Case 10

Kyphoplasty in Osteoporotic Compression Fractures

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Clinical Presentation

An 84-year-old man presented with severe back pain in the midthoracic spine. The patient had been experiencing pain for 6 weeks. There were no significant comorbidities in this individual. The pain was very limiting of his usual life style, and he had failed conservative therapy.

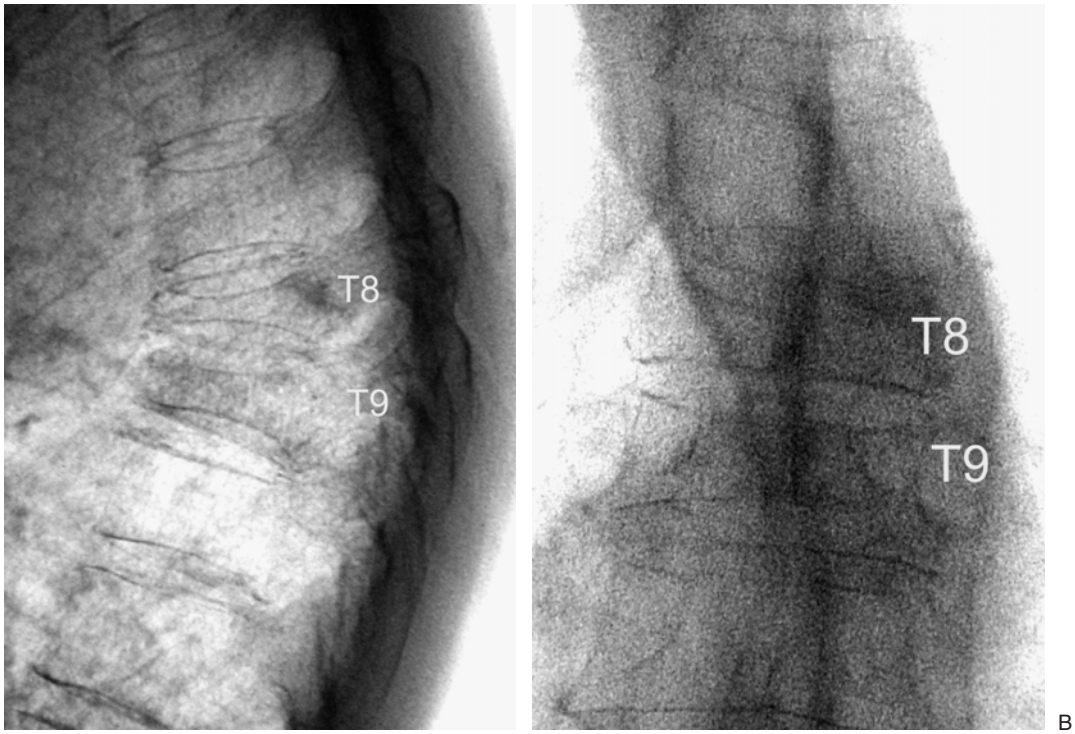
Imaging Findings

The patient was found to have moderate compression of the T8 and T9 vertebra (Case Figure 10.1), and there was associated kyphosis. These were subacute by bone scan. The level of pain correlated with the site of the fracture. Because there were two adjacent fractures, percutaneous kyphoplasty (KP) was chosen as the therapeutic option to try to restore as much height as possible to these vertebrae.

Procedure

The patient was given intravenous antibiotics prior to the procedure, which was performed in an angiography suite with intravenous procedural sedation (fentanyl and Versed). Sterile preparation of the back was followed by local anesthesia to the skin and periosteum of the bone.

Trocar and cannula systems were introduced using biplane fluoroscopic guidance via a transpedicular approach (bilaterally). When the cannula reached the posterior aspect of the vertebral body (Case Figure 10.2A), the trocar was removed and a drill inserted to develop a channel in the vertebral body for subsequent balloon insertion (Case Figure 10.2B). This was accomplished on both sides, and a balloon was inserted through each guide cannula (Case Figure 10.2D). The balloons were inflated, again using fluoroscopy for monitoring (Case Figure 10.2E). Balloon inflation was irregular in T9 (Case Figure 10.2F) and



Case Figure 10.1. Lateral **(A)** and anteroposterior **(B)** radiographs showing moderately severe compression of T8 and T9.

reached maximum pressure (300 mm Hg). When a portion of one balloon reached the vertebral margin, additional inflation attempts were terminated and the balloons were removed from T9 for cement introduction. No appreciable height restoration was achieved in this vertebra. Cement leaked along the cannula track (Case Figure 10.2H).

