

Vertebroplasty - how to do it

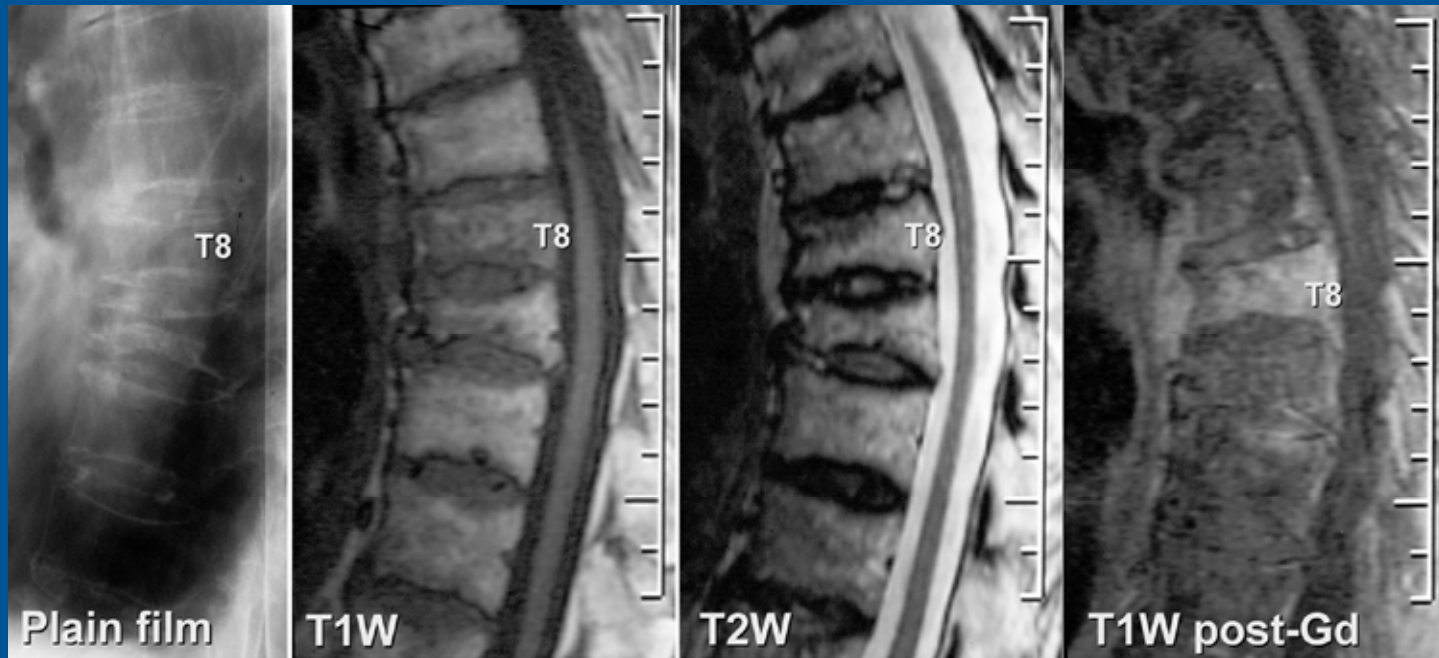
P-L Westesson, M Oka, A Hiwatashi, T Moritani

