

Vertebral Augmentation: How I Do It

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Disclosures

Brian Schiro: Speakers' Bureau – Penumbra, Inc., Medtronic, Philips Medical

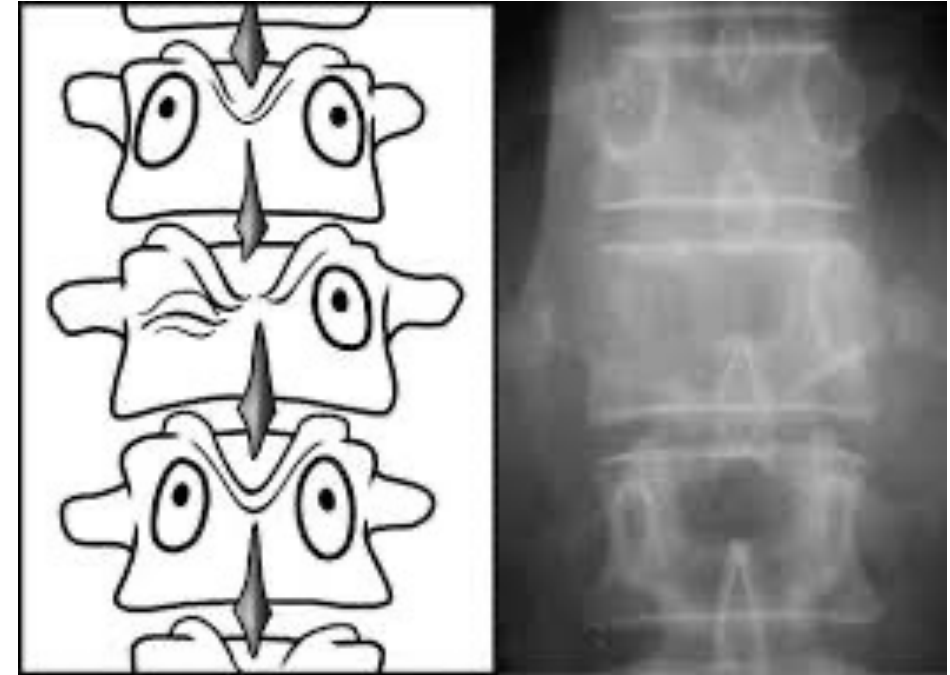
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Objectives

- Review patient selection for treatment of spinal fractures
- Discuss percutaneous treatment options for
 - Spinal osteoporotic compression fractures
 - Spinal pathologic compression fractures
- Case review

Introduction

- Spinal metastases are the most common tumors of the spine
 - Breast (21%), lung (19%), prostate (7.5%), renal (5%), gastrointestinal (4.5%), and thyroid (2.5%)
- With better treatments and longer survivals, increasing rate of advanced disease (spine)



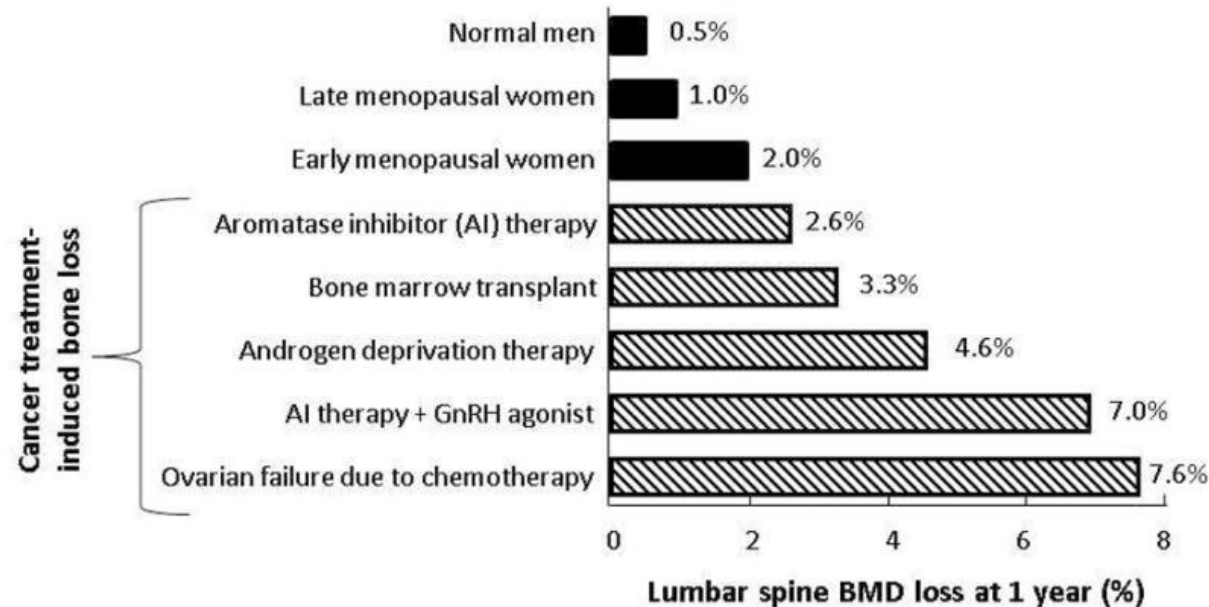
Causes of Bone Pain in Cancer Patients

- **Osteoporotic compression fractures**

- Cancer- and treatment-related
- Age-related

- **Bony metastases**

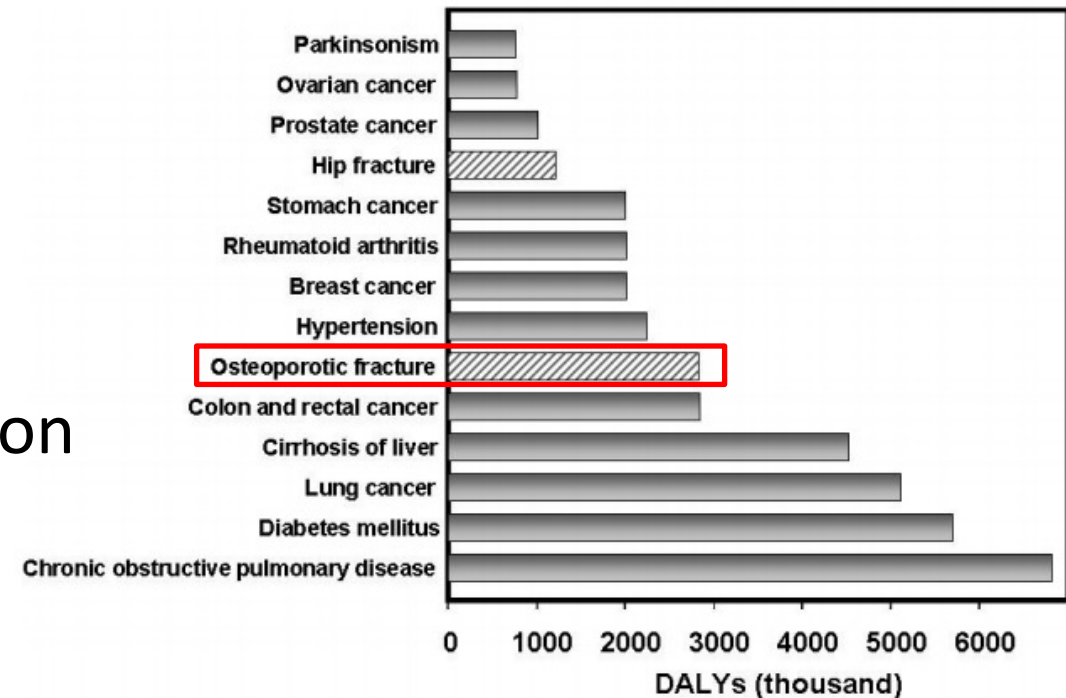
- Bony weakening by tumor cells
- Common and often related to cancer type and stage



Etiology of Osteoporosis in Cancer Patients

- Cancer Therapies
 - High dose steroids
 - Aromatase inhibitors
 - Androgen deprivation
- Advanced Age
 - Osteoporosis in the general population
- Malnutrition/malabsorption
 - Vitamin D (photosensitive patients)
 - Calcium

Figure 1: Burden of diseases estimated as disability-adjusted life years (DALYs) in 2002 in the Americas and Europe combined



Vertebral Compression Fractures (VCF)

TREATMENT OPTIONS

VCF Treatment Options for Osteoporosis

- Conservative Management (NSM)
 - Pain medications
 - Back brace to provide support and stability
 - Bed rest
 - Physical Therapy
 - Antiresorptive medications (eg, Bisphosphonates, calcitonin)
- Minimally Invasive Procedures
 - Vertebroplasty
 - Vertebral augmentation
 - Balloon kyphoplasty
 - Cavity creation
 - 3rd-generation height restoration devices
- Open Surgery
 - Limited to neurologic deficit, 3-column instability
 - Significant rehabilitation time and effort required



NSM Pain Improvement

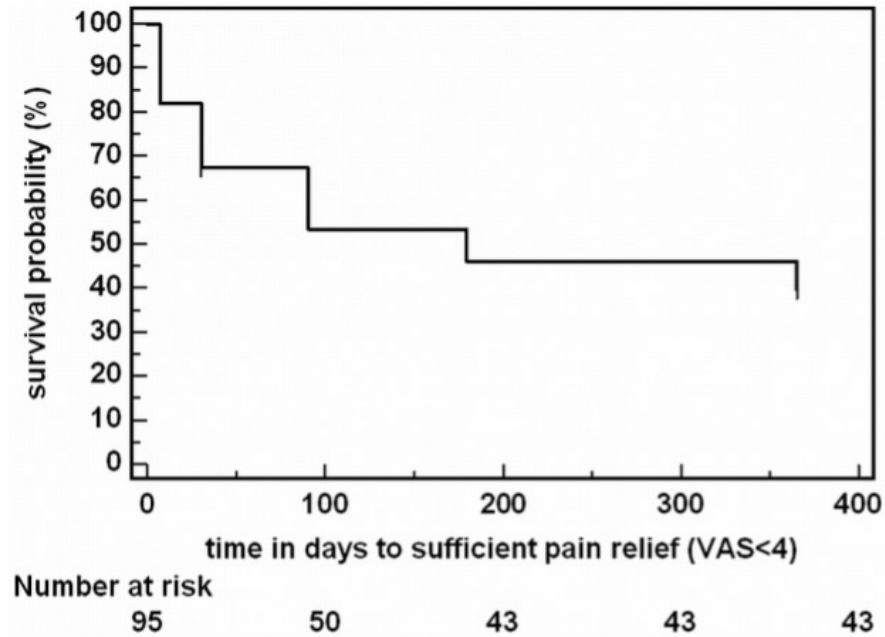


Fig 1. Kaplan-Meier curve showing the time until significant clinical improvement.

- 50% had pain relief in first 3 months
- 40% had persistent pain with VAS > 4 at 12 months
- Unknown who will have persistent pain

Percutaneous Vertebral Augmentation

- Percutaneous Vertebral Augmentation
 - Percutaneous Vertebroplasty – 1984
 - Balloon Kyphoplasty – 1998
- Pain reduction
- Quality of life improvement
- Disability improvement
- Life expectancy improvement by 2.2-7.3 years



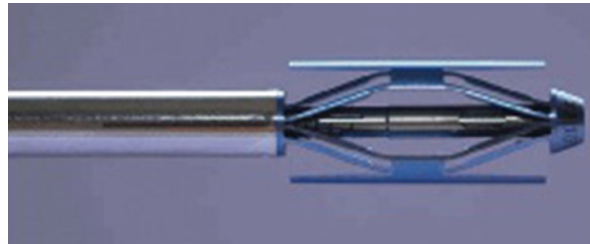
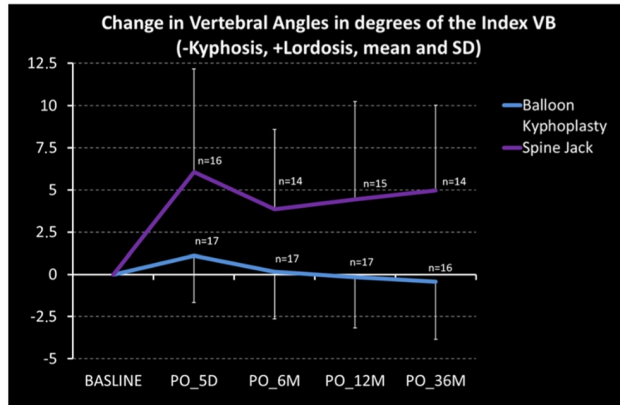
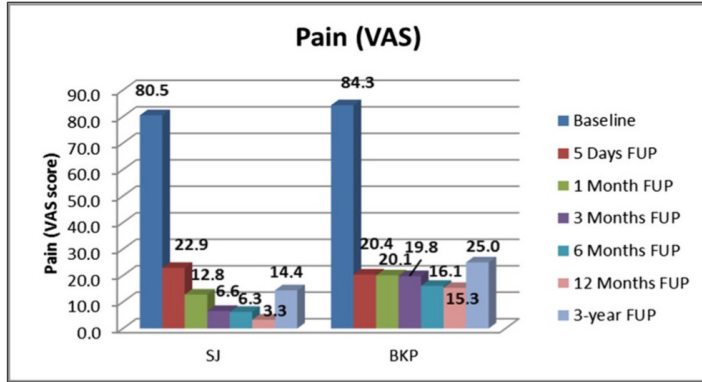
VCF Treatment Options for Metastases

