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# From Detection to Decision: Multimodality Imaging and Prognostic Scoring in Spinal Metastatic Disease

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  - None
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  - None
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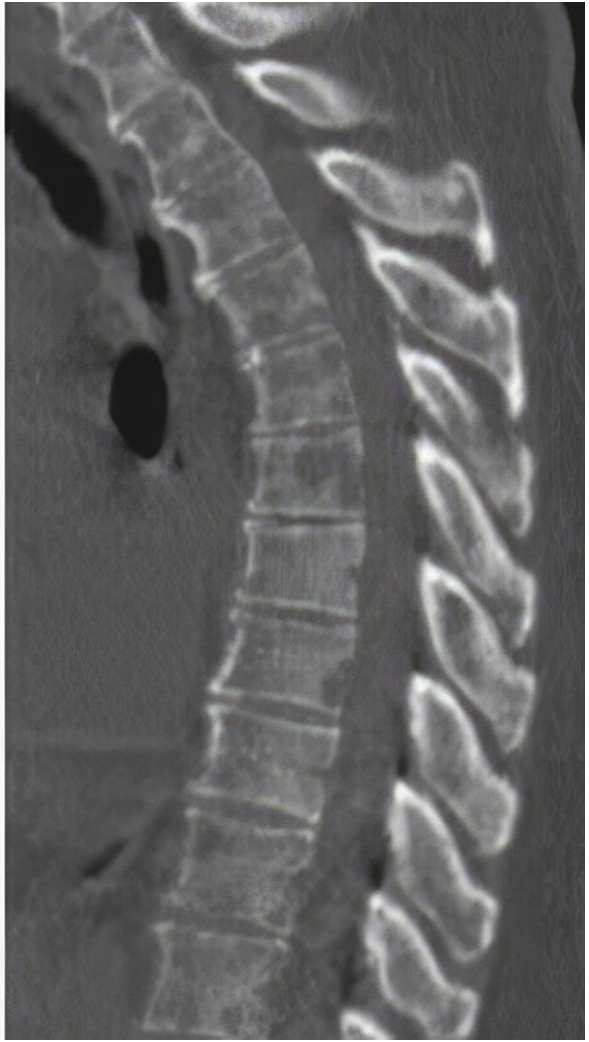
# Objectives

1. Compare strengths and limitations of radiography, CT, MRI, and nuclear medicine studies in spinal metastases.
2. Review assessment of spinal stability and neurologic risk using SINS and ESCC.

# Radiography & CT

- Radiography:
  - Low sensitivity (≈44–50%); lytic lesions often occult, blastic lesions more conspicuous
  - Useful for fractures and alignment
- CT:
  - