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Fractures of the thoracolumbar spine A report of three cases†

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Thoracolumbar fractures are sometimes misdiagnosed and treated as mechanical low-back pain. This report describes three such cases following flexion-compression injury to the spine. The characteristic presentation along with appropriate examination of the patient are discussed. It is important to consider the possibility of thoracolumbar fracture in the differential diagnosis of low-back pain.
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KEY WORDS: low-back pain, thoracolumbar fracture, chiropractic, manipulation.

Les fractures thoraco-lombaires sont parfois mal diagnostiquées et traitées à tort comme une lombalgie mécanique. Ce rapport décrit trois de ces cas, suite à des lésions de flexion-compression à l'épine dorsale. On y discute de la présentation caractéristique et de l'examen approprié du patient. Il est important, dans le diagnostic différentiel de douleurs lombaires, d'entrevoir la possibilité d'une fracture thoraco-lombaire.
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MOTS CLÉS : lombalgie, douleurs lombaires, fracture thoraco-lombaire, chiropratique, manipulation.

Introduction

Patients presenting with lumbosacral backache following trauma involving axial loading or flexion injury of the spine should be investigated to rule out, among other things, fracture at the thoracolumbar junction. Pain referred along the cluneal nerves from the thoracolumbar junction to the iliac crests is a well-known clinical entity.[1,2] Radiographs of the lumbar spine must include the twelfth thoracic vertebra to rule out pathology at that level.

Denis reports that compression fractures of the spine account for approximately 47 percent of all spinal fractures.[3] In fact, the majority of these are localized to the thoracolumbar junction. The following cases describe fractures at the thoracolumbar junction that were initially misdiagnosed and treated as lumbosacral back strain.

Case one

A 46-year-old male presented with a nine-week history of low-back pain. The onset was reported to be a motor vehicle accident in which the patient was thrown forward and upward, landing firmly on his buttocks. Low-back pain was immediately present. Following transport to the local hospital by ambulance, anteroposterior and lateral radiographs of the lumbar spine were obtained, and the patient was informed that he had suffered a back strain (figure 1).

The patient was treated with bedrest in hospital for nine days. On discharge he continued to suffer from back pain. Shortly thereafter, he also noticed a painful lump in the thoracolumbar region of his spine.

On examination, he stood with a straight spine, although there was a noticeable gibbus deformity at the thoracolumbar junction (figures 2 a and b). The range of motion of the lumbar spine was restricted by 25 percent in extension and was full, but painfull, in other directions. Straight-leg raising was to 90 degrees without signs of nerve-root tension. Neurological examination of the lower limbs was unremarkable. Plantar response was downgoing.

Repeat radiographs of the lumbar spine, which included the thoracolumbar junction, were obtained. These revealed an anterior compression fracture of the first lumbar vertebra (figure 3).

Upon reviewing the initial radiographs, the fracture could not be visualized on the lateral view because the film was coned

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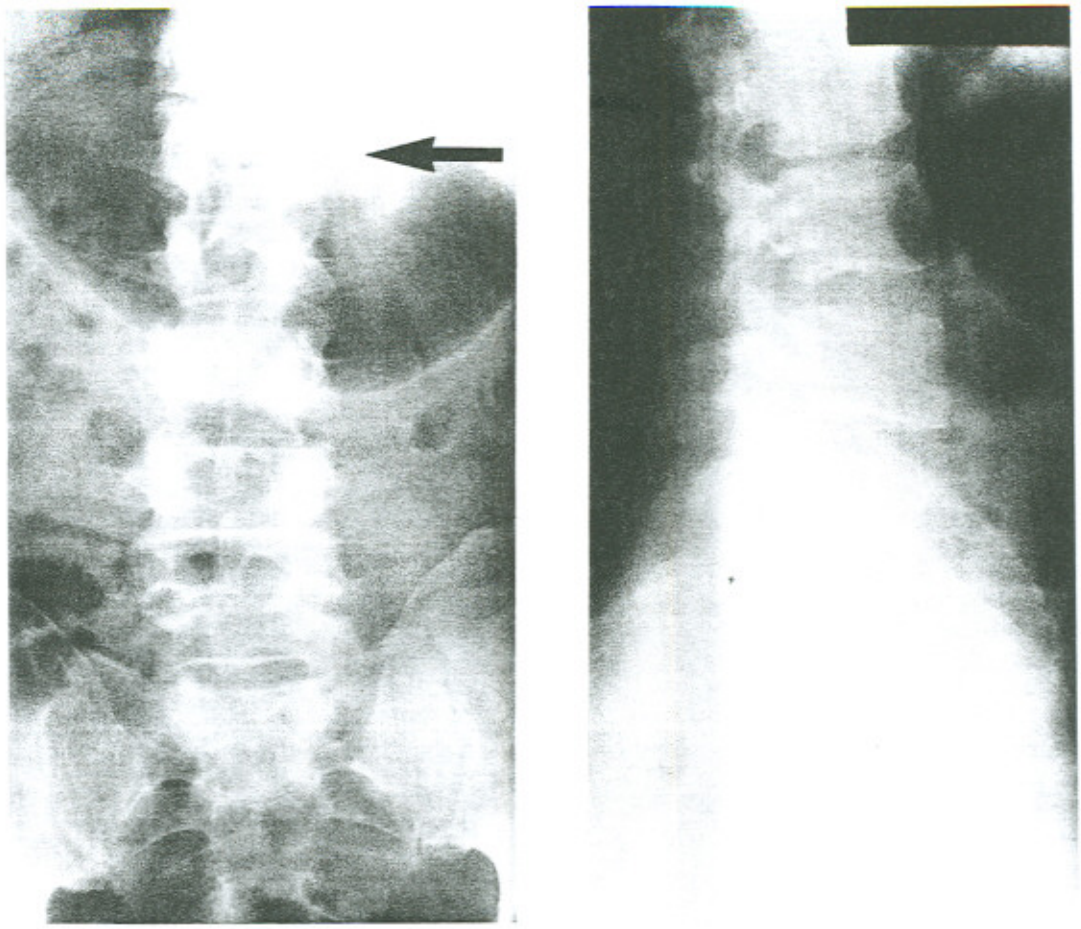