- Radiation Therapy
 - Single session
 - Multiple fraction
 - Proton Beam
- Minimally Invasive Procedures
 - Vertebroplasty
 - Vertebral augmentation
 - Balloon Kyphoplasty
 - Cavity Creation
 - 3rd Generation Devices
 - Ablation Therapies
- Open Surgery
 - Limited to neurologic deficit, 3-column instability
 - Significant rehabilitation time and effort required

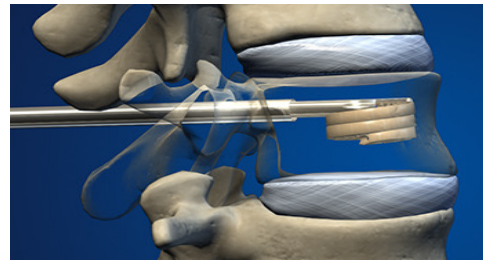
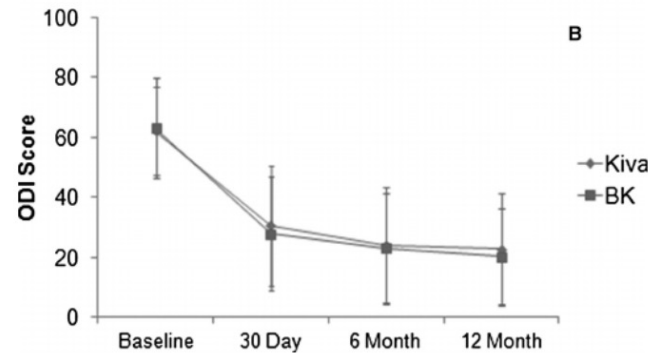
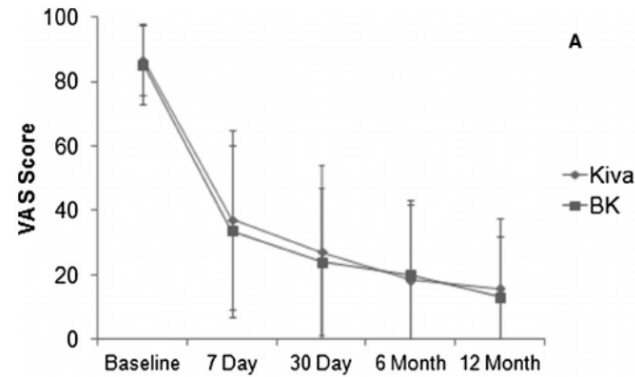


3rd-Generation Vertebral Augmentation

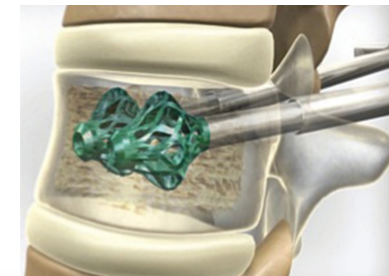
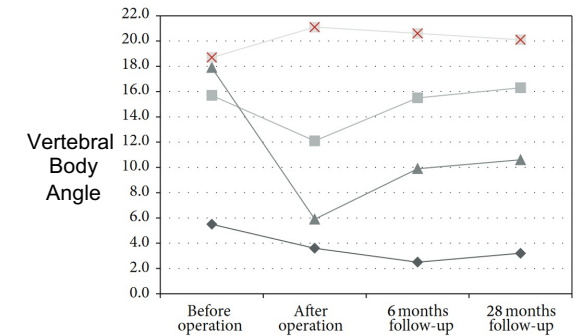
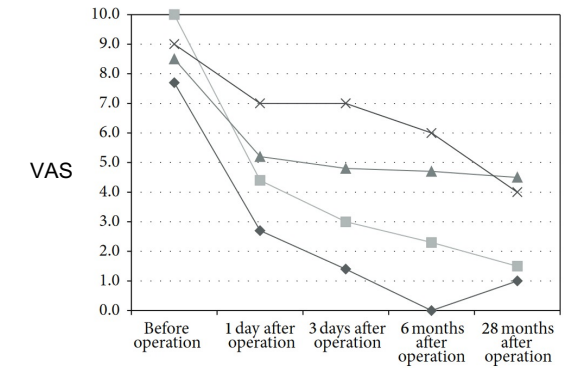
Spine Jack™



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Radiofrequency Ablation: Metastatic Bone Tumors

- Treatment Goals
 - Augment pain relief
 - Local tumor control
 - Stabilize bone with accompanying vertebral augmentation
 - Curative treatment (rare)

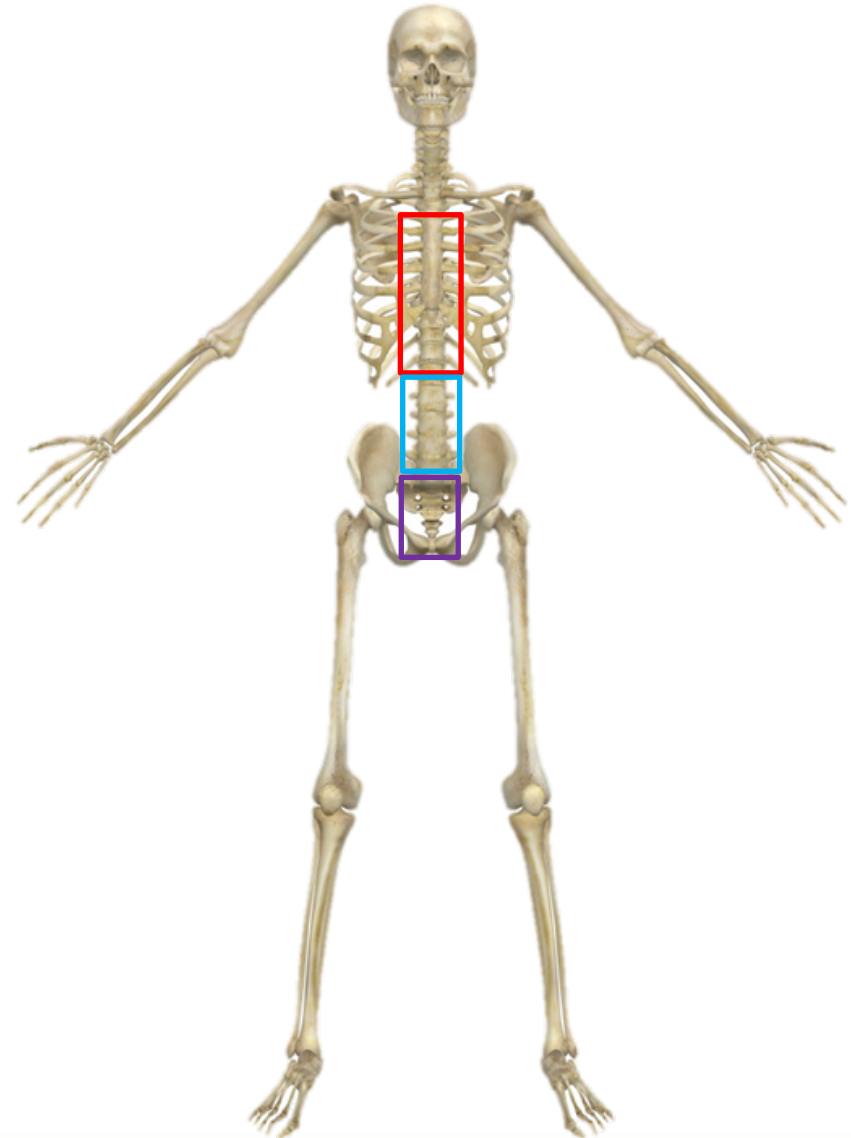


Vertebral Compression Fractures (VCF)

PATIENT SELECTION

KEY AREAS OF FOCUS

- Thoracic Spine
 - T5-T12
- Lumbar Spine
 - L1-L5
- Sacrum
 - Sacral Ala
 - S2



Ideal Patient for VCF Treatment

- Duration of Pain
 - 2-6 weeks (osteoporosis)
- Pain Scale (VAS)
 - ≥ 7
- Pain is directly attributable to VCF
 - No radicular component
 - Pain with movement
 - Point tenderness

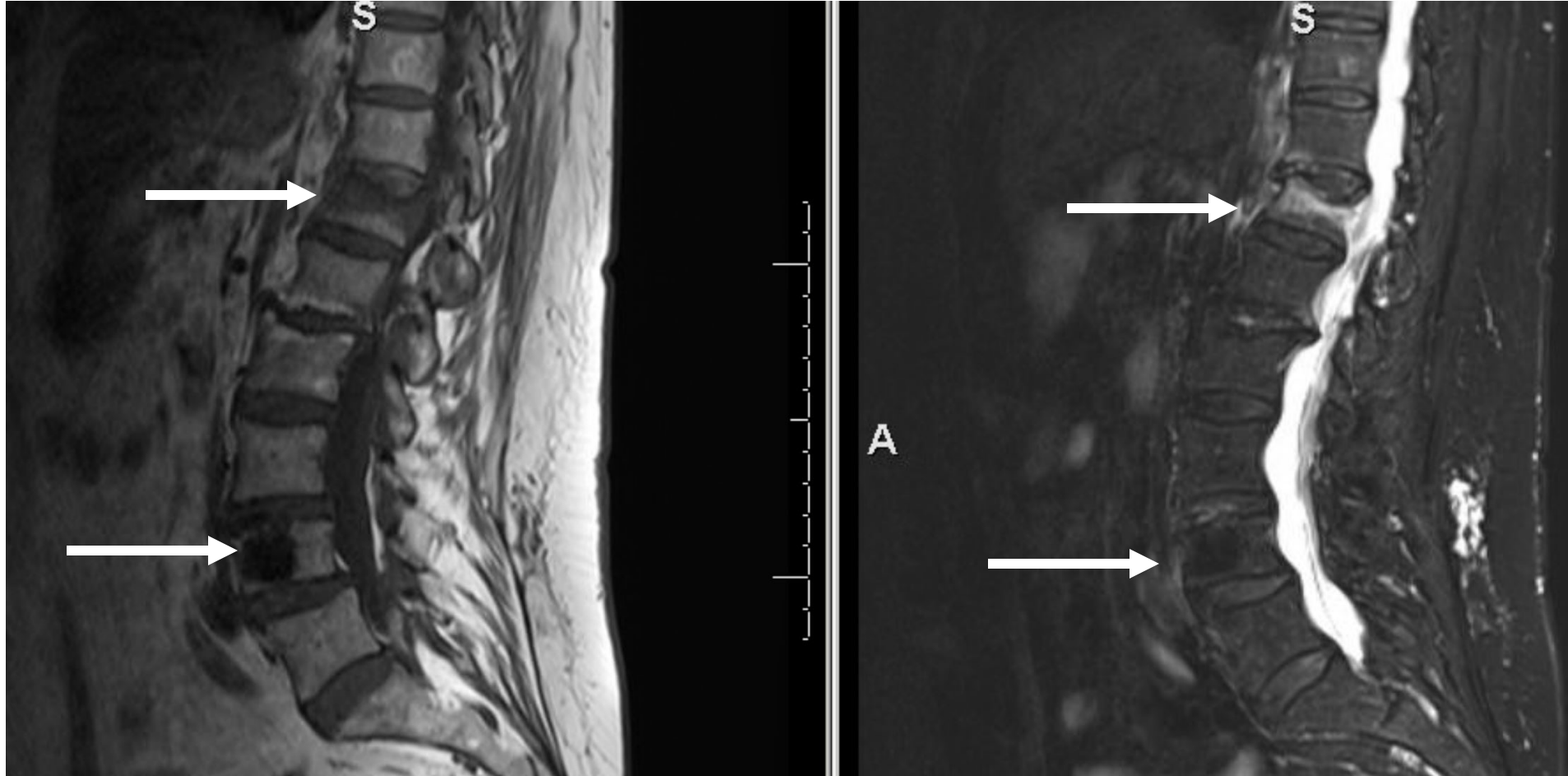
Ideal Patient with Metastatic Tumors

- Oligometastatic spinal involvement
 - 1-3 lesions
- Uncontrolled bone pain related to tumor
- Point tenderness and lack of radiculopathy
- Bone marrow edema surrounding lesion or in endplates