Balloons were inserted into T8 (following the same procedure as for T9) (Case Figure 10.3A–C). Inflation was more uniform (Case Figure 10.3D) and progressed until maximal pressure (300 mm Hg) was achieved. The balloons were deflated and removed. Cement was introduced into the vertebral body of T8 (Case Figure 10.3E). This vertebra did gain height, and this was estimated to be 3–4 mm (Case Figure 10.3F). No cement leaks were experienced at this level.

Results

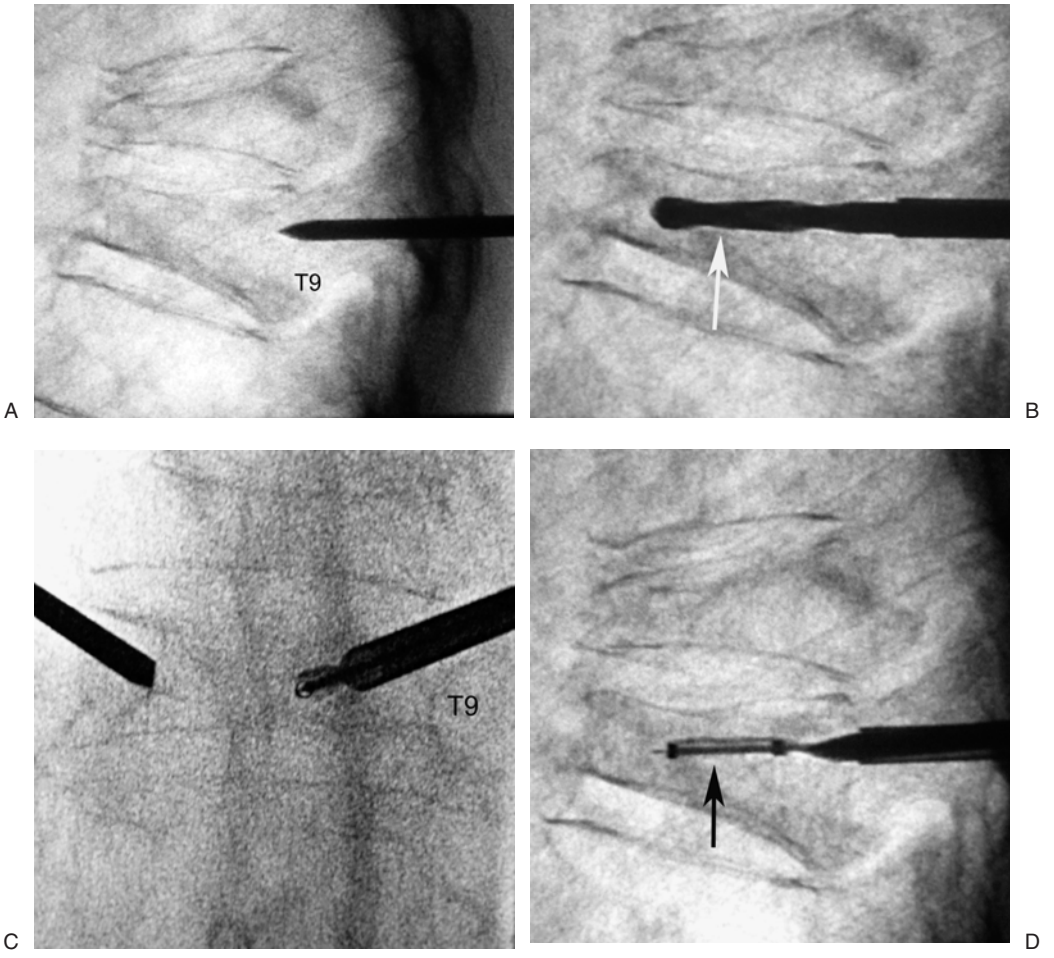
This patient experienced complete pain relief and had no clinical complications associated with the cement leak noted at T9. He returned to his daily routine and was able to discontinue analgesics.