Figure 1 Anteroposterior (AP) and lateral radiographs taken at time of injury, originally reported as normal. The L1 vertebra is not visualized on the lateral view. Lateral wedging of the superior end plate of the L1 vertebra can be seen on the lateral view. Also notice the increase of the interpedicular distance at this level (arrow).

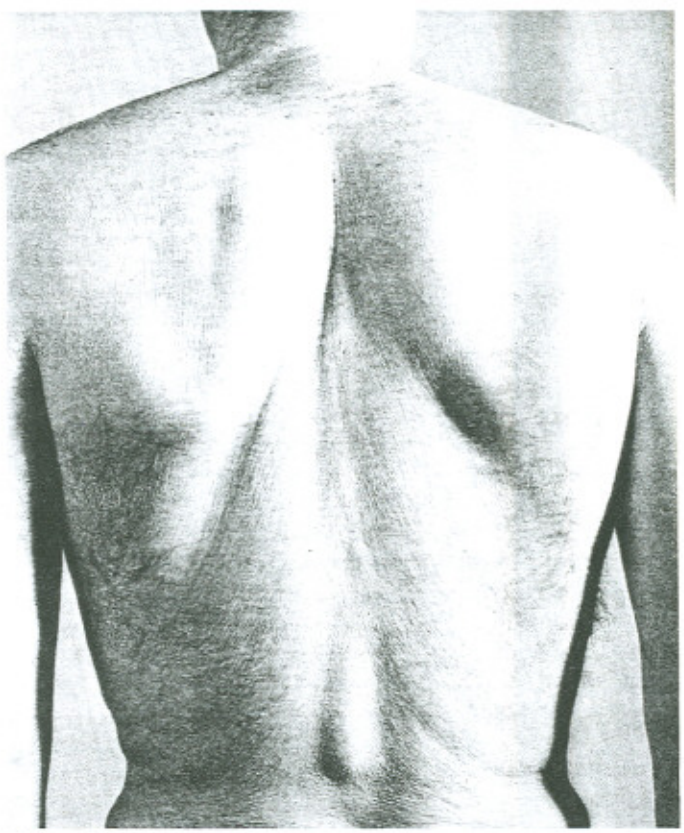

Figure 2a Clinical photograph of case 1 at presentation. Note the obvious gibbus deformity at the thoracolumbar junction.

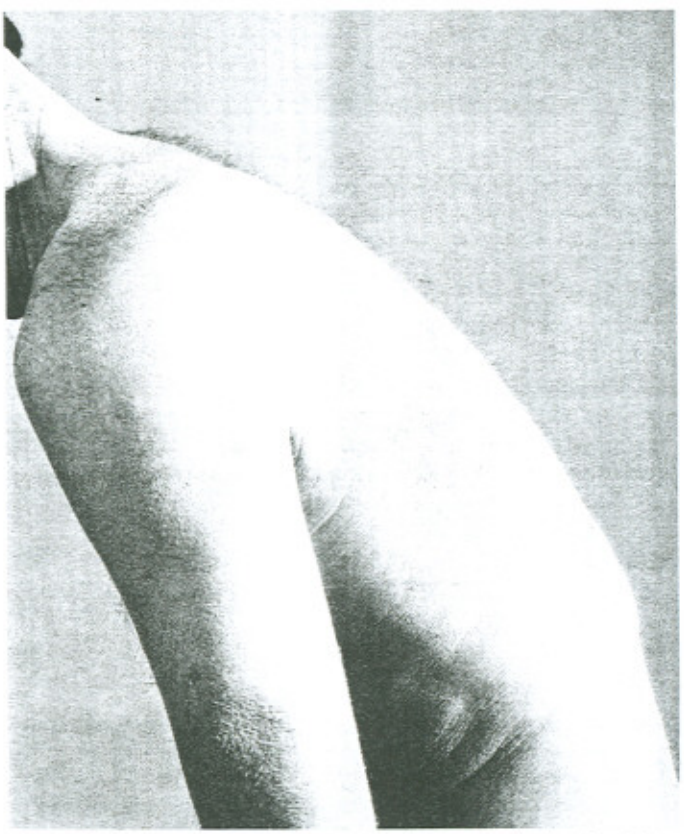

Figure 2b Photograph in forward flexion to emphasize the gibbus deformity.

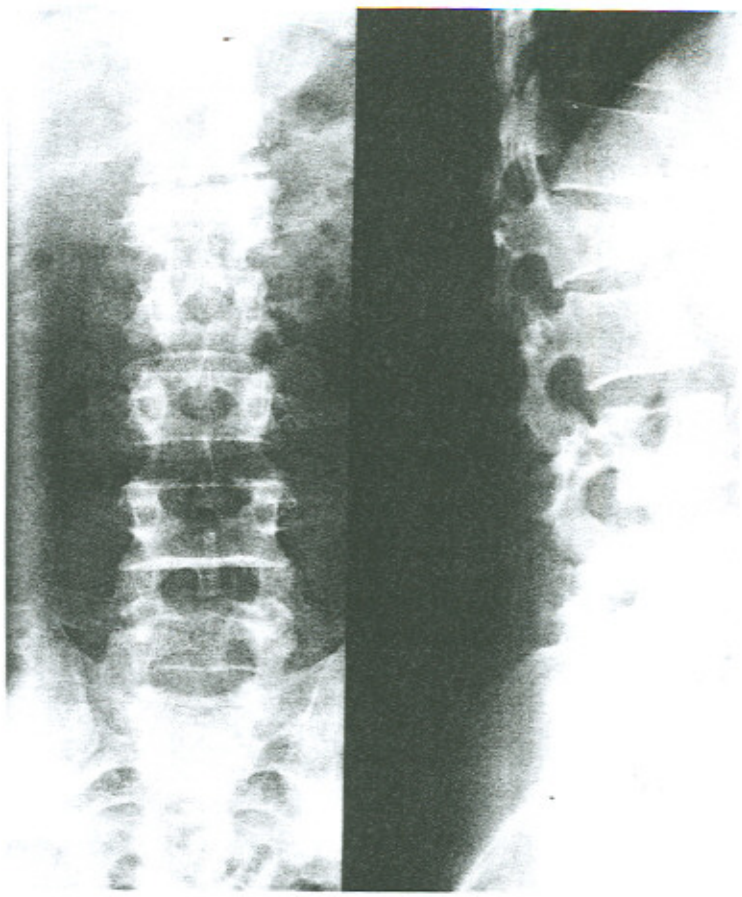

Figure 3 AP and lateral radiographs ordered to include the thoracolumbar junction. Lateral wedging and an increase in the interpedicular distance are evident on the AP view. Obvious compression fracture of L1 is noted.