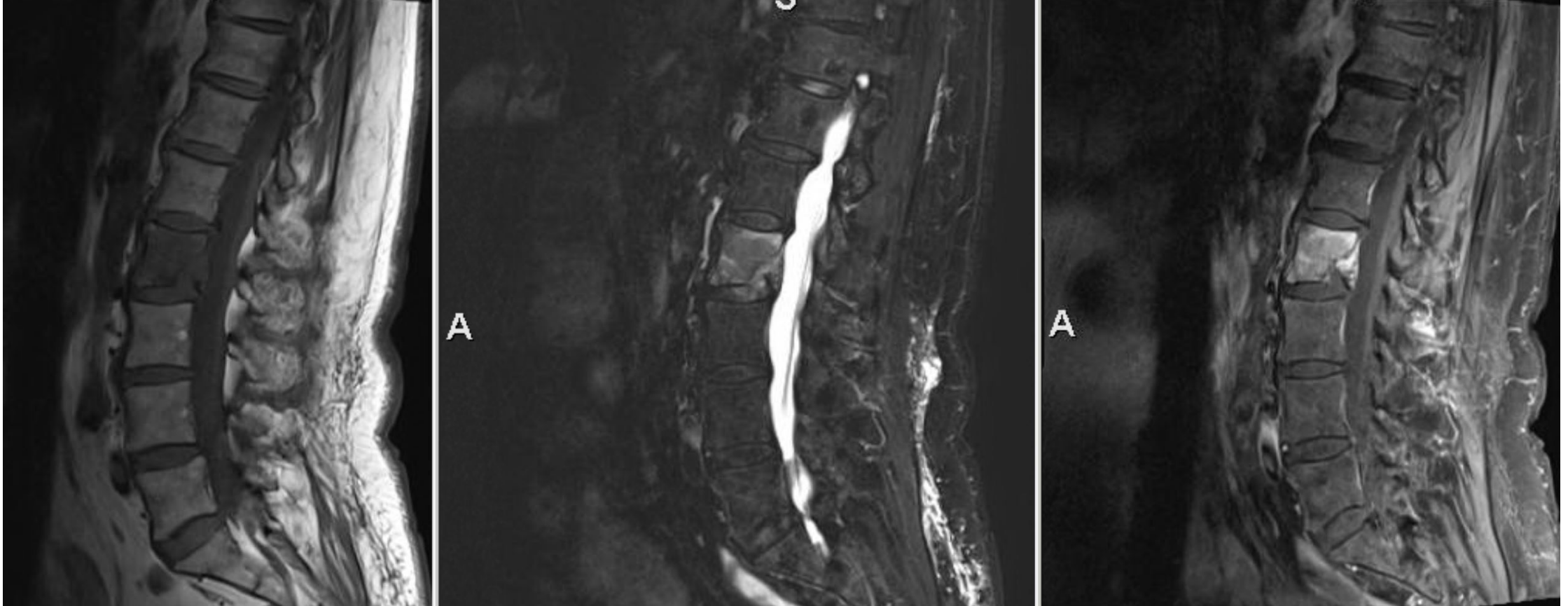
Imaging of Acute VCF

- MRI
 - Bone marrow edema typically in superior endplate without extension to posterior elements (pedicles)
- Bone Scan (Pacemakers & Myeloma)
 - Linear uptake of radiotracer in vertebral body

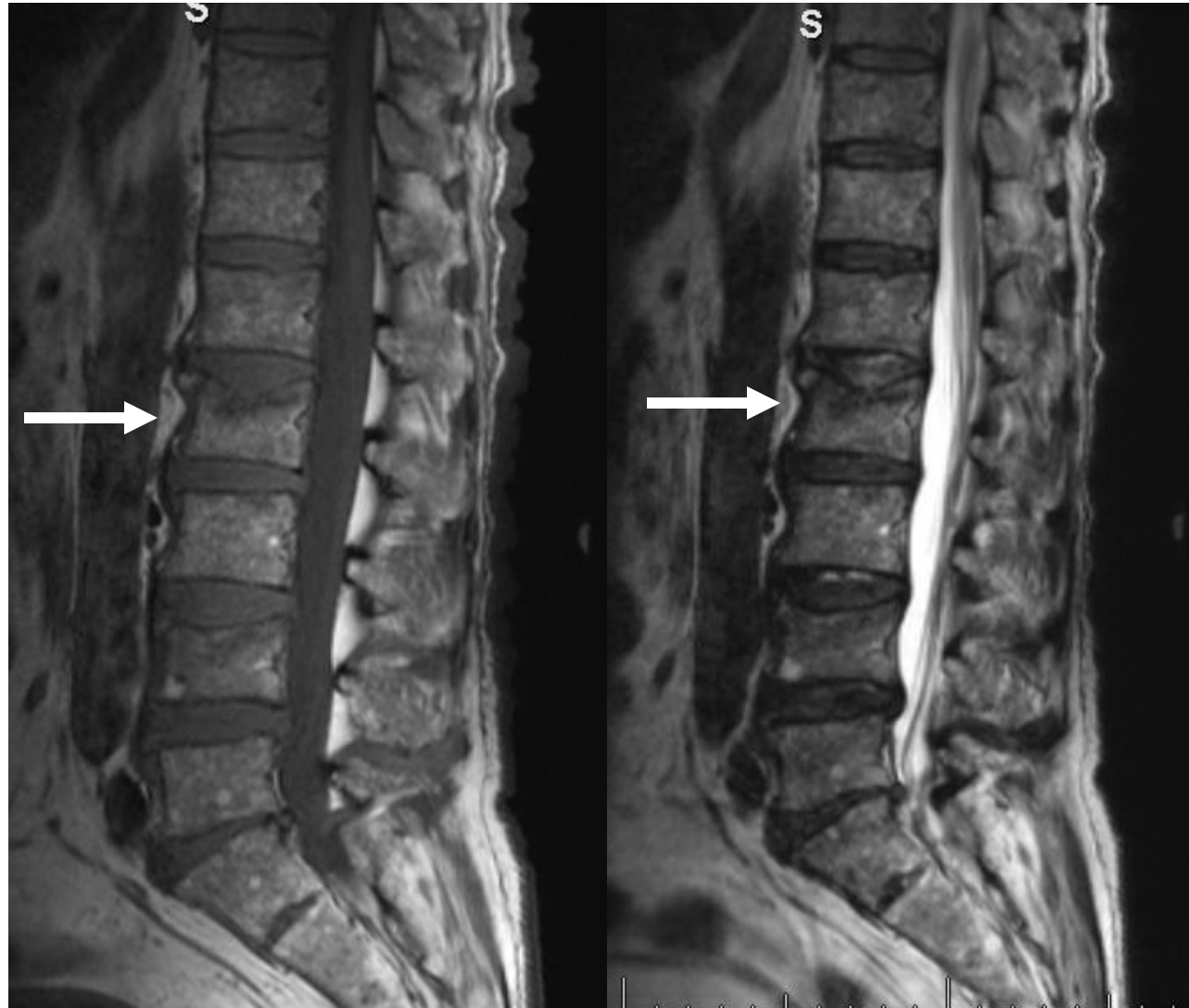
MRI of VCF



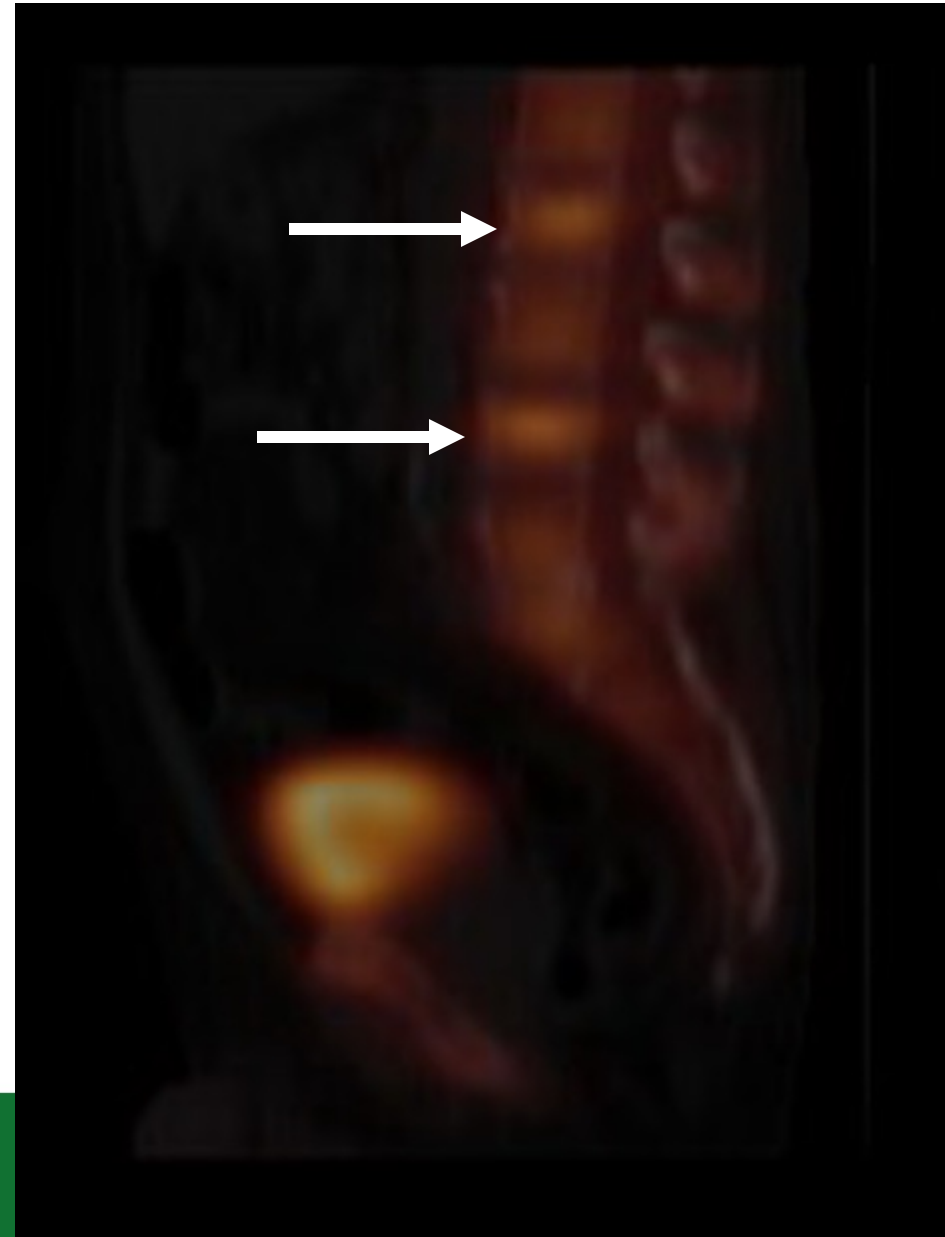
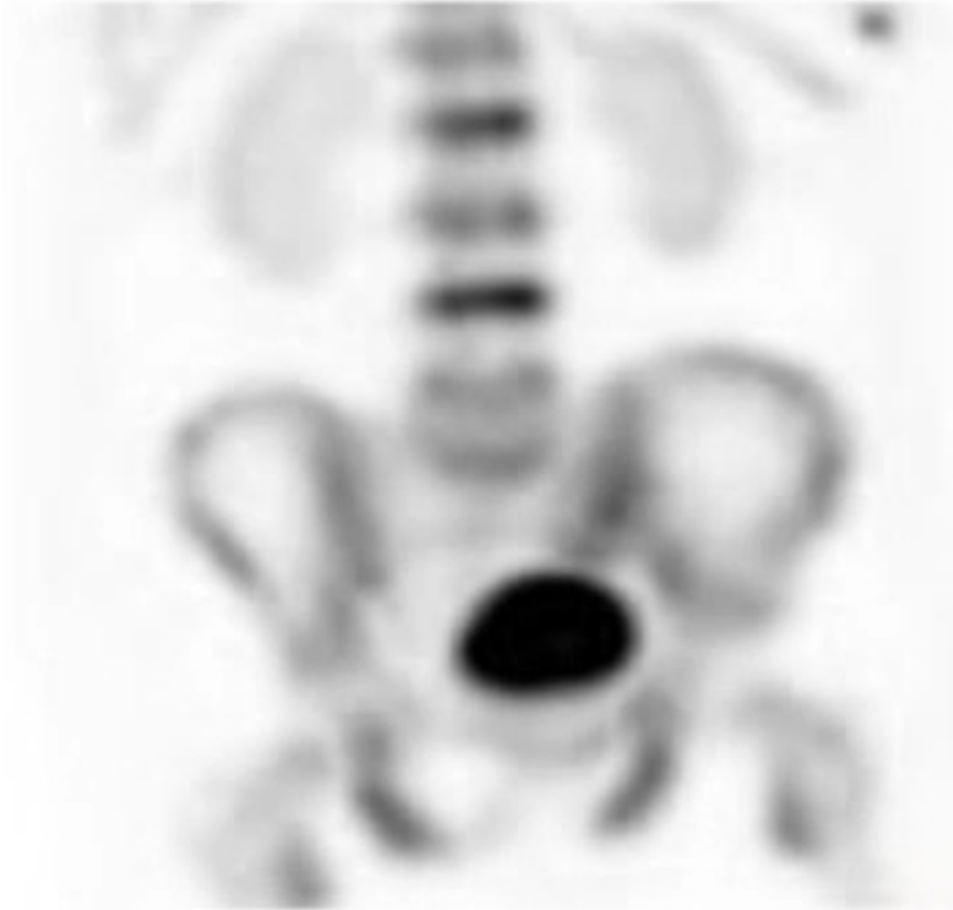
MRI with Metastatic Involvement



Imaging Exception: Multiple Myeloma



Imaging Exception: Multiple Myeloma



Treatment Algorithm

Osteoporotic VCF

- Vertebroplasty
 - Unipedicular in the thoracic spine
 - Bipedicular in the lumbar spine

