# Case 1

# Single-Level Vertebroplasty and Biopsy

**John M. Mathis**

## Clinical Presentation

The patient is an 80-year-old man who has had multiple compression fractures in the past. He has some chronic back pain that is suspected to be related to noncritical spinal stenosis. He has prostate cancer, but no signs of metastasis clinically or by laboratory analysis. He presents with 2 weeks of new back pain after minor trauma at the junction of the mid and low back. His pain is worse with standing and movement but partially relieved by lying down. Oral narcotic analgesics produce considerable nausea and constipation. He is referred by his local physician with little change in the initial level of presenting symptoms and after undergoing magnetic resonance imaging (MRI).

This elderly gentleman has local tenderness at the thoracolumbar junction region on palpation. He is afebrile, and laboratory tests are normal with no signs of infection and normal clotting function.

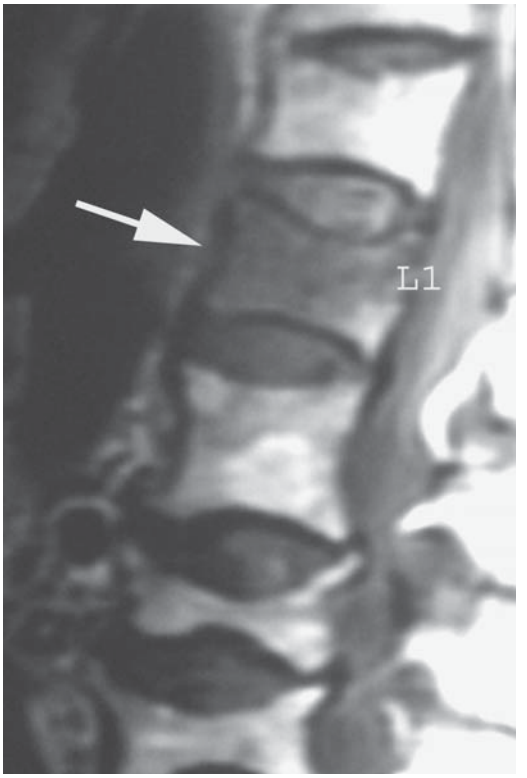
## Imaging Findings

The patient's MRI reveals an acute fracture involving the L2 vertebra with marrow edema and mild compression (Case Figure 1.1). Multiple old fractures are noted but are chronic by MRI signal analysis. The MRI does show moderate spinal stenosis below the level of new fracture. The MRI did not show signs of tumor involvement, but because of the history of prostate cancer it was decided to perform a biopsy at the time of percutaneous vertebroplasty.

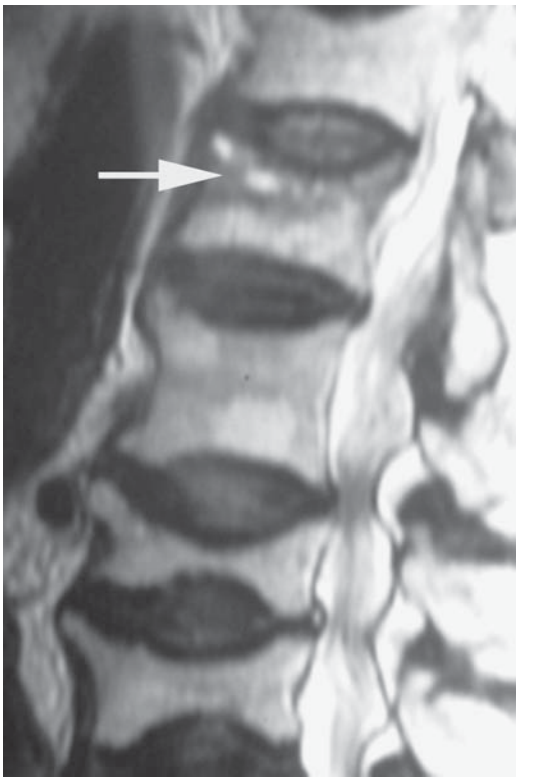
## Procedure

The patient received 1 gram of Ancef (cefazolin) intravenously (IV) 30 minutes before the procedure. Procedural sedation was accomplished by titrating IV fentanyl and Versed.