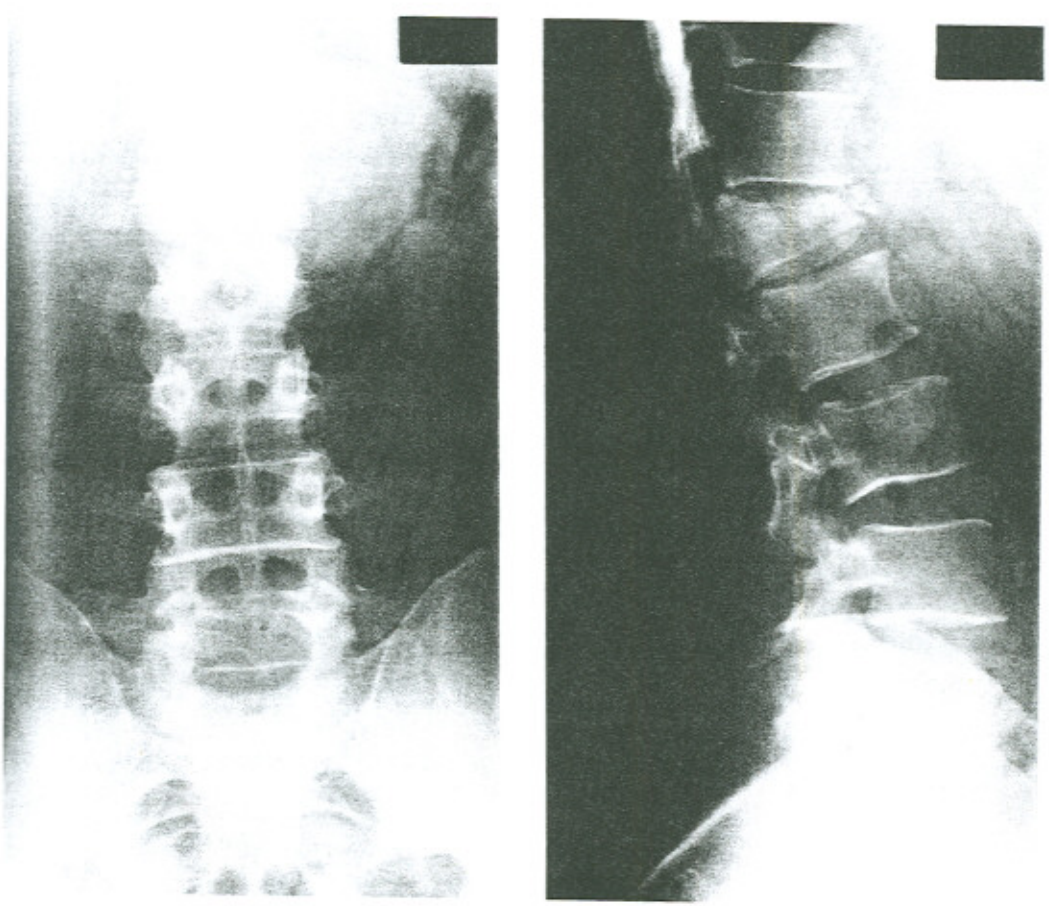

Figure 4 Further repeat views taken 8 weeks post injury show progression from the previous views. Note the increase in interspinous gap and further deminution of the anterior body height suggesting instability.

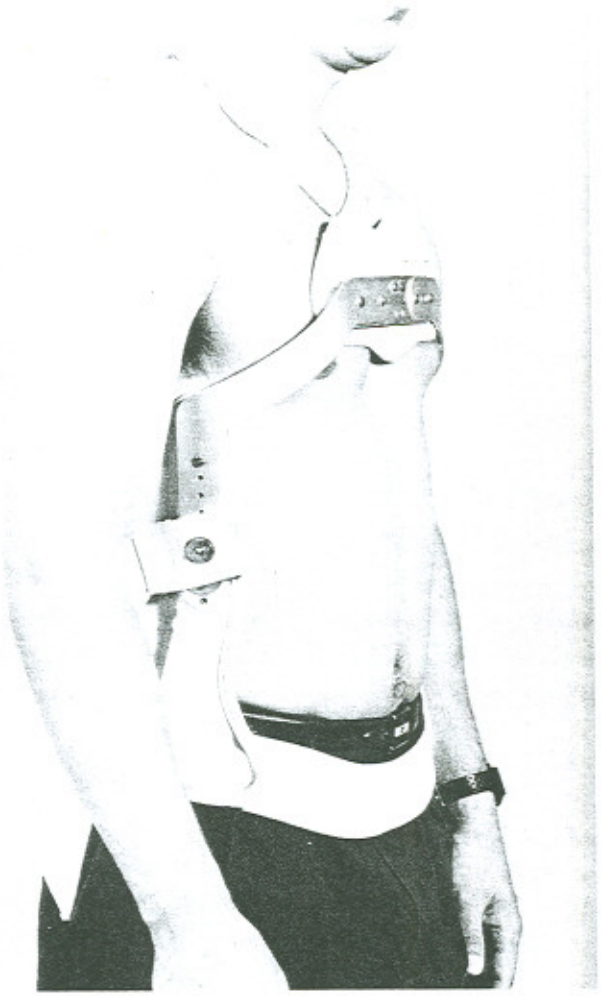

Figure 5a Model in Jewet brace, side view.