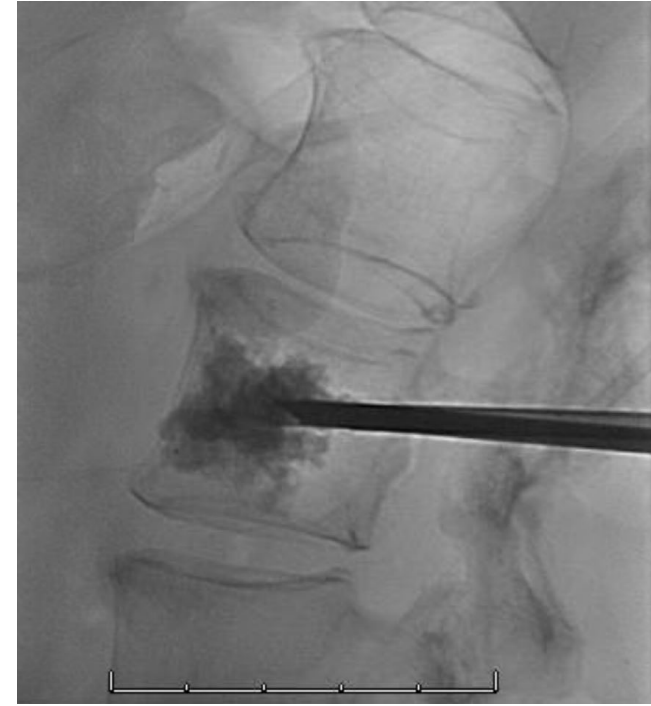
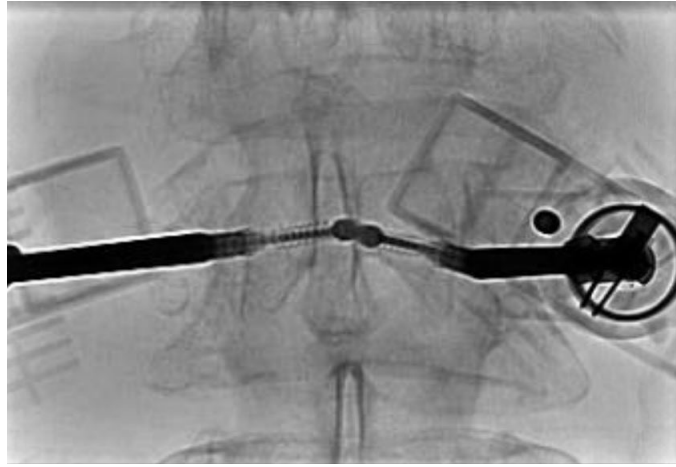
All performed under moderate sedation unless patient is unable to lie prone

Bony Metastases

- Radiofrequency ablation
- Cavity creation (\pm 3rd-gen device) in most to allow space for cement and decrease extravasation

Multiple Myeloma/Diffuse Disease

- Vertebroplasty
 - Unipedicular in the thoracic spine
 - Bipedicular in the lumbar spine

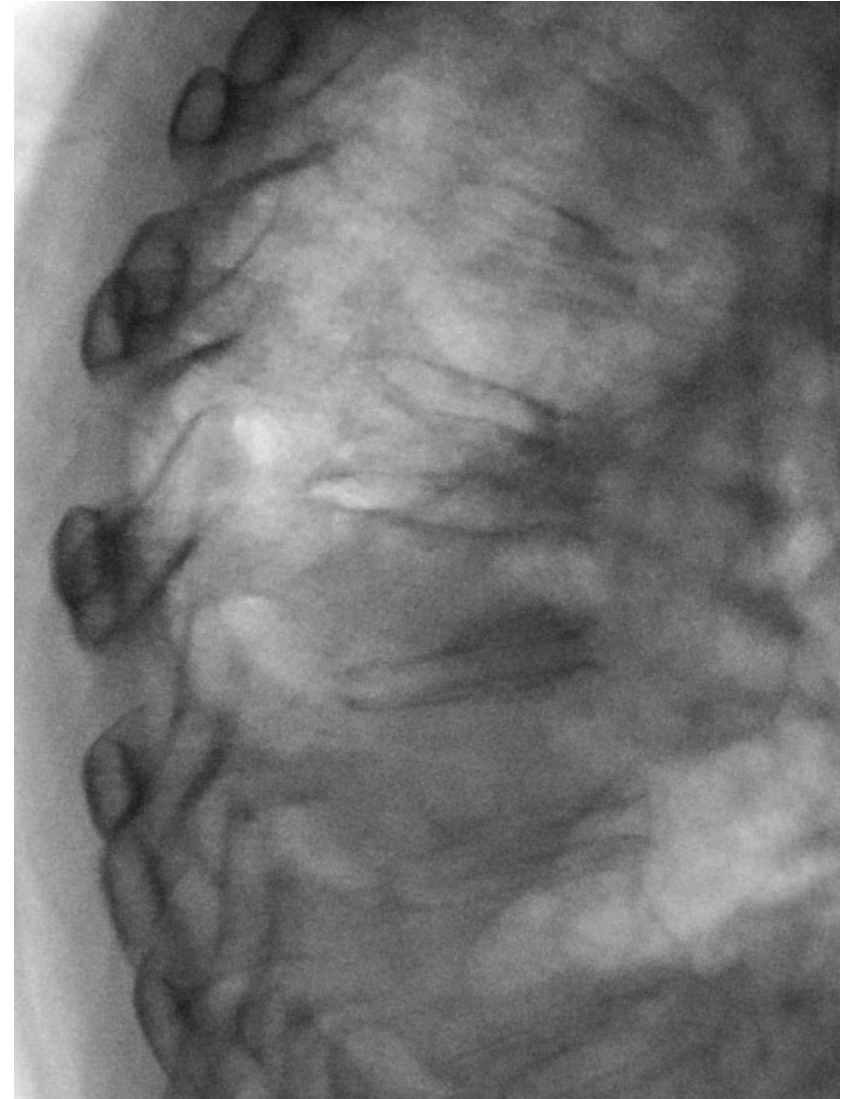
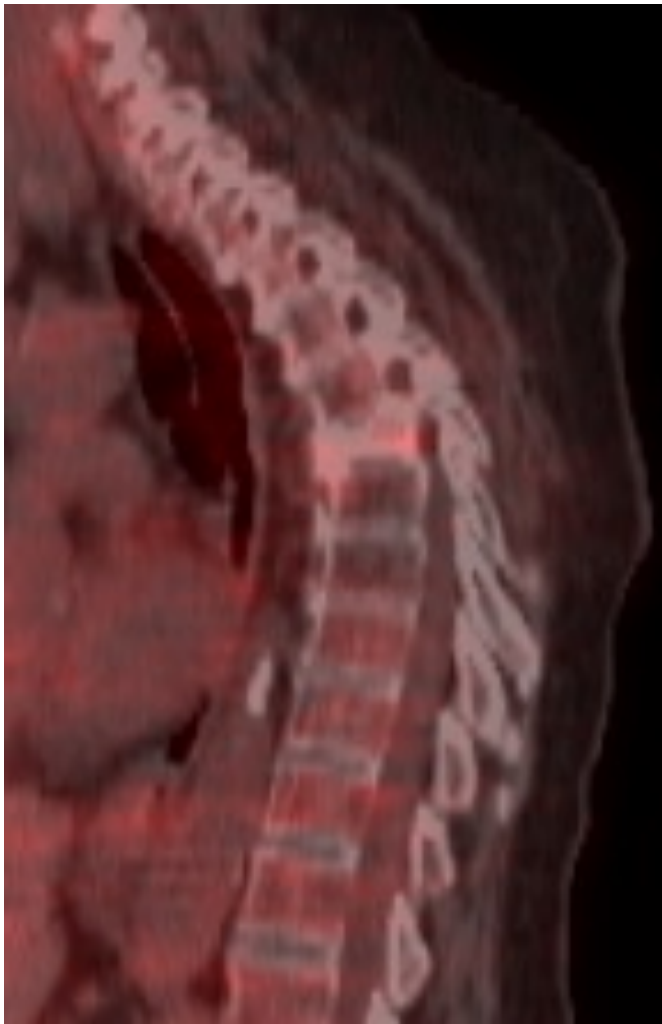


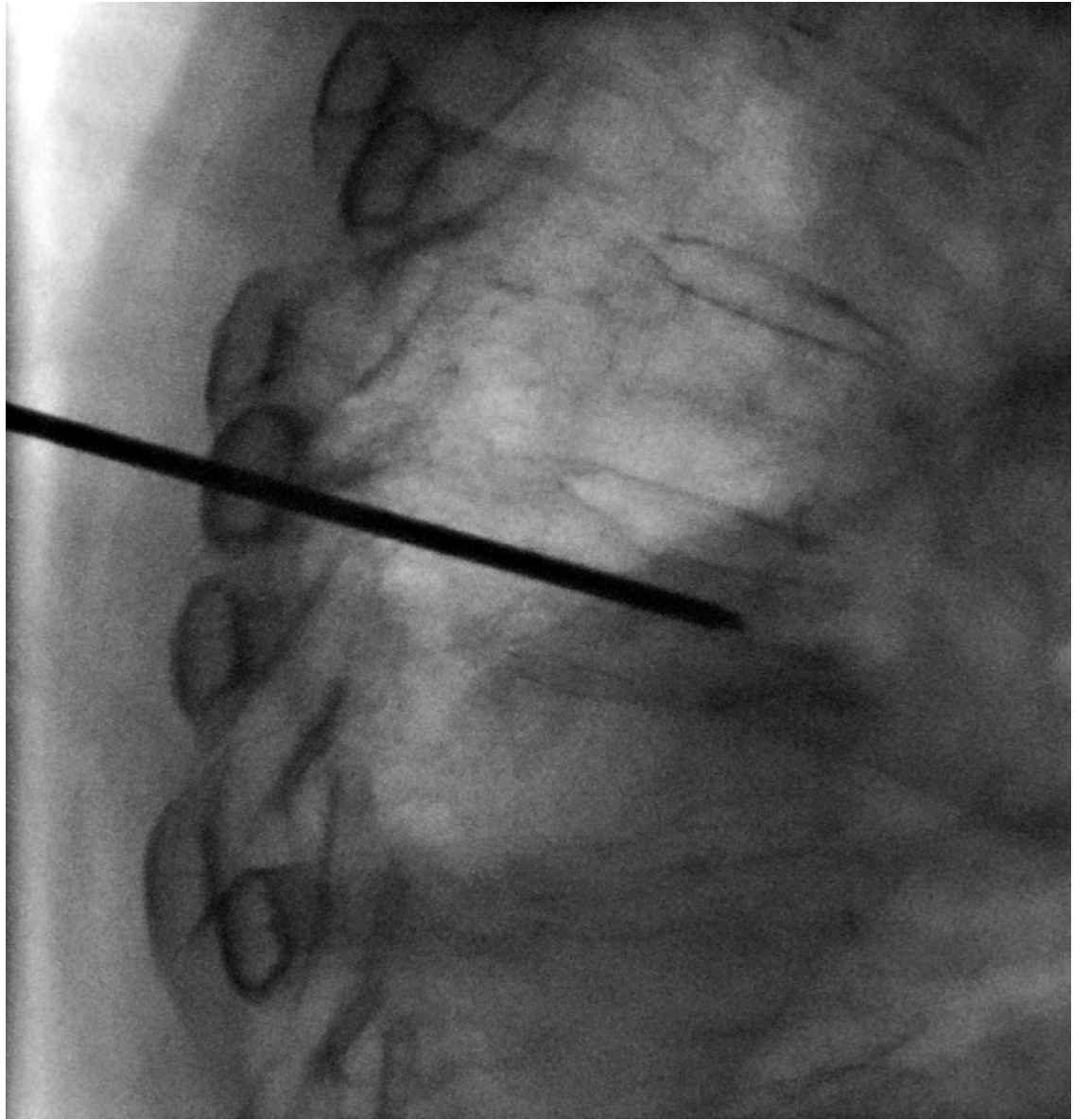
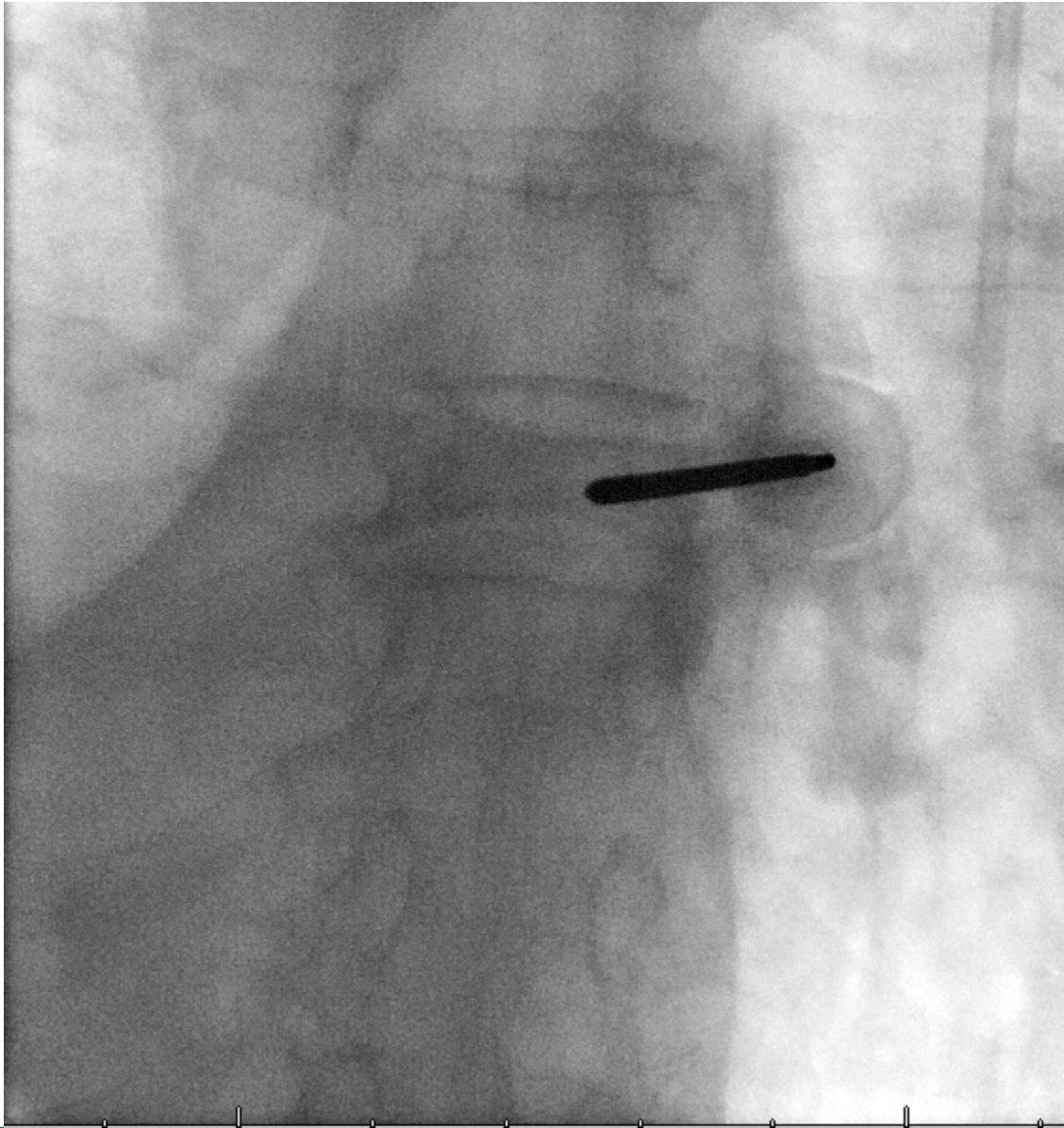
Vertebral Compression Fractures (VCF) & Tumors

