

Emergency Imaging

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Figure 1



Figure 2

A 32-year-old man is brought to the emergency department following a motor vehicle accident in which he was a restrained passenger. On physical examination, there is midline tenderness over the lower thoracic spine. AP and lateral radiographs of the thoracic spine are obtained (Figures 1 and 2).

What is the finding, and what is the differential diagnosis?

Are additional imaging studies necessary? If so, which study would you recommend?

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ANSWER

The frontal and lateral radiographs (Figures 3 and 4) of the lower thoracic spine reveal loss of height of the T9 vertebral body (white arrows). The differential diagnosis for this imaging finding includes compression fracture (which may be traumatic, osteoporotic, or neoplastic in etiology), burst fracture, or Chance fracture. Although the spinous processes are not well visualized on the lateral view (which is over-penetrated), the AP view (Figure 3) demonstrates that there is widening of the spinous processes, indicating injury to the posterior elements (black arrows). As both simple compression fractures and burst fractures typically do not involve the posterior elements, the leading consideration in this case is Chance fracture. The preferred imaging examination for further evaluation of this type of injury is CT because it has the ability to reconstruct images in multiple planes and is widely available in the emergency department setting. CT may also detect associat-

ed intra-abdominal injuries (most frequently bowel and mesentery), which occur in up to 40% of patients with Chance-type fractures.¹

CT examination was performed in this patient. The coronal reformats (Figure 5) demonstrate anterior compression of the T9 vertebral body (white arrows). The sagittal reformats (Figure 6) show compression of the anterior vertebral body (white arrow) and extension of the fracture into the facets (black arrow), indicating involvement of the posterior column and confirming the diagnosis of Chance fracture.

Chance fractures, also known as seat belt fractures, are flexion-distraction injuries of the lower thoracic/upper lumbar spine that typically occur in motor vehicle accidents or falls.² They have become less common with the increased use of shoulder straps on seat belts, as the shoulder belt prevents the rotation around the lap belt that results in flexion of the spine. Because Chance fractures are flexion injuries, there is compression of the anterior column of the spine (anterior half of the vertebral

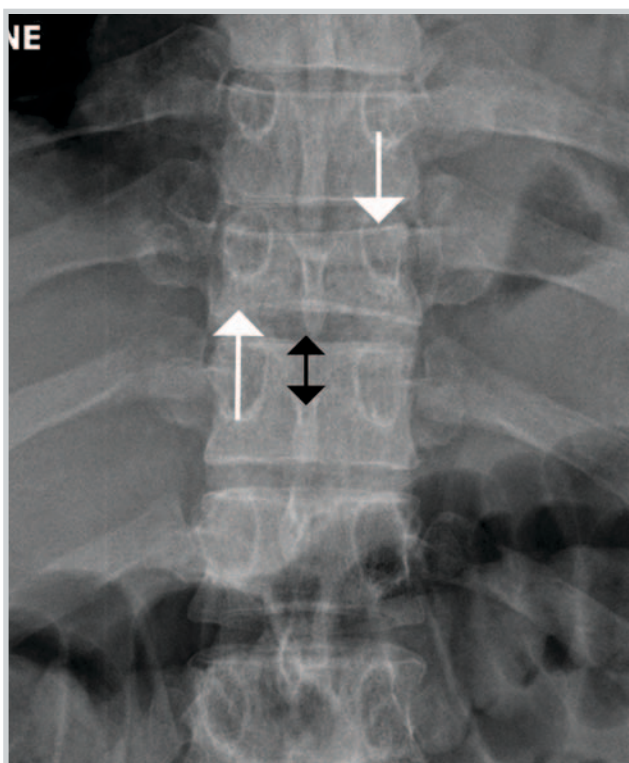


Figure 3

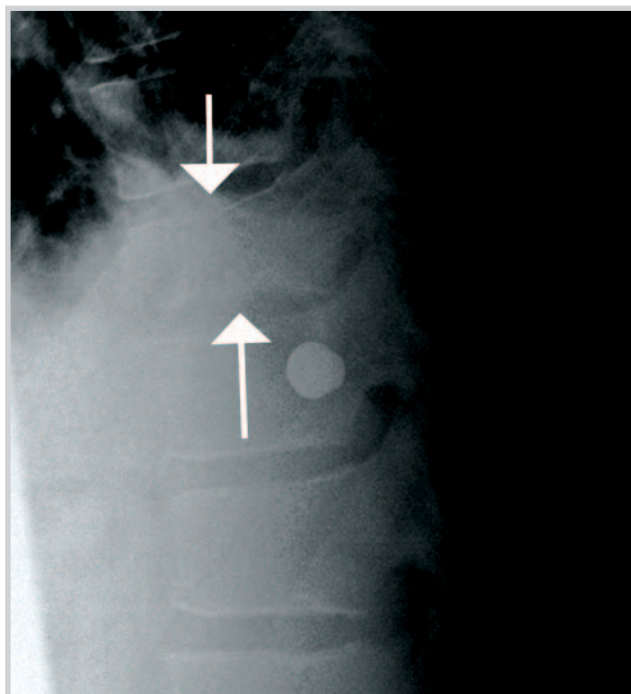


Figure 4



Figure 5



Figure 6

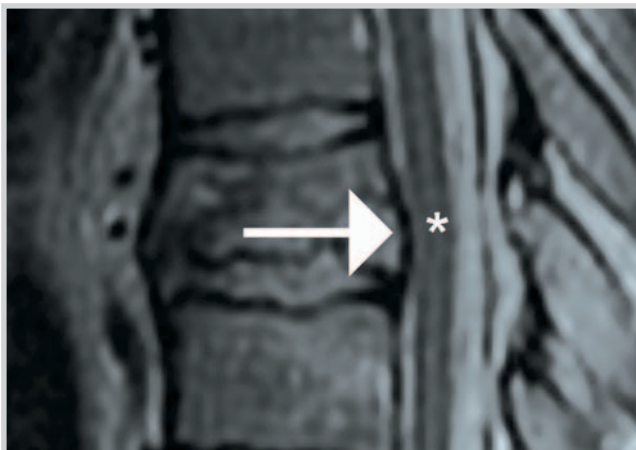


Figure 7

body, anterior longitudinal ligament) and distraction injuries of the posterior column (facet joints, spinous processes, ligamentum flavum). The middle column (posterior half of the vertebral body and the posterior longitudinal ligament) may be spared. However, as two of the three columns of the spine are disrupted in Chance fractures, they are unstable injuries and most commonly require surgical fusion. Neurologic injury may be present and is often the result of retropulsion of the posterior aspect of the vertebral body. This occurs in 15% to 50% of Chance fractures and has been termed the *Chance-Burst fracture*.¹ While CT will detect retropulsed fragments, MRI may be useful because it allows direct visualization of the

spinal cord. Sagittal T₂-weighted MR images obtained in the case patient (Figure 7) demonstrate that although there is mild retropulsion of the posterior cortex of the T9 vertebral body (white arrow), the spinal cord is normal in appearance and is not compressed (white asterisk). Despite the lack of neurologic injury, the patient required surgical fixation due to the inherent instability of his injury. He has done well on follow-up. **EM**

REFERENCES

1. Bernstein MP, Mirvis SE, Shanmuganathan K. Chance-type fractures of the thoracolumbar spine: imaging analysis in 53 patients. *AJR Am J Roentgenol*. 2006;187(4):859-868.
2. Hsu JM, Joseph T, Ellis AM. Thoracolumbar fracture in blunt trauma patients: guidelines for diagnosis and imaging. *Injury*. 2003;34(6):426-33.