema and tenderness to palpation of the paraspinal soft tissues to the left of L2 through L4. No deformity was visualized or palpated.

Hemoglobin was 16.7 g and hematocrit was 47.2%; amylase and lipase were within normal limits.

Lumbosacral spine films on admission revealed intact Harrington and Luque rods joined by multiple Wisconsin wires (Fig 2). On the lateral view a transverse fracture through the proximal 1/4 of the body of L3 with collapse of approximately 25% of the anterior height of the L3 body was noted (Fig 3). To better visualize the posterior elements, lateral tomograms of the lumbar spine were performed, revealing a transverse fracture through the L3 spinous process (Fig 4). Because of the patient’s diffusely tender abdomen, an abdominopelvic computerized tomography scan with contrast was obtained and showed no evidence of retroperitoneal or
Intraperitoneal hemorrhage. Clinical and radiographic findings in this case were consistent with a seat-belt-type injury of the lumbar spine. Following return of normal bowel function, the patient was fitted with a hyperextension thoracolumbosacral orthoses and began ambulating in the brace upon its arrival. He was discharged from the hospital shortly thereafter. His total hospitalization was 5 days. The brace was removed at 3 months, after radiographic evidence of fracture healing was demonstrated. One year following the original injury the patient was without complaints and had been discharged from the orthopedic clinic.

**DISCUSSION**

In his classification of major spinal injuries, Denis included the seat-belt-type injury. The injury results from a failure in tension of both the posterior and middle columns caused by flexion and distraction. Never losing its role as a hinge, the anterior column may fail under compression. The "seat-belt-sign," or abdominal contusion, is often a concomitant of this entity as are an array of intra-abdominal injuries.

In fact, the presence of lap-belt ecchymosis should prompt a careful search for spine, bowel, or bladder injury. The present case is unique, as it may be the first report of a lap-belt-type injury to a lumbar spine stabilized by instrumentation and fusion. In this case, the axis of flexion exists at the point of contact between the belt and the abdominal wall, anterior to the body of L3. Hence, all the spinal components at the belt level are subject to distraction. The fusion mass and instrumentation from T4 to L3 provide the long moment arm necessary for distraction of the posterior and middle column elements of L3 and thus facilitate the injury. With the implementation of mandatory seat-belt legislation, an increasing frequency of restraint-related injuries to the thoracolumbar spine is inevitable.

**REFERENCES**


**EDITORIAL DISCUSSION**

ORTHOPEDICS: The seat-belt-type injury described appears to have the same mechanism and implications as that previously described by Howland et al, as well as the more commonly referenced "Chance" fracture. Similarly, Smith and Kaufel's work further described the pathomechanics of similar injuries. Does the presence of a previous fusion mass change these implications and findings? What are the authors' feelings about the compression injury component to the body of L3? Do you feel this represents a bi-modal injury with the distraction occurring...
first, followed by axial loading with the deceleration portion of the motor vehicle accident? The latter description has been offered as a possible explanation of these types of flexion-distraction injuries by Begeman et al. 3

Ebraheim and Cecil: The presence of a previous fusion mass does not change the mechanism and findings in flexion-distraction injury. We agree that the compression to L3 represents a bimodal injury with the distraction occurring first followed by axial loading.

REFERENCES (EDITORIAL DISCUSSION)


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