Department of Radiology
University of Rochester Medical Center
Rochester, NY



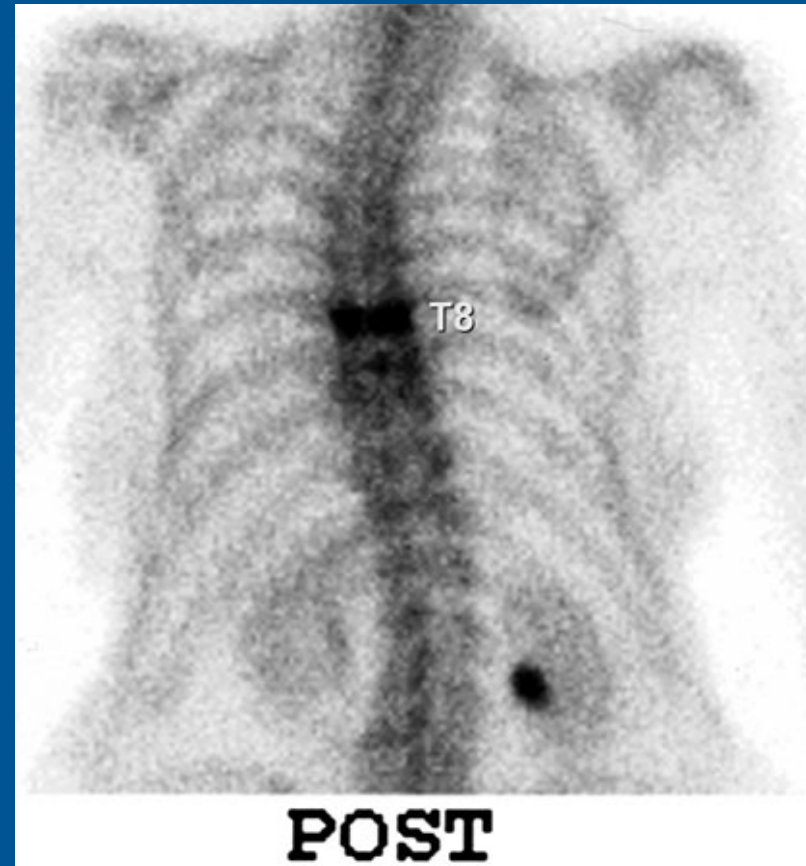
• MRI of Acute Compression Fracture

- We use MRI for preoperative evaluation of vertebroplasty in all patients unless contraindicated.
- We use precontrast sagittal T1, fat suppressed T2-weighted and postcontrast sagittal fat suppressed T1-weighted images. Imaging matrix is 512 x 256, with a 32 x 24 cm field of view, and 3 mm slice thickness with intersection gap of 0.2 mm.
- Plain film shows two compression fractures (T8 and T9). Post-Gadolinium T1-weighted image is especially helpful showing a significantly enhanced T8 indicating a recent fracture. T9 is a chronic fracture and does not need vertebroplasty.



• Pre-Operative Bone Scan

- In patients who cannot have an MR, we rely on bone scans. A nuclear bone scan can be helpful in identifying which fractures are more acute in nature and most likely to contribute to the patient's symptoms.



• Consultation

- All patients are seen by a neuroradiologist before the procedure since patient selection is the key to the success of vertebroplasty.
- Thorough history including the duration and nature of pain is obtained. The pain should be focal, intense, and deep, and must correspond with imaging findings. There should be no radiation to the legs. The procedure is discussed with the patient and/or his/her family, and benefits, risks, and possible complications are explained. Once the patient's questions are answered we obtain informed consent.
- The alleviation of pain does not occur in all patients, reportedly 80% in patients with osteoporotic fractures and even lower in fractures associated with malignant neoplasm. Pain alleviation also depends on acuity of fracture. Potential complications are outlined in Table1.



• Physical Examination

- Physical examination is important to determine the degree of symptoms and the relationship to the suspected vertebral body.



Table 1: Potential Complications

- **Possible complications**
- **Bleeding**
- **Infection**
- **Fracture of the pedicle**
- **Damage to the nerve roots or spinal cord**
- **Worsening of symptoms**
- **Spinal cord or nerve root compression (radiculopathy) from cement leakage**
- **Pulmonary embolism**
- **Rib fractures from moving onto the table**

• Instruments and Table Setting

- We use biplane fluoroscopy, moderate conscious sedation, and local anesthesia. We use 13-gauge bone biopsy needles. Ancef 1g IV is given pre-operatively.



• Fluoroscopy

- The AP tube is angled to find the oval appearance of the pedicle for the entry. In most cases we use a bilateral approach with one needle through left and another through the right pedicle.