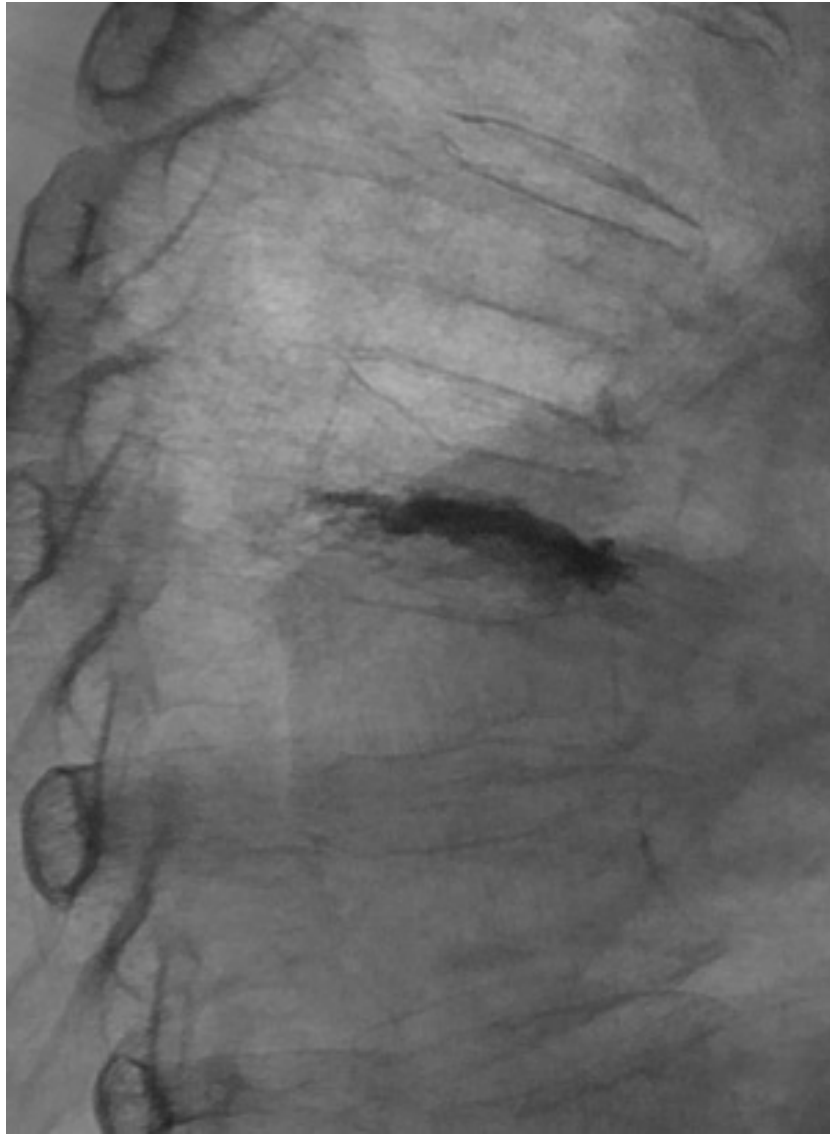
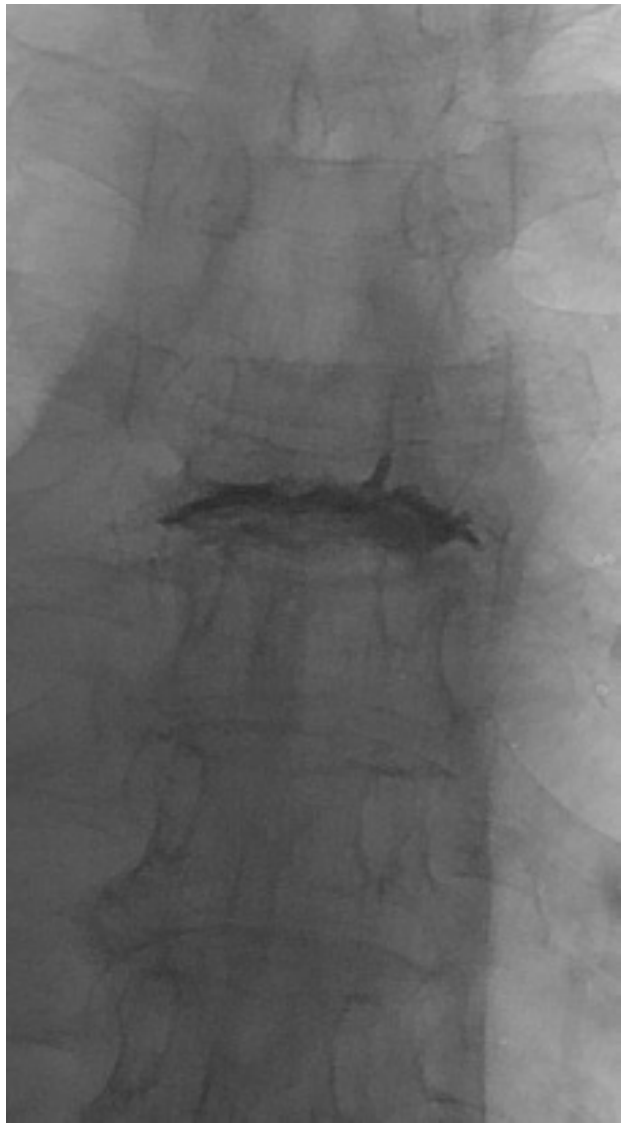
CASE REVIEW

Case

- 63-year-old female with lung cancer
- Patient with severe pain in upper back that radiates into the ribs

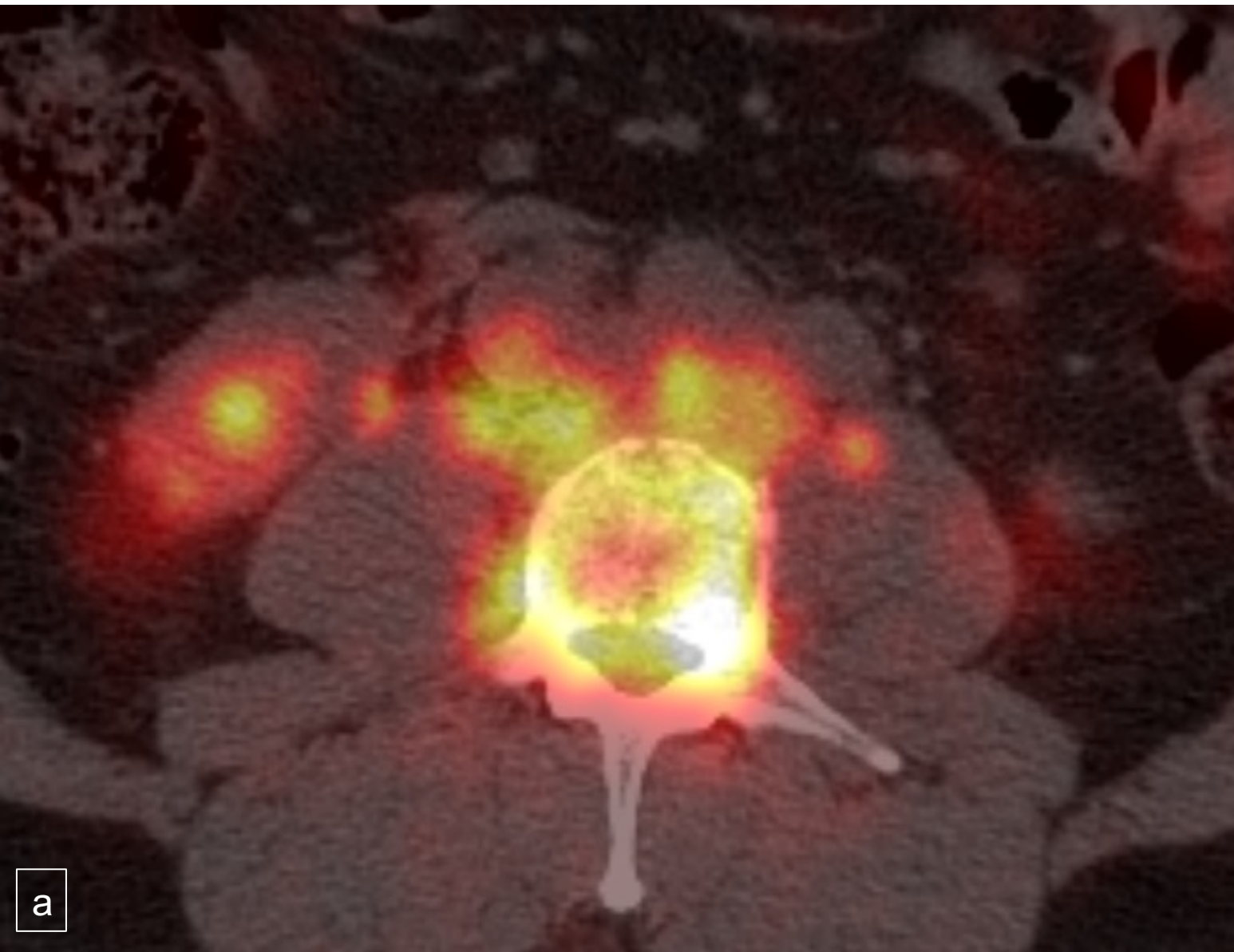






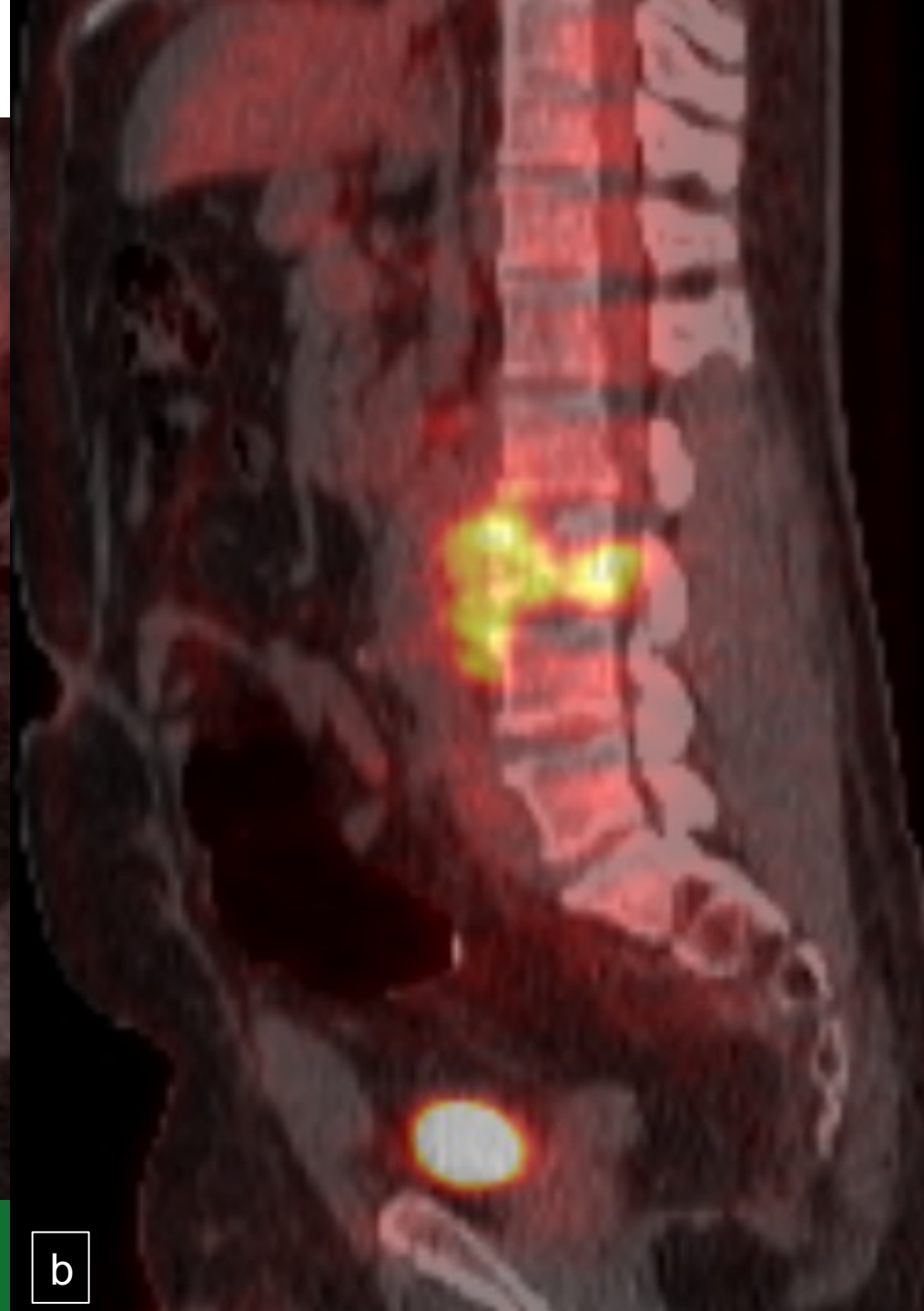
Case

- 48-year-old male with colon cancer and spinal metastases
- Patient with severe intractable back pain and is unable to lie on the treatment table for XRT