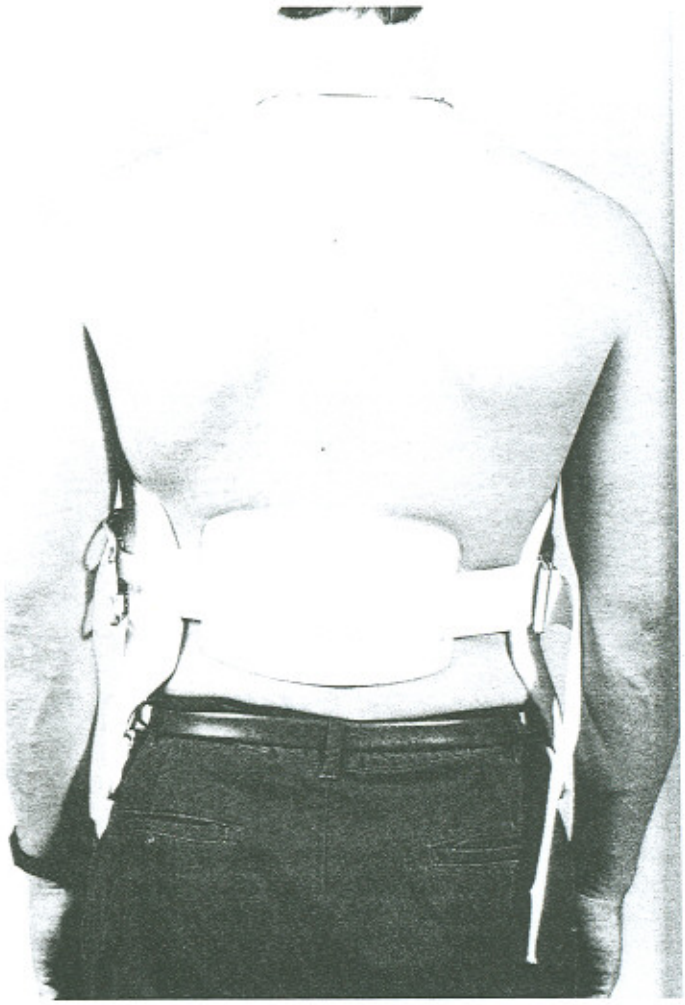

Figure 5b Jewet brace as seen from posterior.

down to the lower lumbar area. However, on the anteroposterior view, there was a slight increase in both the interpedicular distance and lateral wedging of the L1 vertebral body. If there is greater than a 50 percent decrease in the height of the anterior vertebral body it is generally assumed that the fracture is stable. In this case there did appear to be a decrease of at least 50 percent, and therefore the fracture was thought to be unstable. Referral was made to an orthopaedic surgeon on that basis. At that time, a repeat set of films was taken (figure 4). Progressive anterior wedging was apparent at L1 confirming the suspected instability. The orthopaedic surgeon prescribed a Jewet brace for six weeks of daily wear (figure 5).

At follow-up four weeks following the bracing period, the patient had improved but continued to have discomfort towards the end of the day. Further follow-up was not available at the time of writing.

Case two

A 29-year-old man was pushed over backwards, falling on to his buttocks, one day prior to presentation. Shortly after the fall he experienced a continuous dull ache in his lower back for which he saw his family physician. Following physical and radiographic examination of his back he was referred for chiropractic treatment.

On examination, pain was localized to the lumbosacral region with most of the tenderness over the right sacroiliac joint. The lumbar lordosis was flattened and lumbar spine flexion was reduced by 50 percent. Straight-leg raising was to 80 degrees without signs of nerve-root tension or neurological deficit. There was no tenderness present at the thoracolumbar region. On review of the initial radiographs, anterior compression fractures of the first and second lumbar vertebral bodies could be seen (figure 6). Less than 50 percent of the anterior vertebral body height was lost and both vertebrae appeared stable.

After notifying the family physician, the patient was managed conservatively with rest, gentle mobilization, and massage of the paraspinal musculature for a one week period. He returned to work two months following the accident. Follow-up x-rays, three months from the initial injury failed to show any progression at the fracture sites.