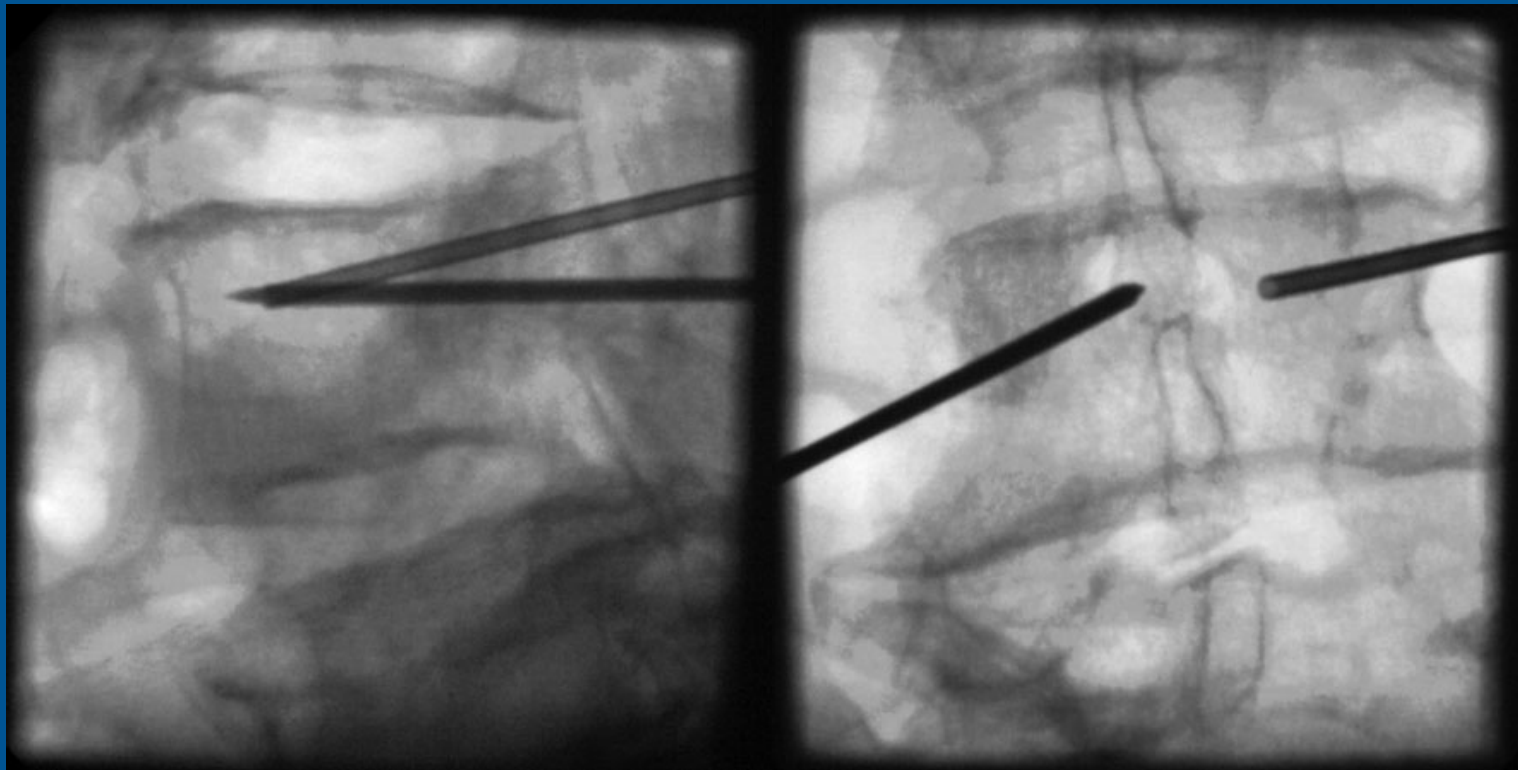
• Needle Placement

- As the needle is advanced into the pedicle, the position of the needle tip is checked frequently in both planes. On the AP view the needle tip should not touch the medial curve of the pedicle which forms the wall of spinal canal. On the lateral view the needle should be parallel to the superior and inferior edge of the pedicle.



• Ready to Inject Cement

- Once the needle passes the pedicle into the vertebral body, the needle tip can be advanced to the junction between anterior and middle third of the vertebral body. Then the second needle is placed into the contralateral half of the vertebra body in a similar fashion.