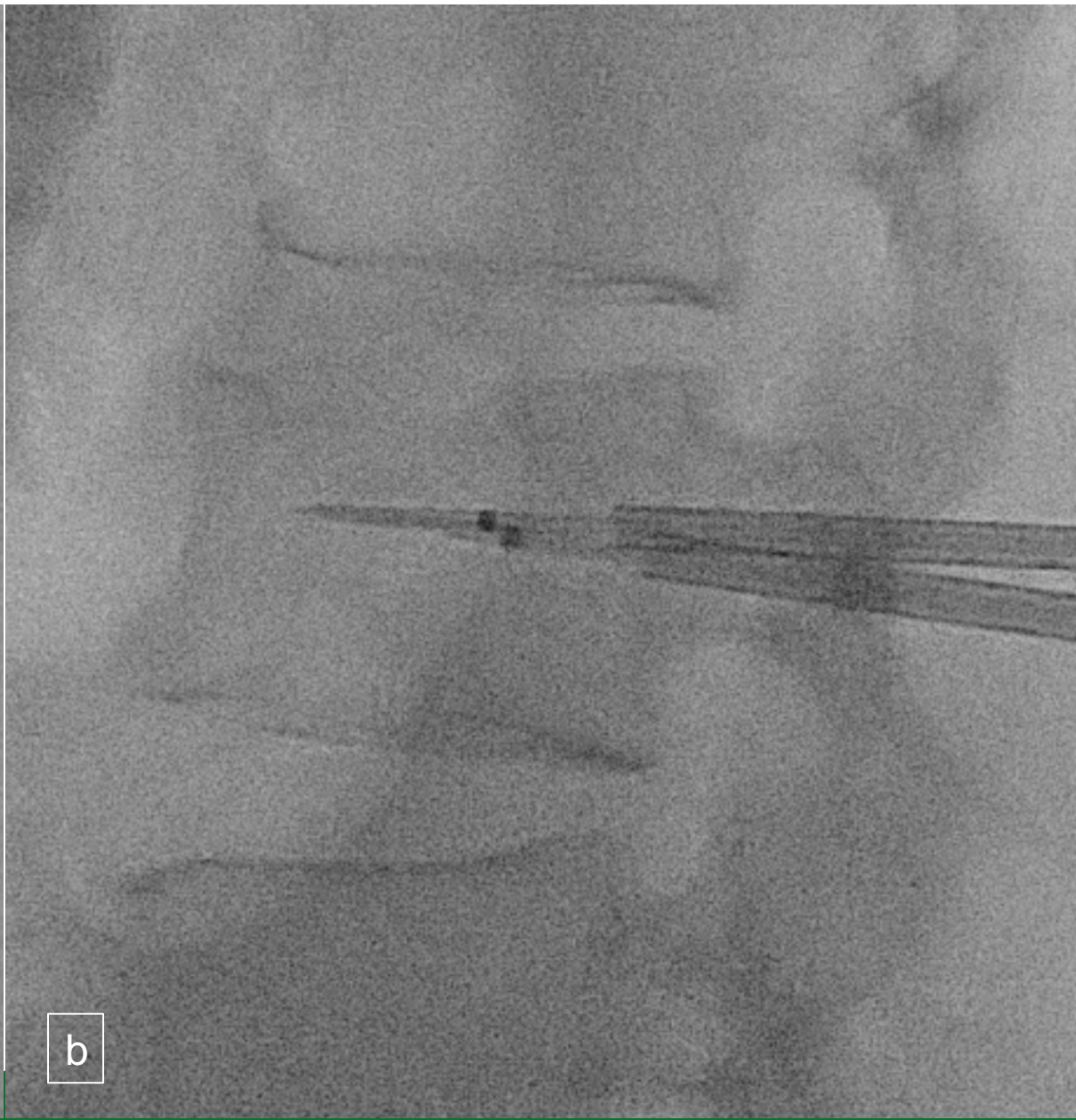


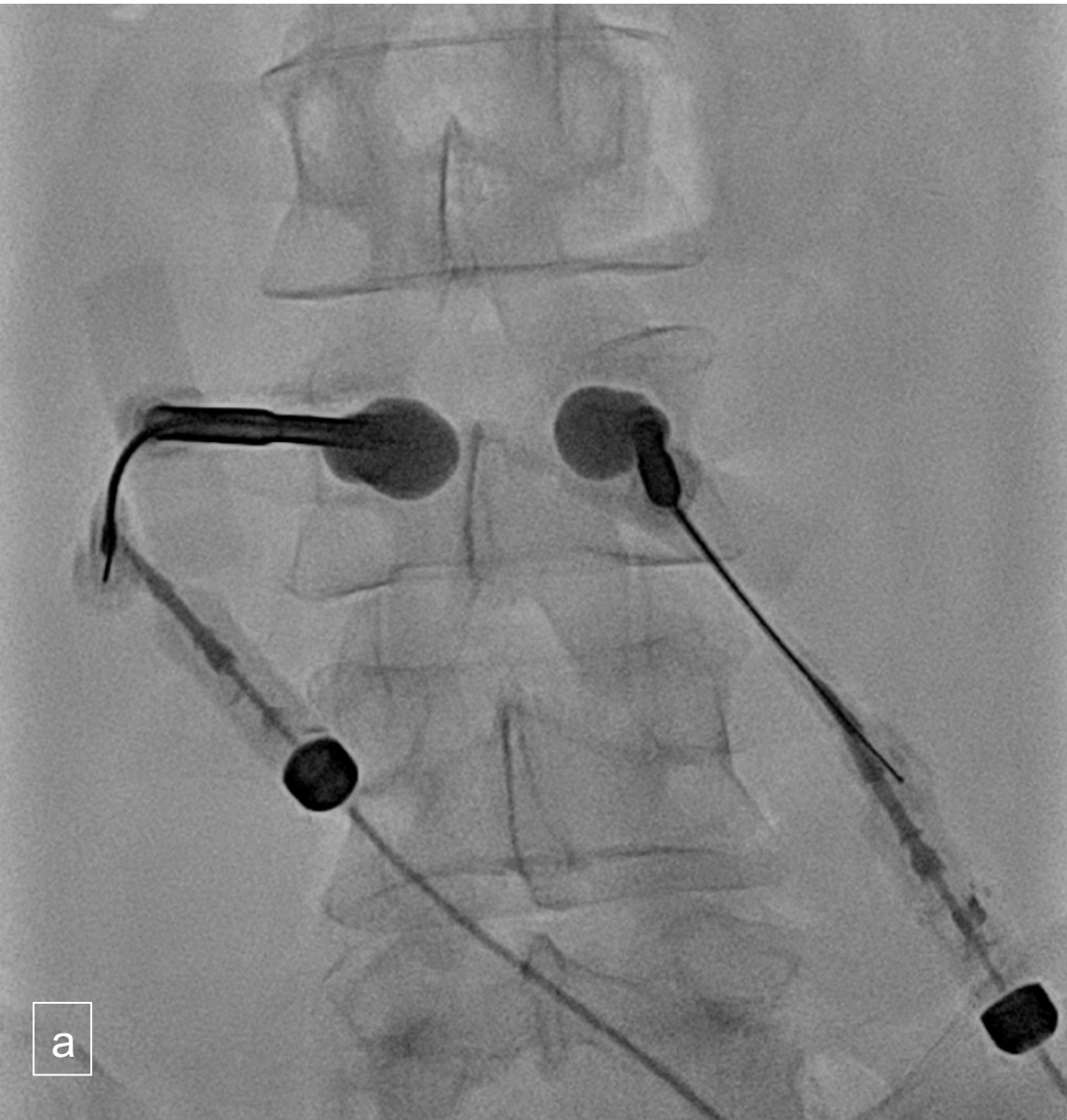
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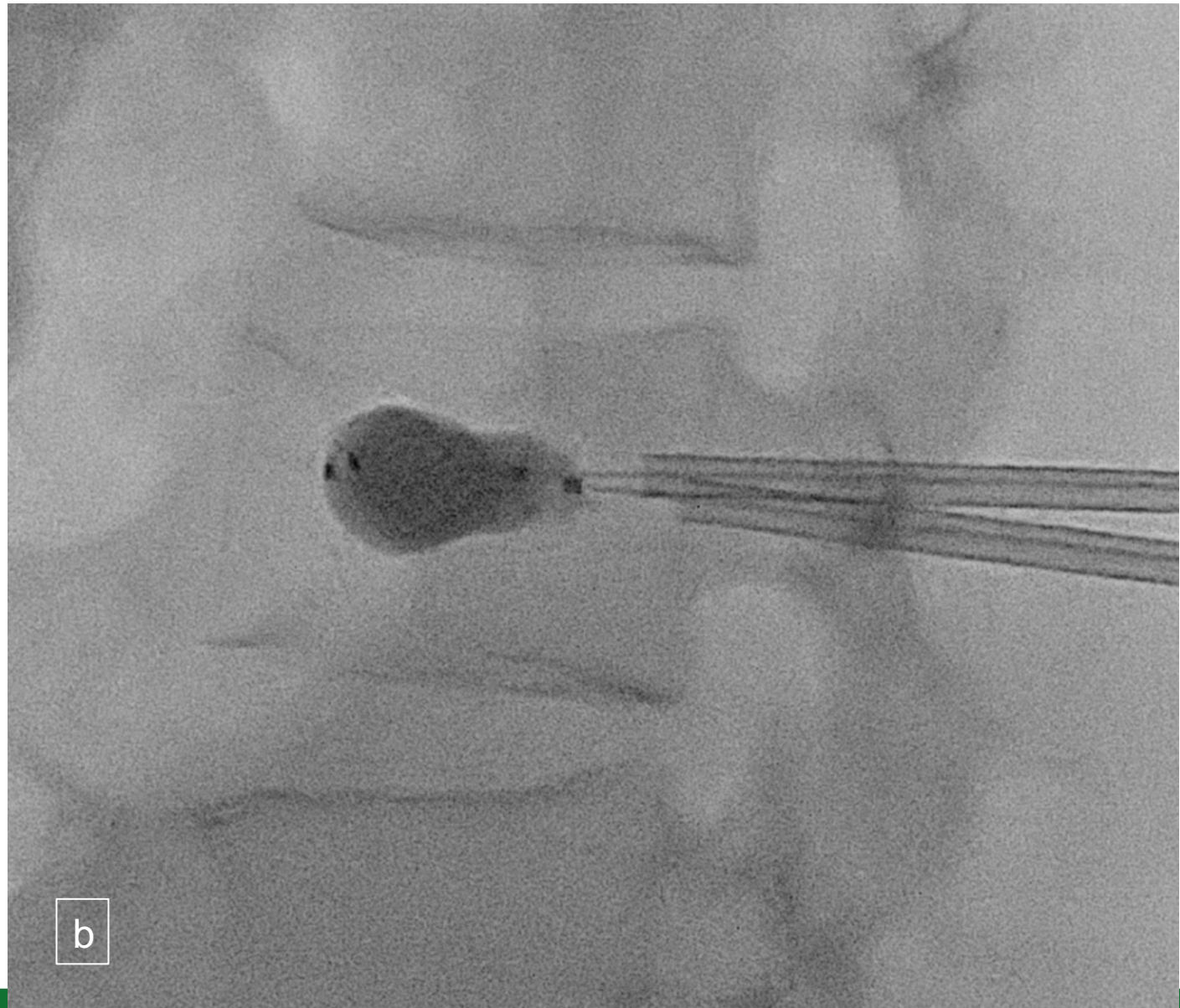


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b



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Micrograph a shows a central dark spot on a leaf, likely a lesion or a specific anatomical feature. The leaf is shown in a cross-section or a similar view, with the dark spot being the most prominent feature.

