Case 4

The Mobile Vertebra: Height Restoration

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Clinical Presentation

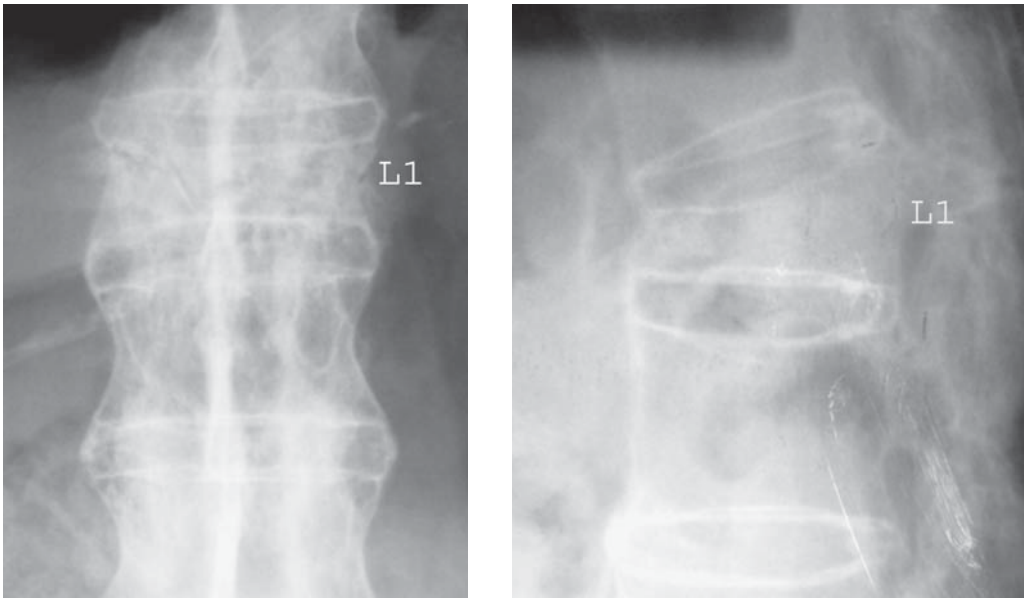
A 65-year-old man presented with new, severe back pain after a minor fall. The patient was known to have ankylosing spondylitis. The pain was so severe that the patient was confined to bed. The pain was focal at the thoracolumbar junction region, and there was no associated motor dysfunction. An initial trial of analgesics and bed rest was unsuccessful, and subsequently the primary care physician ordered magnetic resonance imaging (MRI).

Imaging Findings

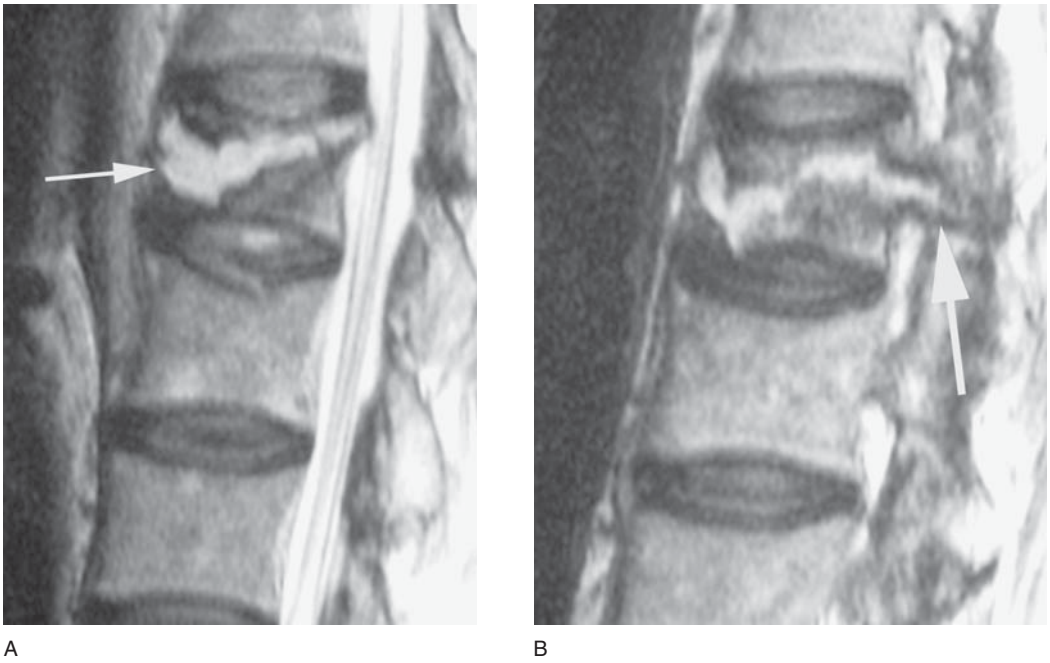
Initial radiographs of the lumbar spine were obtained and revealed a compression fracture of L1 (Case Figure 4.1). The L1 vertebra was markedly compressed, with only 35% of its original height anteriorly. An MRI demonstrated the fracture with a central cavity (Case Figure 4.2A). Height was regained by simply placing the patient supine on the MRI table. Height restoration compared with initial radiographs was estimated at 35%. The MRI also demonstrated that the fracture extended into the posterior elements (Case Figure 4.2B). Based on the findings, a vertebroplasty was planned.