- **Cement, Barium and Tobramycin**

- We use Codman cranioplastic (30g), sterile barium sulfate powder (12g), and tobramycin (1.2g).



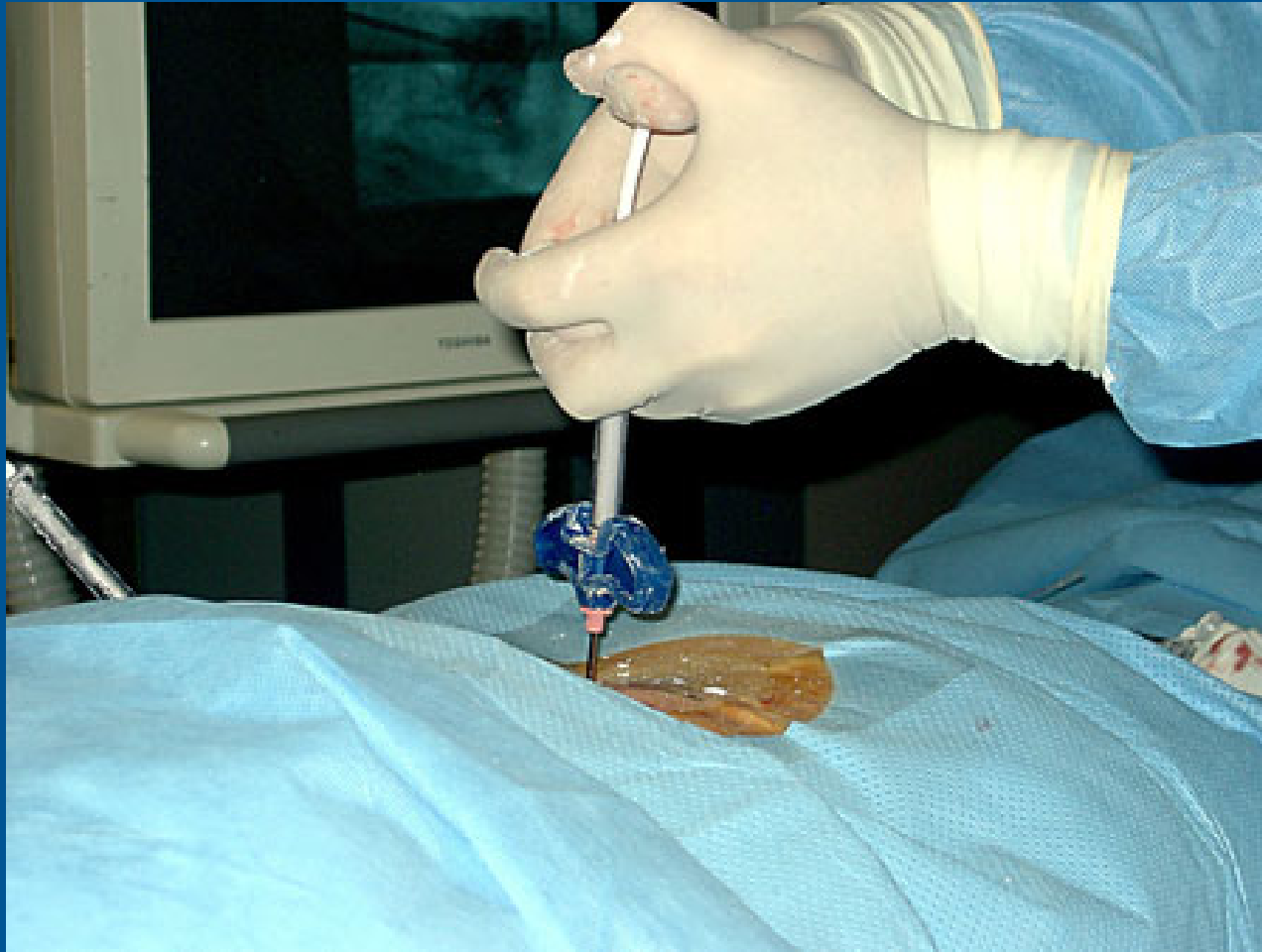
• Mixing

- First powder polymethylmethacrylate is mixed with barium sulfate and tobramycin in a sterile plastic bowl. Then liquid polymethylmethacrylate is added to the powder and admixedured by a tongue blade to a dough-like consistency. The cement is then poured into a 10 ml syringe, and divided into multiple one-milliliter Luer-Lock syringes.