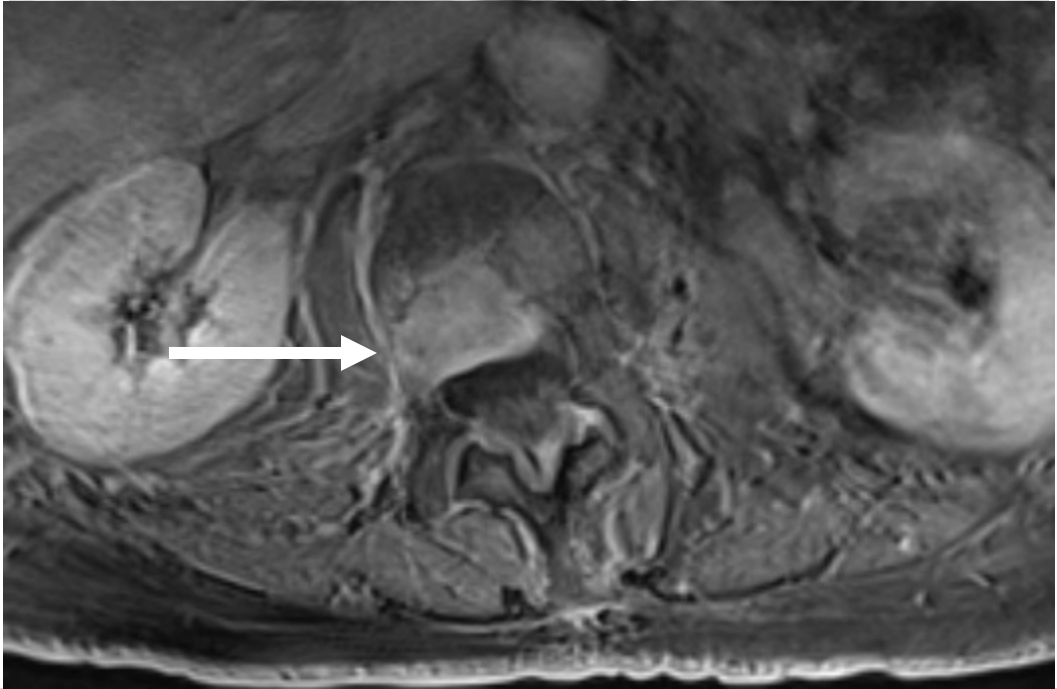
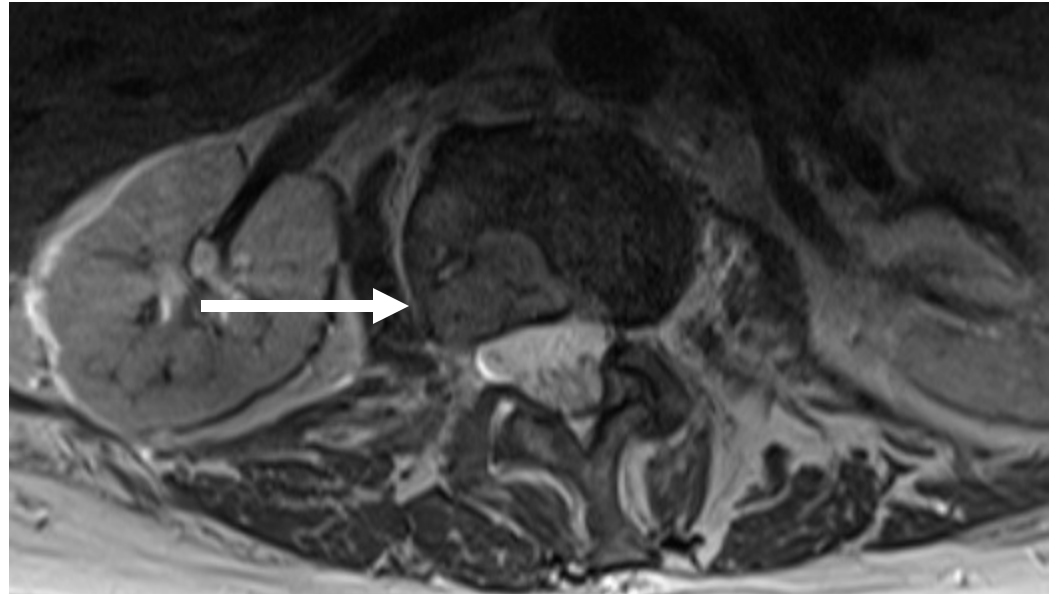
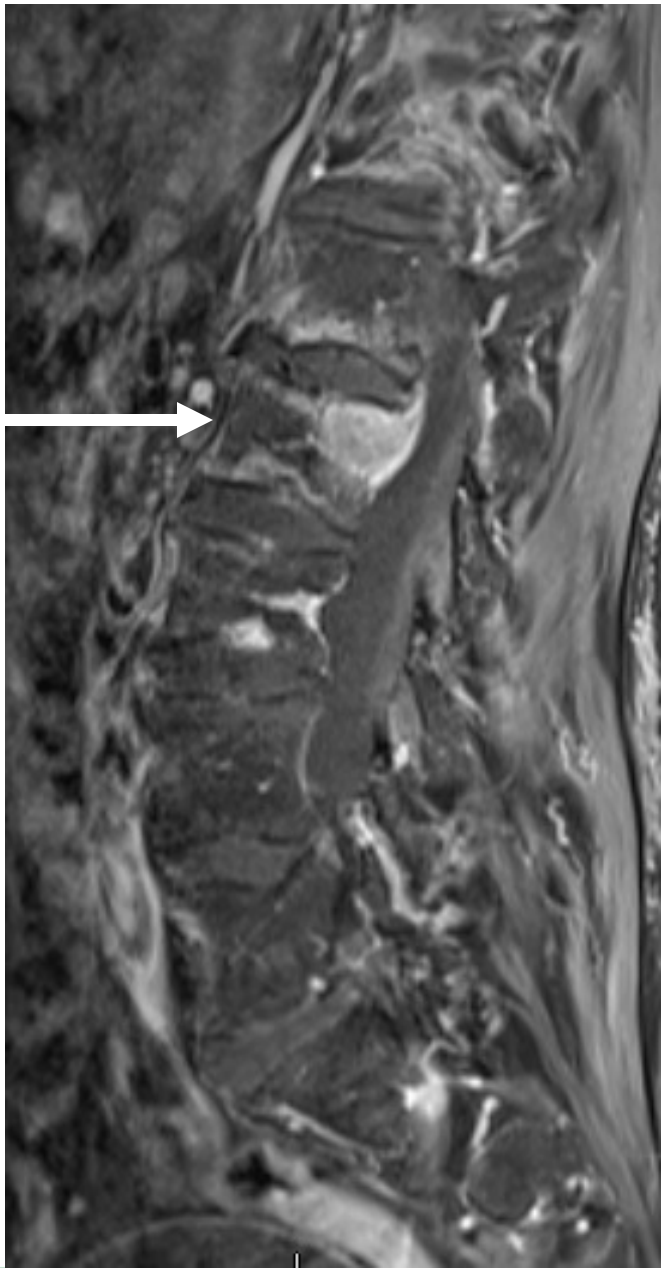


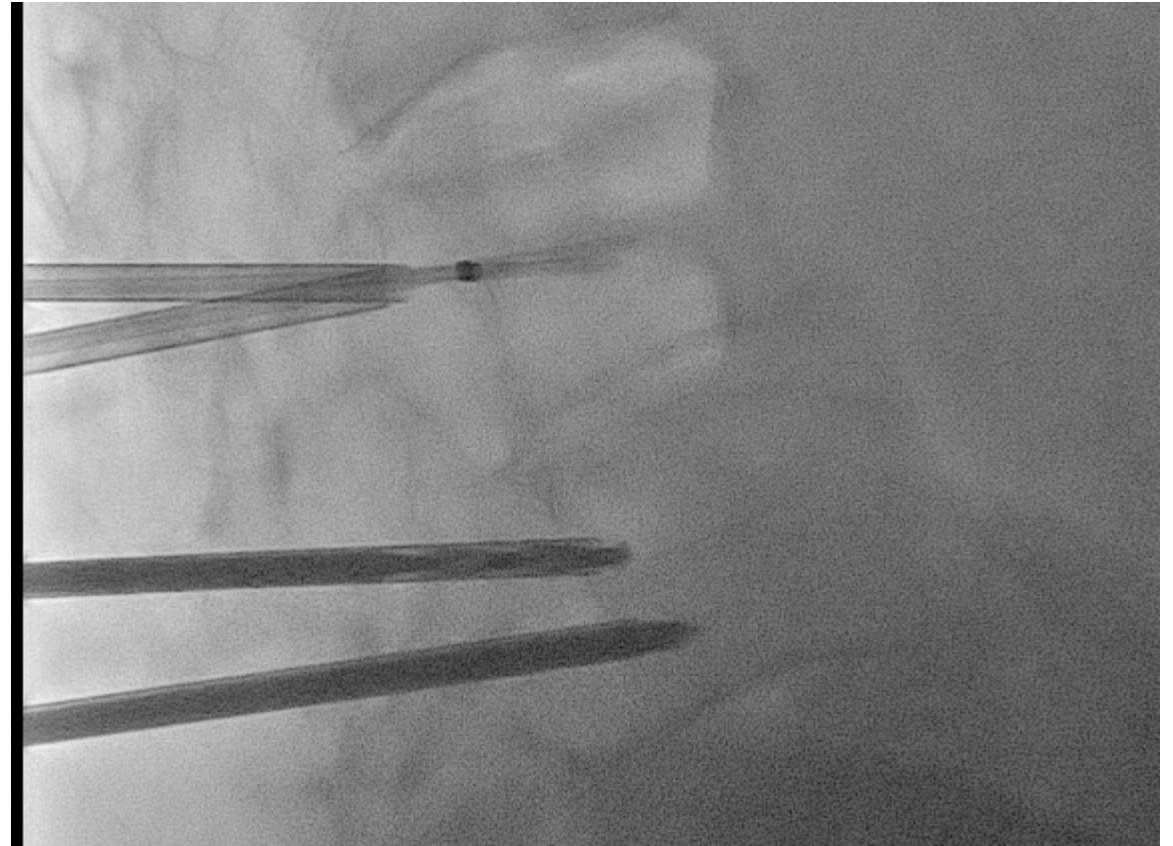
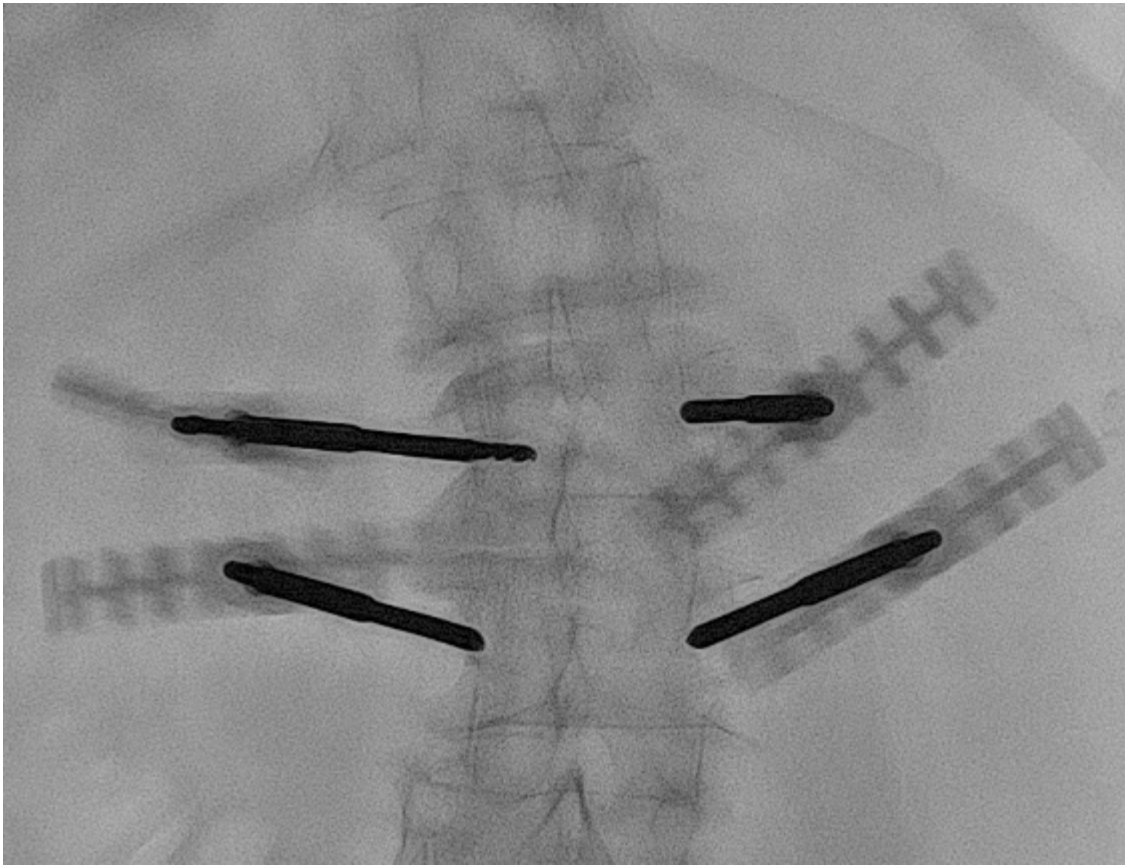
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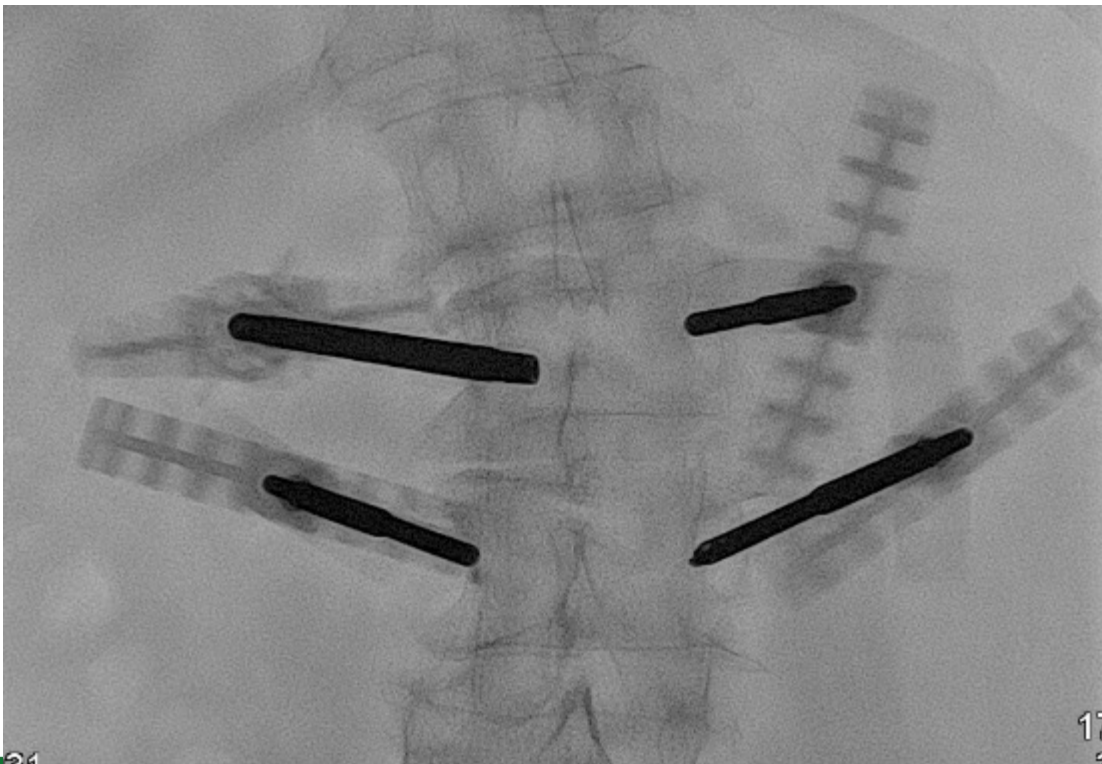
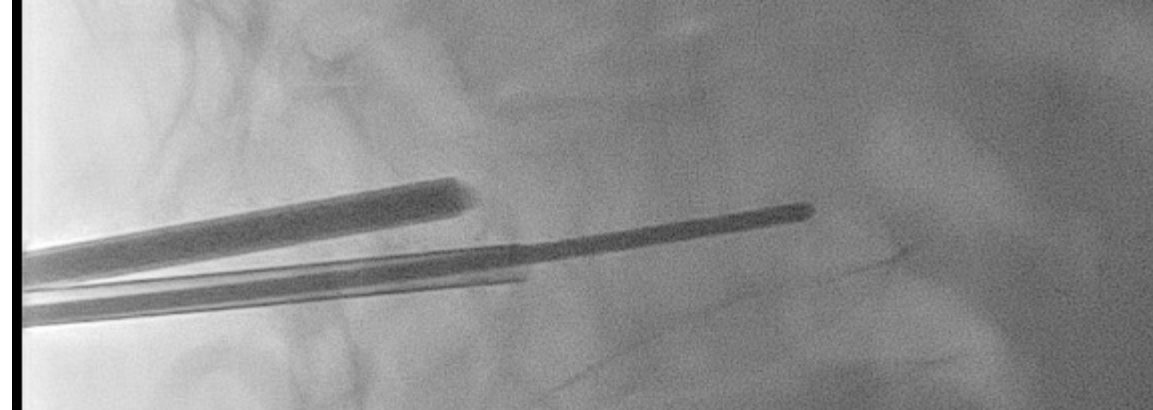
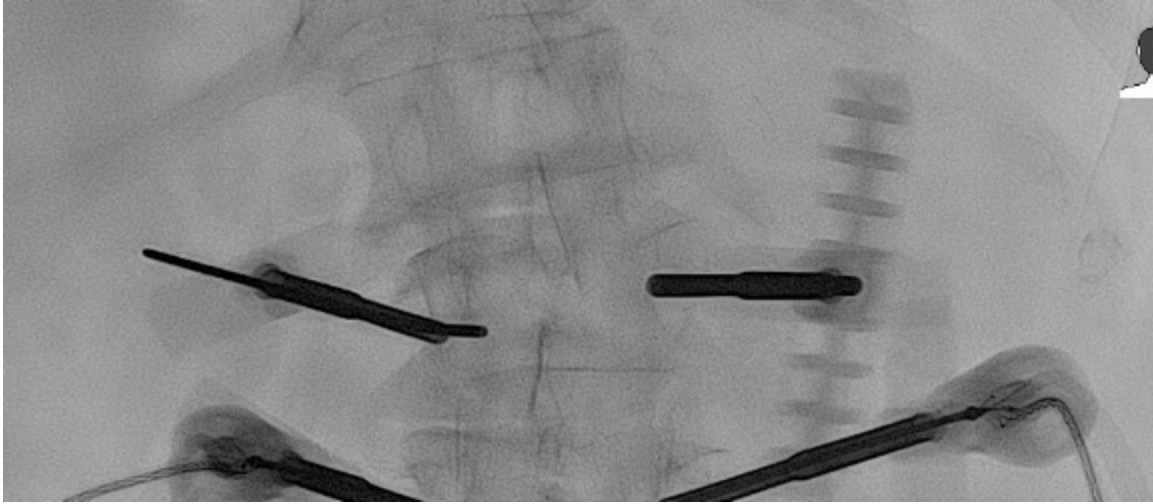
Micrograph b shows a dark spot on a leaf, similar to the one in micrograph a. The spot is located in a different position on the leaf, and the surrounding tissue appears slightly different in texture or color.