Procedure

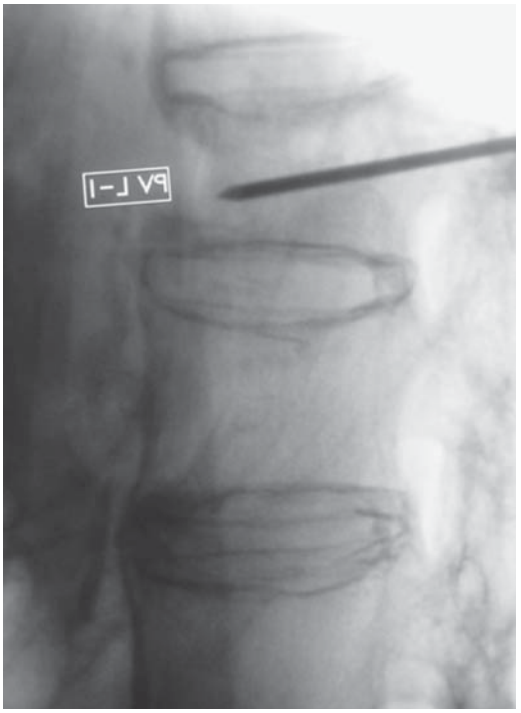
The patient received 1 gram of Ancef and procedural sedation intravenously. He was placed prone on the procedure table and sterile preparation and local anesthesia were administered. The 13-gauge needles were placed transpedicularly with fluoroscopic guidance. It was noted that the vertebral height was almost complete in the prone position (Case Figure 4.3A) and markedly changed compared with the initial postfracture radiograph (Case Figure 4.1B). Cement was injected, and the cavity created within the vertebra filled preferentially.



Case Figure 4.1. (A) An anteroposterior radiograph shows typical signs of ankylosing spondylitis. There is a compression fracture of L1. **(B)** A lateral radiograph demonstrates again the severe compression fracture of L1. The anterior height is 35% to 40% of the anterior height of the adjacent L2 vertebra.



Case Figure 4.2. (A) A sagittal T2 MRI demonstrates a cavity within the L1 vertebra (white arrow). Note that the anterior height is now 75% to 80% of the anterior height of the adjacent L2 vertebra. With the patient supine for the MRI, the vertebra is distracted, producing partial height restoration and opening the central cavity. **(B)** A more lateral image for this MRI series shows the fracture line extending into the posterior elements (white arrow). This is a common occurance with fractures in ankylosing spondylitis.



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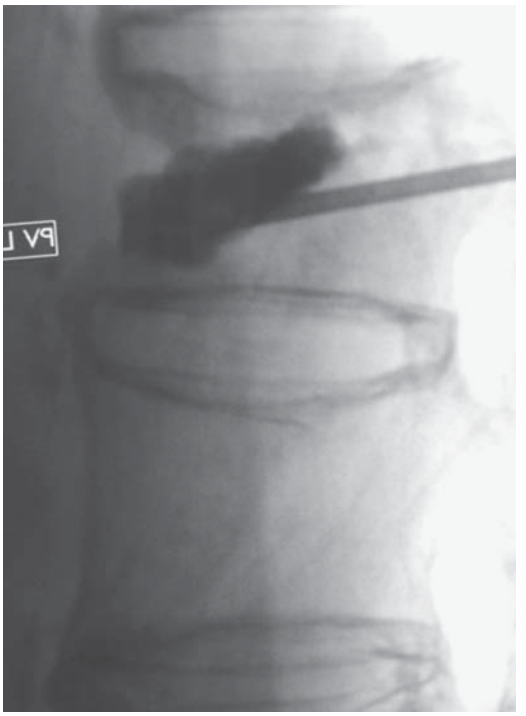