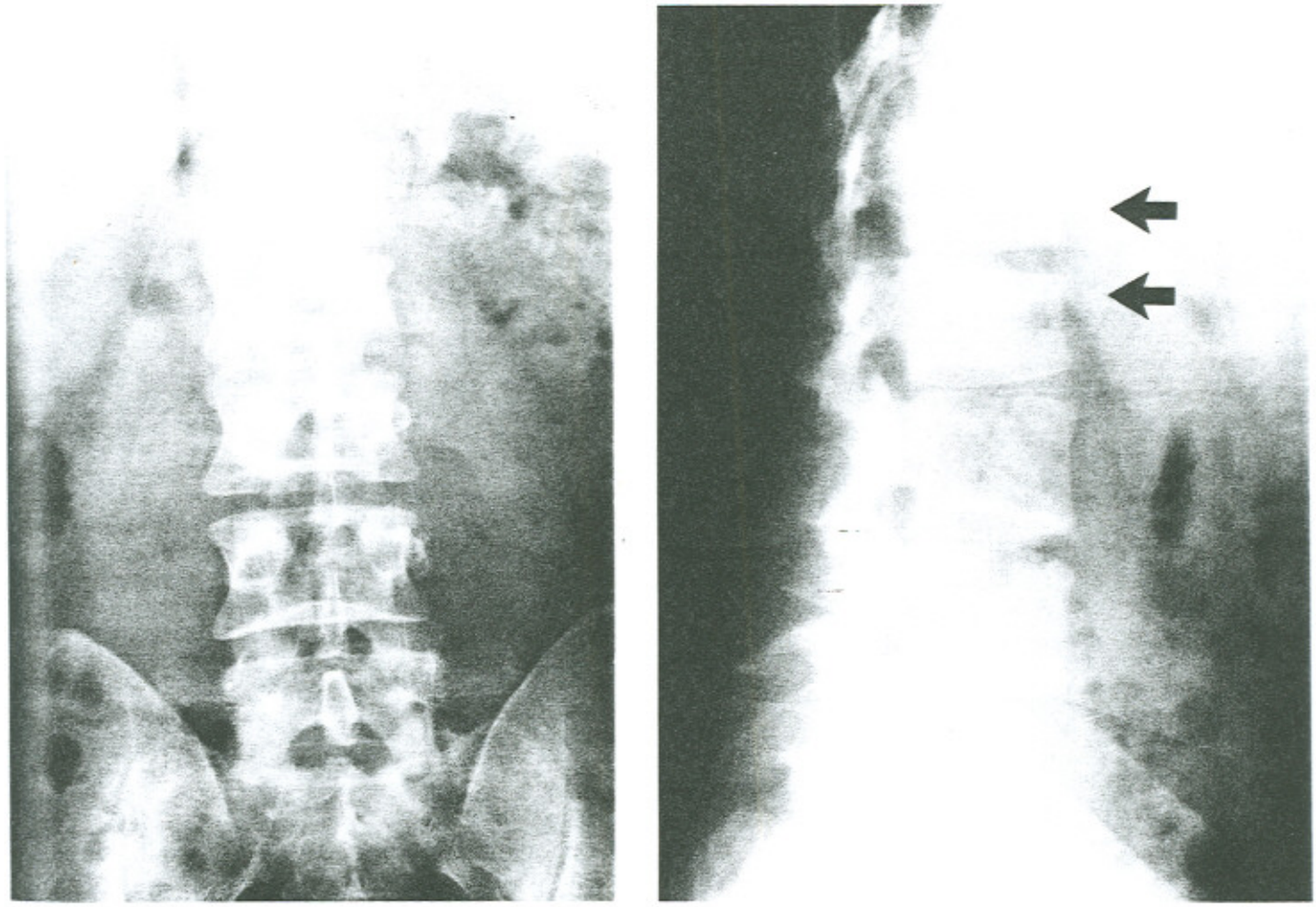

Figure 6 AP and lateral radiographs of case 2, reported as normal. Slight compression of both L1 and L2 is noted with radiodense lines along the fracture sites (arrows).

Case three

An 88-year-old gentleman presented with a three week history of lumbosacral pain. The pain started when the patient struggled to assist another person to arise from a chiar. The discomfort was initially described as a dull ache located in the lower lumbar region. He was not on any medications at the time. There was no history of similar pain or serious illness and he reported to be in good general health. The patient had been seeing another chiropractor for one week previous for this same complaint. The chiropractor had been manipulating the sacroiliac joints without noticeable improvement so a second opinion was sought.

On examination, the range of motion of the lumbar spine was limited by 50 percent in all directions. There was kyphotic deformity and step defect at the thoracolumbar area. Percussion of the spinous process with a reflex hammer caused considerable pain at the lower aspect of the thoracic spine. Neurologic examination was unremarkable.

The original x-rays of the lumbar spine were reported as normal. A further radiograph examination was requested in order to visualize the lower thoracic spine.

The anteroposterior and lateral views showed a marked compression fracture of the twelfth thoracic vertebra (figures 7 a and b). There was marked wedging present creating a localized kyphotic deformity. The disc spaces appeared normal.

The patient was treated conservatively on ten occasions utilizing electrotherapy and massage directed at the T12 area. Subjective improvement was noted, but the patient continued to experience considerable discomfort. A repeat set of radiographs (figures 8 a and b) showed marked progression of the compression fracture at the T12 level. The anterior body height decreased to eight millimeters from 20 on the previous examination.

The patient was referred back to his family physician for further management. Seven months follow-up showed that the patient was feeling better, but still experienced occasional back ache. He continued to remain healthy.