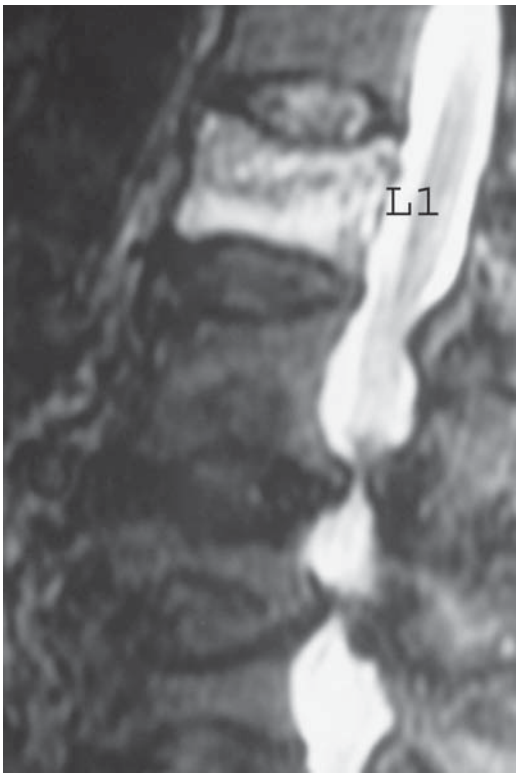
Local anesthesia was administered to the skin, subcutaneous tissue, and periosteum over the L2 vertebra at the sites of intended needle




A



B




C

**Case Figure 1.1. (A)** T1-weighted MRI reveals acute marrow edema (low signal) in the L1 vertebra (white arrow). Chronic compressions of T12, L3, and L4 are noted. These have normal bright marrow signal. **(B)** T2-weighted MRI demonstrates some focal bright signal in the L1 vertebra below the upper endplate (white arrow). This indicates fluid in a small cleft or cavity created during the fracture. This will preferentially fill with cement. **(C)** Fat saturation, inversion recovery (STIR) image shows the acute fracture at L1 as bright. All other vertebrae are low signal, again consistent with no acute injury.

introduction. A 13-gauge trocar–cannula for cement delivery was inserted through the pedicle of L2 bilaterally using fluoroscopic guidance (Case Figure 1.2A).

The needle tip of the first needle was stopped just beyond the posterior wall and a biopsy device inserted (Case Figure 1.2B). A biopsy specimen was obtained and submitted for analysis (Case Figure 1.2C,D). (It subsequently was negative for cancer.) Both needles were ultimately advanced to the junction of the anterior and middle thirds of the vertebra (shown in the lateral projection) (Case Figure 1.2E).

Simplex P was mixed with sterile barium sulfate (the barium level was brought to 30% by weight). The cement was injected and an adequate fill achieved with no significant leak or clinical complication. The patient had a small cavity in the upper part of the vertebra that preferentially filled with cement during the cement injection (Case Figure 1.3A). The cement fill on this vertebroplasty was not homogenous (Case Figure 1.3B,C). This occurs commonly and does not indicate a problem with the ultimate outcome. One does not need to reinsert additional needles to try to fill the parts of the vertebra not filled with cement. A more homogenous fill is shown in Case Figure 1.4. This fill gives a better visual result but the clinical outcome should be the same.

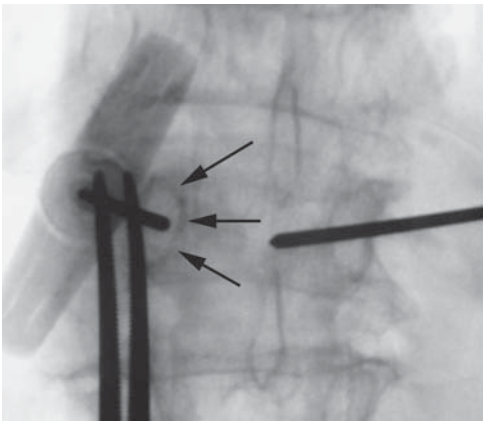
## Results

Postprocedure the patient was monitored for 2 hours total. He was maintained recumbent for 1 hour and then gradually ambulated. He experienced good pain relief by about 4 hours postprocedure and was able to discontinue narcotic analgesics. His chronic back pain remained.