Case

- 72-year-old female with metastatic lung cancer and severe low back pain



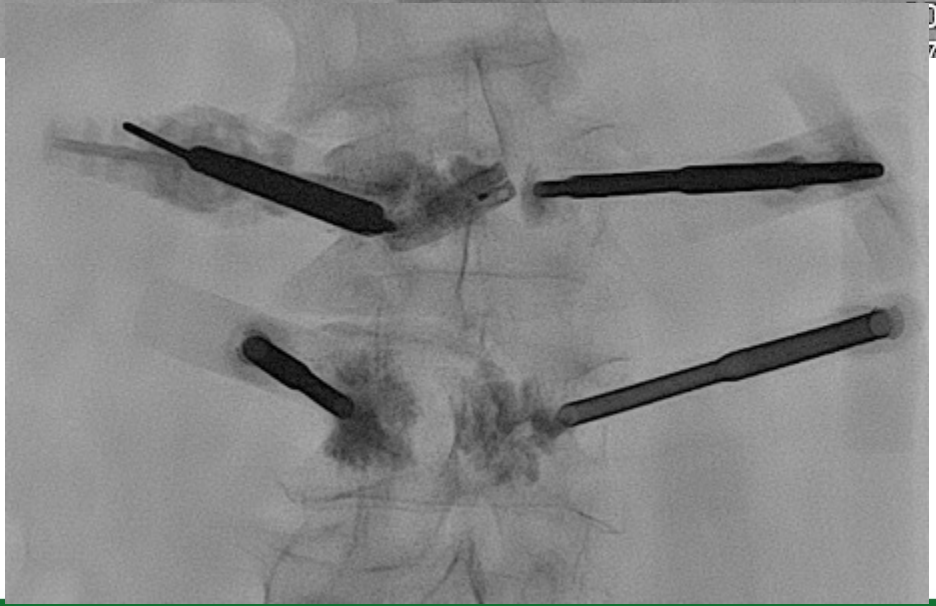
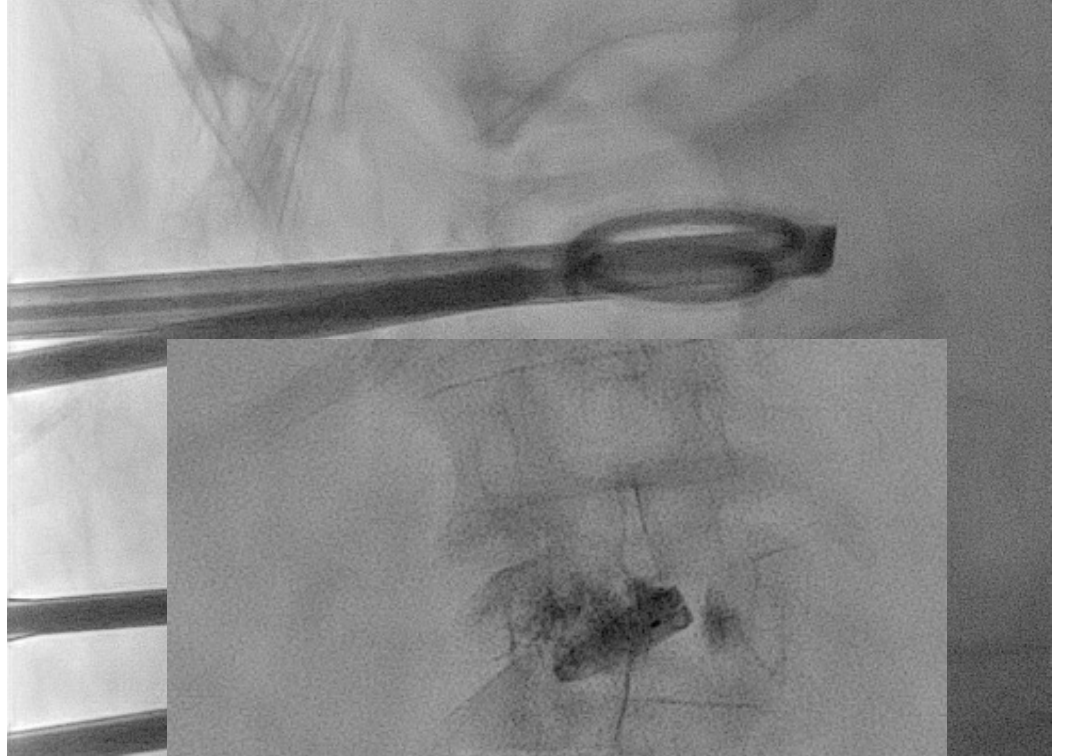
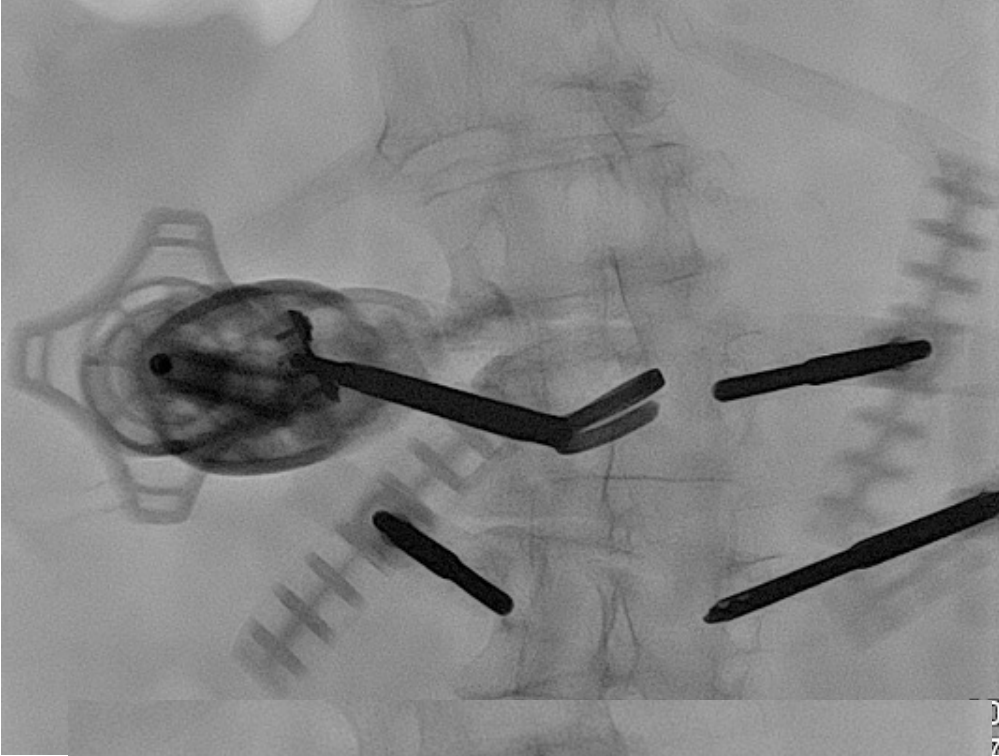




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Conclusions

- Pathologic and osteoporotic compression fractures are common in cancer patients
- Pain palliation is paramount for quality of life
- Minimally invasive procedures offer fast improvement in pain and can be used synergistically with RT and other oncologic treatments

Thank You!