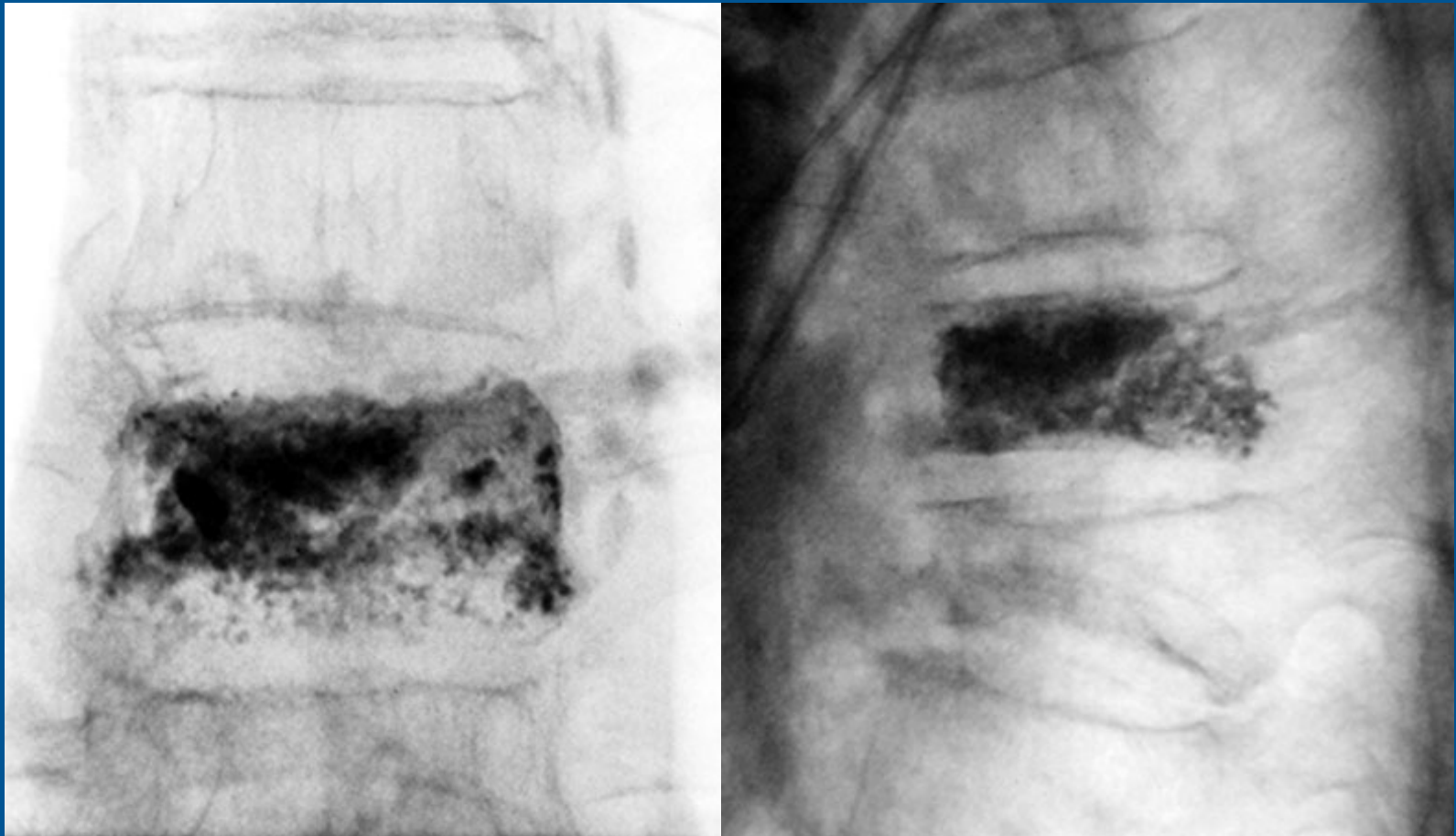
• Cement Injection

- We use 1 ml syringes attached directly to the bone biopsy needle to inject the cement. Fluoroscopic control is important for early detection of leakage.