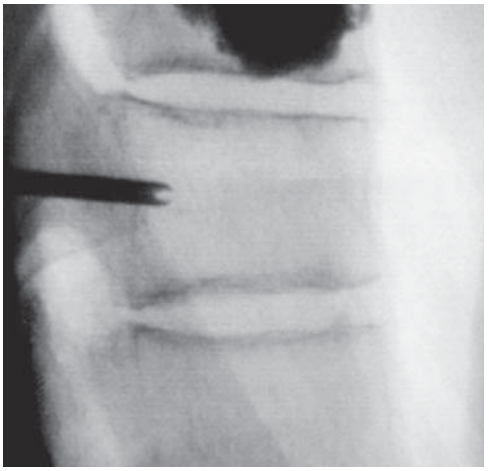
## Discussion

This patient demonstrates the common situation of coexistent spine problems accompanying new compression fracture and new, severe pain. The new pain is often superimposed on more chronic but less severe pain. In discussing this procedure with patients and their family, it is important to point out that the new pain related to the compression fracture should be relieved by the percutaneous vertebroplasty. The more chronic pain will likely remain. In this patient's case, the chronic pain was related to spinal stenosis, which was not critical and did not have radicular symptoms.

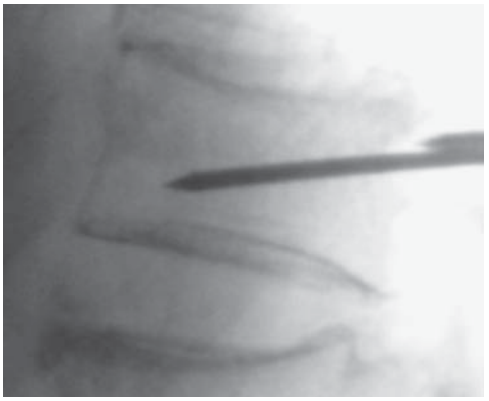
This patient had known prostate cancer but no evidence of systemic spread. Because vertebroplasty can be performed effectively in either benign or malignant disease, one does not have to wait for the result of the biopsy before continuing with the procedure. If malignant disease is ultimately found, appropriate therapy can be instituted at that time and will not be adversely affected by the