Discussion

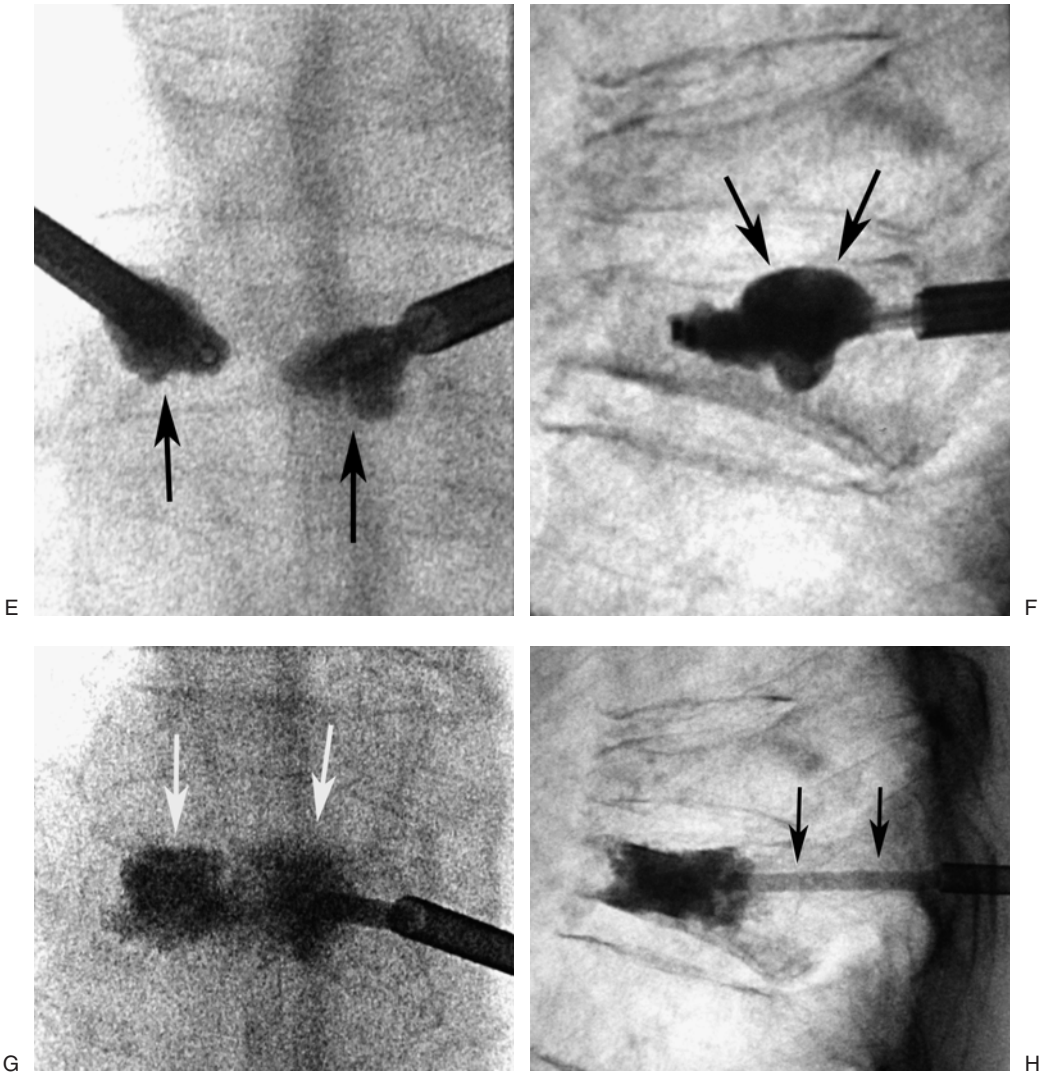
This case demonstrates the use of KP for the treatment of osteoporotic compression fractures. It resulted in good pain relief, but only gave minimal height restoration to the two levels treated. There was a cement leak, but, as with most leaks encountered in vertebroplasty, it was of no clinical significance. Overall, the result is clinically similar to that expected if vertebroplasty had been the method of treatment.

Pain relief seems to be similar for both KP and PV, as one would expect because both methods rely on final stabilization of the fracture with bone cement. Direct comparisons of biomechanical strength have been made that found similar resultant strengths.