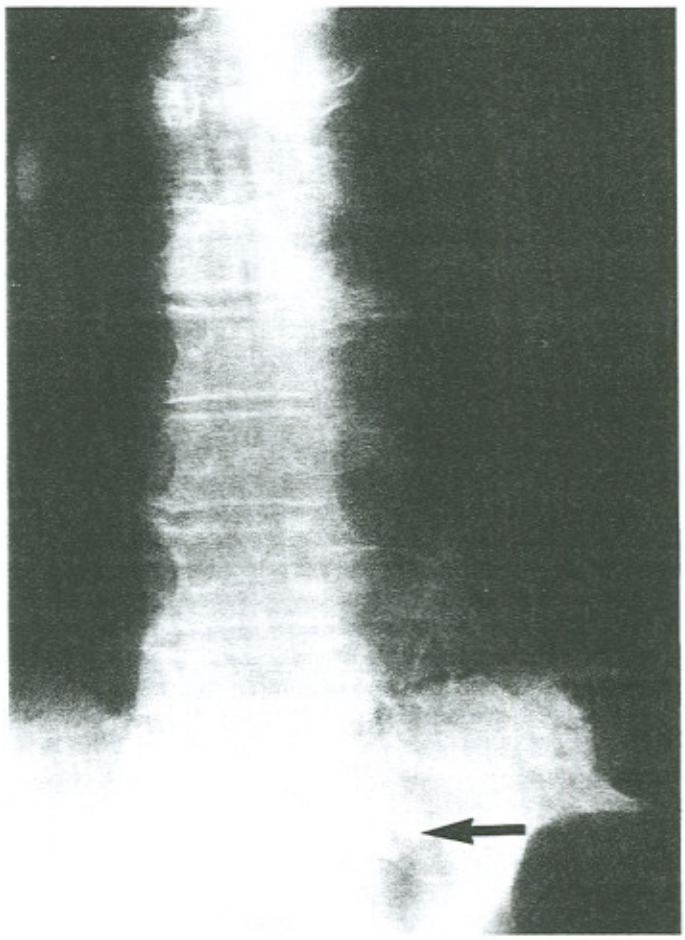

Figure 7a Initial radiographs of case 3 which include the thoracolumbar spine. Severe compression of the T12 body is noted (arrow).

Figure 7b Lateral radiograph showing compression fracture at the T12 level. Anterior body height measures 20 mm (arrow).

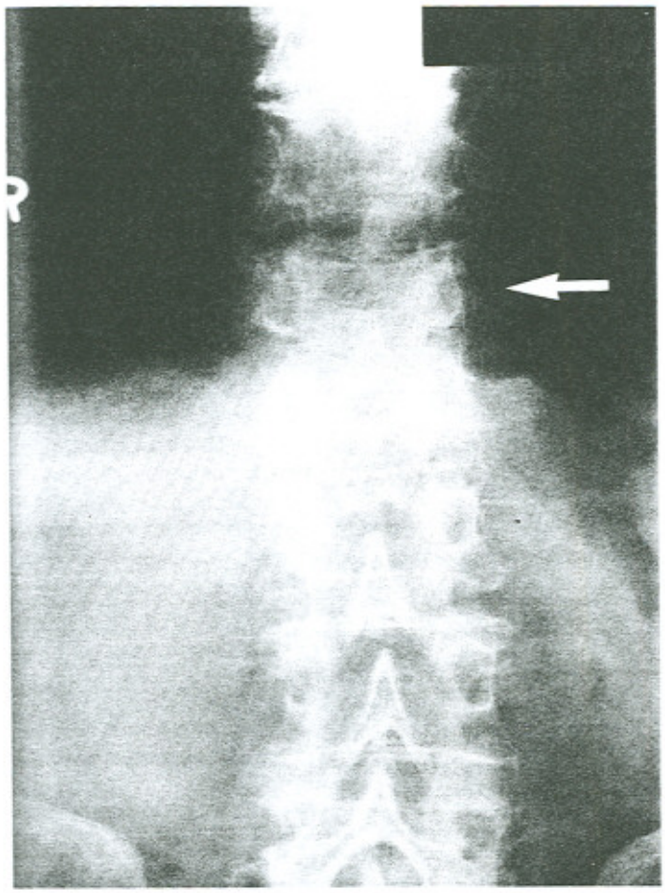

Figure 8a Follow up AP view of case 3. Although difficult to visualize, it appears that the fracture has progressed (arrow).