• Completed Vertebroplasty

- Injection is continued until the vertebral body is filled. If there is significant leakage, we stop the injection.



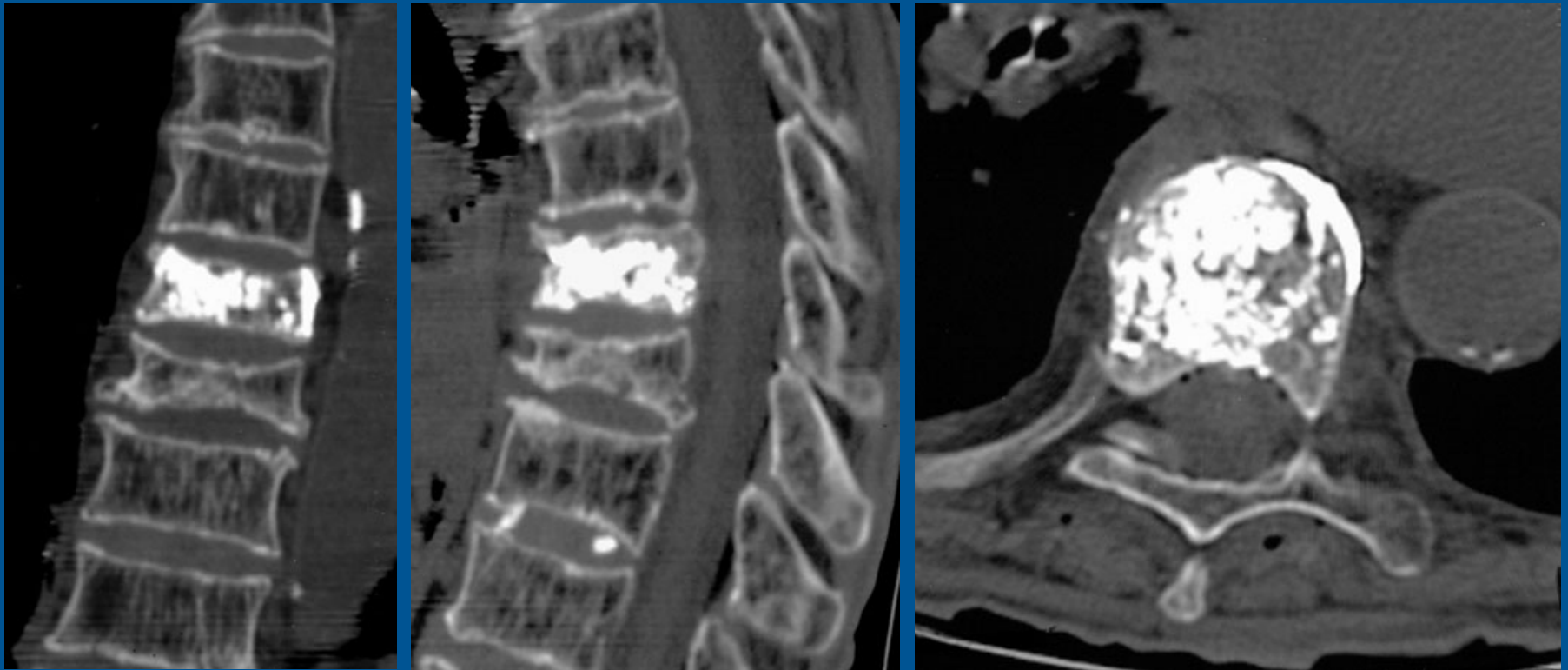
• Cement Hardening

- The patient should remain on the table until the cement is completely hard (approximately 15 minutes). This can be confirmed by keeping excess cement in your hand (body temperature).



• Post-Operative CT

- We use post-operative CT to document the location of the cement. This is especially valuable in cases where there has been cement leakage.



• Discharge

- The patient is discharged two hours after the procedure and follow-up is done the next day, one week, one month, and six months after the procedure. Most of the follow-up is done over the telephone.