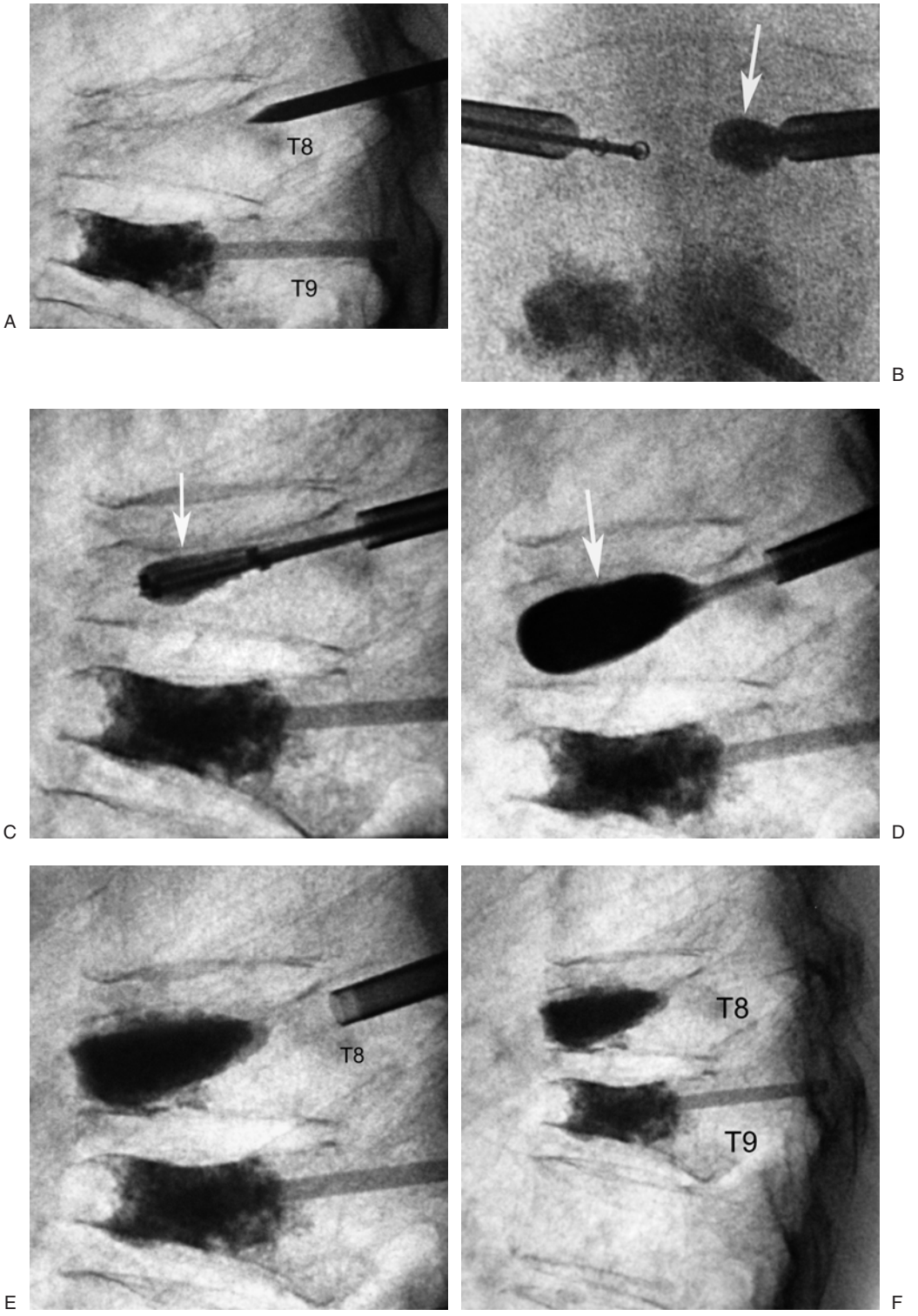
Height restoration is variable from case to case. As of yet, there are no good data to help determine which patients are more appropriate for KP or for PV. Height restoration is seen with both procedures and is relatively meager generally. Very mobile vertebrae can achieve complete height restoration with either technique, and such cases are sometimes used as anecdotal examples. However, these are unrealistic outcomes for most cases. Until a direct prospective study comparing KP and PV is obtained, we will not be able to predict which procedure is more appropriate in a particular situation. We do know that there is a huge difference in the costs of KP and PV. Kyphoplasty tends to cost 10 times more than PV because of the materials used. The cost can be even greater if KP is performed in an operating room with general anesthesia (the technique used by most spine surgeons). The cost difference might be acceptable if there was demonstrative evidence of better outcomes, substantial height restoration, or improved safety with KP. However, this is not the case, and the actual reason for using KP generally is more driven by marketing to the public and to physicians than medical need. (See additional information in Chapters 8, 9, and 13.)



Case Figure 10.2. **(A)** Lateral image showing the guide cannula and trocar positioned at the posterior vertebral margin of T9. **(B)** Lateral image with the drill (white arrow) inserted through the cannula to produce a track for the balloon. **(C)** Anteroposterior image demonstrates both cannulas in place via a transpedicular approach. **(D)** Lateral image shows the balloon (black arrow) in place before inflation.



Case Figure 10.2. *Continued* **(E)** Anteroposterior image showing inflation of both balloons (black arrows). **(F)** The lateral radiograph shows the eccentric balloon configuration extending to the margin of the upper endplate (black arrows). **(G)** Anteroposterior image showing cement (white arrows) injection. **(H)** Lateral image after removal of the cement-introduction cannula. Note that cement has leaked along the cannula track into the soft tissues (black arrows).



Case Figure 10.3. **(A)** Lateral fluoroscopic image showing the introductory trocar and cannula at the posterior aspect of T8. Note there is some height gain compared to Figure 10.1 even before the cannula is inserted. **(B)** Anteroposterior image demonstrates bilateral cannula with balloons in place. One shows early inflation (white arrow). **(C)** The corresponding lateral radiograph shows early inflation (white arrow) from this projection. **(D)** Lateral image with progressive inflation (white arrow). Note that the inflation of this balloon is more uniform than found at T9. Modest height recovery has been achieved at this level. **(E)** The lateral image following introduction of cement at T8. **(F)** A final lateral radiograph showing the result after treatment of both T8 and T9.