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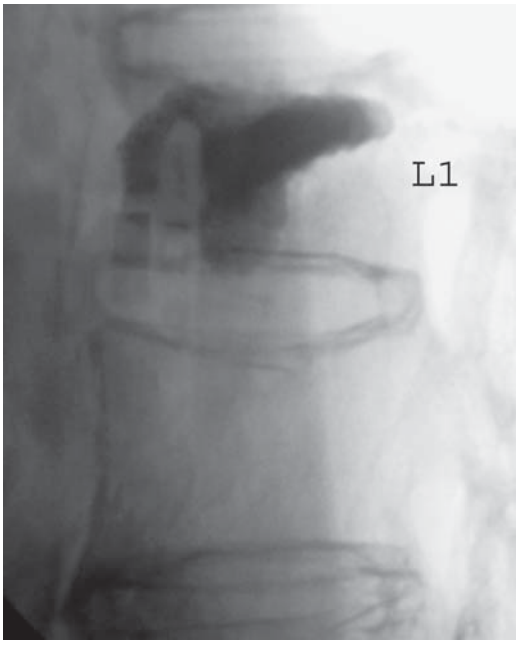

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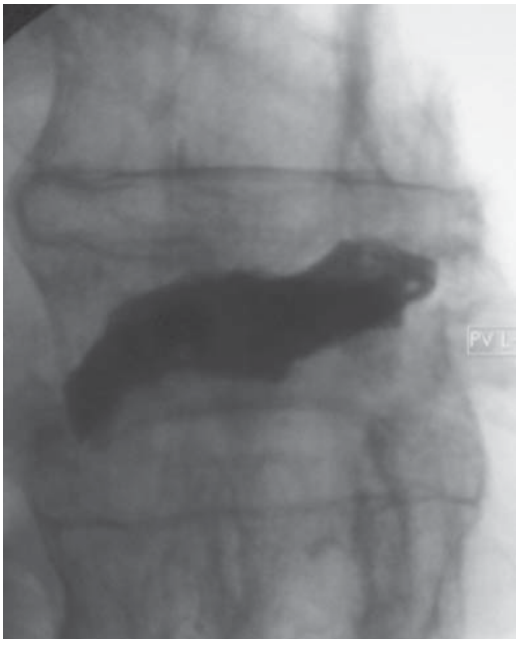

D

Case Figure 4.3. (A) A lateral radiograph after transpedicular needle introduction for percutaneous vertebroplasty. Again, height restoration is substantial compared with the initial postfracture radiograph shown in Case Figure 4.1B. **(B)** A lateral radiograph taken in the early phase of cement filling shows preferential filling of the central cavity. Lateral **(C)** and anteroposterior **(D)** radiographs show the final cement fill achieved in this percutaneous vertebroplasty. Filling is predominately of the cavity, with little cement extending into other parts of the vertebra.

Results

There were no clinical complications. The patient was observed for 2 hours postprocedure, and his pain was totally gone by the end of this observation period. The patient resumed routine activity and has had no additional problems over a 3-year period of follow-up.

Discussion

The postprocedure images reveal that essentially all of the original height of the vertebra was regained with positioning, and this height restoration was permanent following cement injection (Case Figures 4.2 and 4.3). The cement filled the cavity created by opening up of the vertebra during prone positioning. This height restoration was achieved without additional devices such as the balloon tamp used during kyphoplasty.

Many fractured vertebrae are mobile to some degree following fracture, and some height restoration is common with percutaneous vertebroplasty kyphoplasty. One of the big questions is whether this mobility is all that is attainable regardless of which procedure is used. (Are we simply measuring this inherent mobility during kyphoplasty rather than a primary effect of the balloon?)

An important point to note when mobility of a fractured vertebra is observed is that pain relief is usually very quick (sometimes within minutes after coming off the operative table) and dramatic.

Signs of a potentially mobile vertebra include a cleft or cavity seen on the radiographs or MRI images. Change in vertebral height when different images are compared also indicates mobility. This is most commonly observed when images made in different positions are compared (standing versus supine or prone).

The cavity seen in these fractures will often fill preferentially during cement injection. This will be sufficient to create pain relief and provide durable fracture fixation. More vertebral filling is not necessary for a good outcome. Filling of the posterior elements was not attempted, as this increases the risk of a serious leak. Even without posterior element filling, this patient enjoyed a very good outcome that was durable.