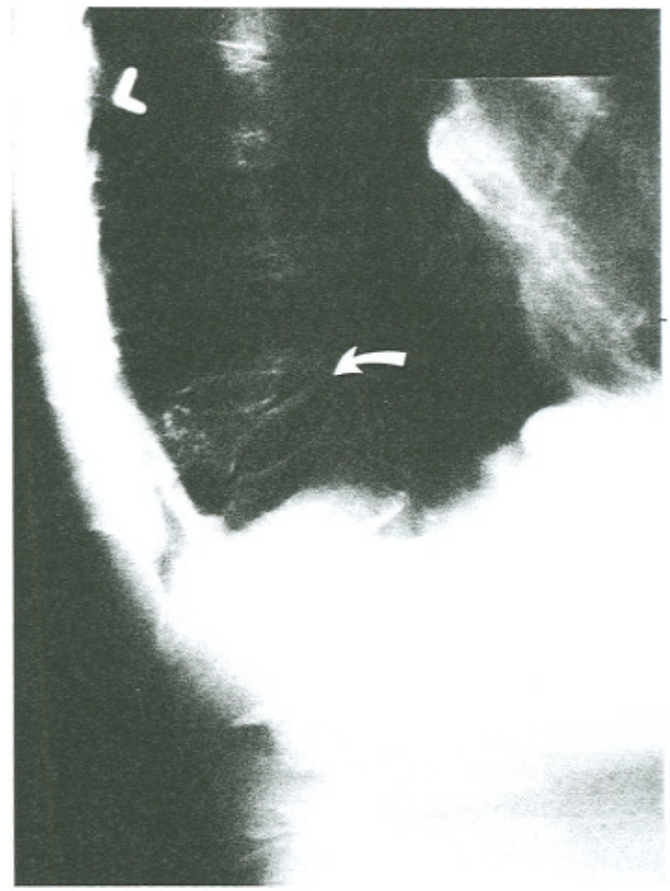

Figure 8b Repeat lateral view taken 12 weeks after the first film. The anterior body height now measures only eight mm (arrow).

Discussion

Fractures of the thoracic and lumbar spine most commonly occur at the thoracolumbar junction.[3,4] The vertebra most commonly involved is the first lumbar, followed in order by L2 and T12 respectively. In fact, fractures at this level represent the greatest proportion of all spinal fractures combined.[3,4]

The mechanism of injury always involves hyperflexion or axial loading of the thoracolumbar spine. Forces about the axis of flexion pass through the mid portion of the nucleus pulposus. The vertebral body anterior to the axis is compressed while the posterior structures are distracted.

Although the injury is located at the thoracolumbar junction, the pain is often referred to the lumbosacral area. This was originally described by Maigne as the Thoracolumbar Syndrome.[1] Irritation of the posterior primary rami at the T12 to L2 levels refers pain along the cluneal nerves to the iliac crests.[2]

Between 10 and 23 percent of all spinal fractures involve neurologic deficit.[3] This deficit may be as minor as localized nerve-root damage or as severe as cord compression with long-tract signs. Anatomically there is variation in canal size at different spinal levels, with the thoracic region having less space for the spinal cord compared to the lower levels. Fractures in the thoracic spine, therefore, have a higher incidence of associated neurologic deficit.[5] Approximately 22 percent of all fractures in the thoracic spine cause deficit compared to 8 percent in the lumbar spine. Compression fractures, however, rarely involve neural compromise, while 47 percent of burst fractures have associated neural deficit. This rises to over 75 percent with fracture dislocations.

Before manipulative treatment is considered, fracture of the upper lumbar spine must be ruled out. A history of hyperflexion injury and/or clinical evidence of a gibbus deformity are indications for radiographic examination of the spine from the thoracolumbar junction to the sacrum.

Once a fracture has been detected, stability of the fracture must be ascertained. Stability is defined as the ability of the

spine to maintain the relation of the vertebrae such that there is neither damage nor irritation to the nerve roots, cauda equina, or spinal cord under physiologic loads.[5] Denis describes a three column spine in which instability occurs when the posterior column is disrupted. This column consists of the osseous posterior arch, the supraspinous and infraspinous ligaments, the articular capsule and the ligamentum flavum. Most simple compression fractures are therefore stable.

Clinically, a great number of patients present with generalized lumbosacral backache without neurological deficit. Gibbus deformity or tenderness at the thoracolumbar junction may be the only clinical findings.

Radiologic instability is indicated by 1) progression of the fracture on repeat films, 2) widening of the interspinous gap, 3) greater than 50 percent loss of the anterior body height, and 4) any loss in the height of the posterior aspect of the vertebral body.[3]

Treatment

Empirically, treatment varies depending on the degree of compression. Minimal and stable fractures are treated with rest and local ice applications in the acute phase. This is followed by gentle mobilization and manipulation above and below the involved level after there is significant callus formation. More severe, but still stable fractures, may require longer periods of rest prior to active therapy. If treatment does not appear to be effective in these cases repeat radiographs should be requested. As was noted in case 1 and 3, unstable fractrures are referred back to the family physician or to a specialist.

Summary

Patients presenting with lumbosacral back pain following flexion trauma must be investigated to rule out fracture at the thoracolumbar junction. It is recommended that in these cases, and perhaps all low-back pain patients, radiographic examination should always include the thoracolumbar junction in both the anteroposterior and lateral views.

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