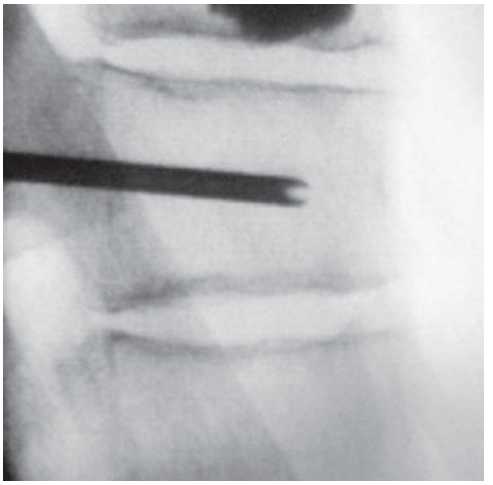
A



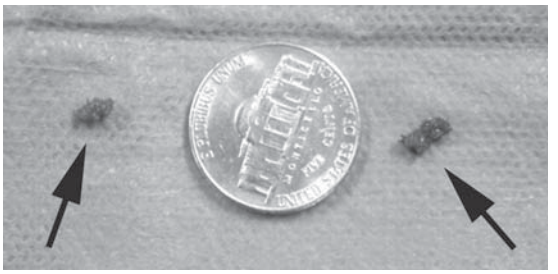
B



E

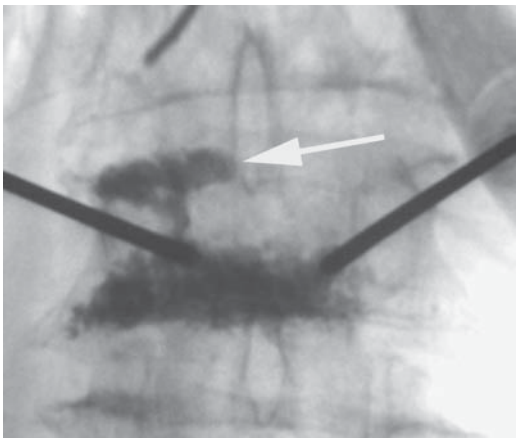


C

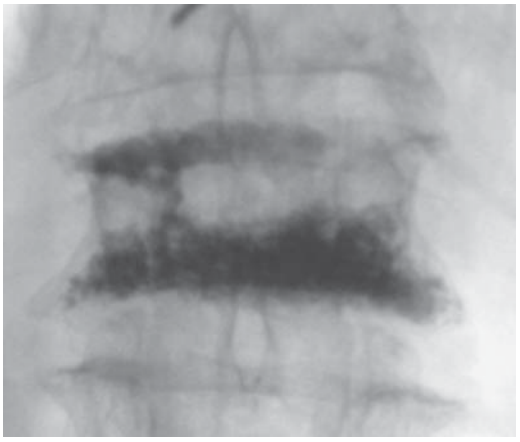


D

**Case Figure 1.2. (A)** Oblique radiograph shows the pedicle appearance (black arrows) as the needle is being directed through the pedicle into the vertebral body. **(B)** Lateral radiograph showing a biopsy device exiting the cannula, which was initially stopped at the posterior margin of the vertebra (this is a different case used for this demonstration). **(C)** The biopsy device is advanced into the vertebra to take a bone core. **(D)** The bone cores (black arrows) obtained with the biopsy device. **(E)** The lateral image shows the final position of the first needle, with the tip at the junction of the anterior and middle thirds of the vertebra.



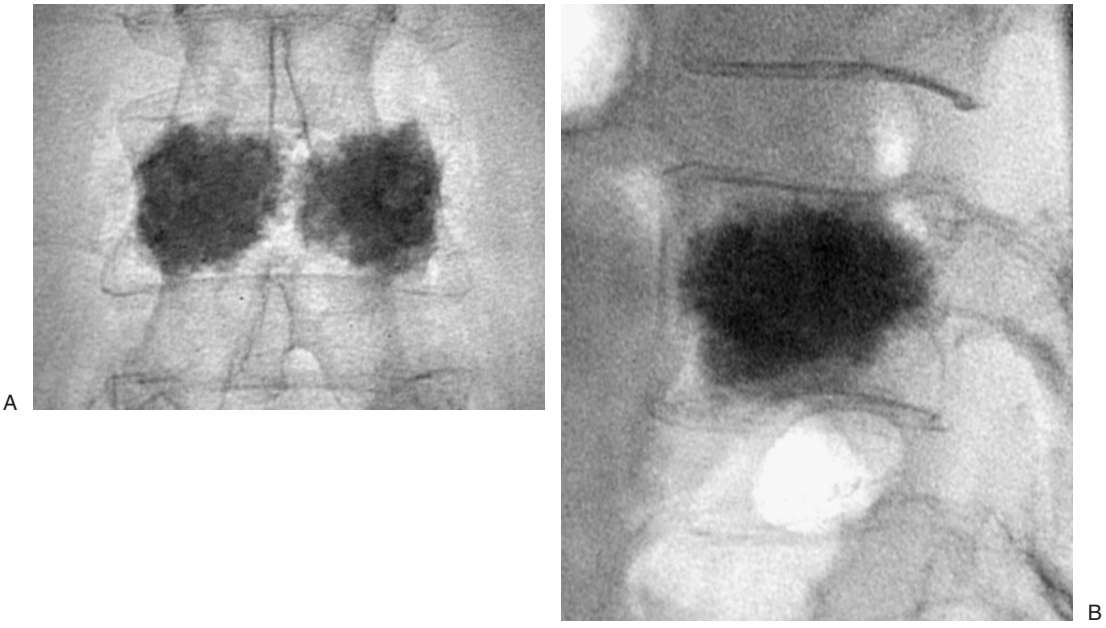
A



B

C

**Case Figure 1.3. (A)** Anteroposterior radiograph shows initial cement filling. Note that the small cleft below the superior endplate (white arrow) is preferentially filling even though the needle tip is not close to this area. **(B,C)** The final fill result. The cleft has filled (C, white arrow), but there is little cement in the center of the vertebra. This fill is not homogenous, but the outcome was good with expected pain relief.




**Case Figure 1.4. (A,B)** Anteroposterior and lateral radiograph of a more homogenous cement fill produced by a bilateral transpedicular vertebroplasty. This is visually nicer than the fill shown in Case Figure 1.3. However, the clinical outcomes were the same.

vertebroplasty. Specifically, vertebroplasty will not interfere with radiation therapy.

Biopsy devices are available in multiple styles and can be placed through either 11- or 13-gauge guide needles. The biopsy is preformed during the procedure but before the injection of cement.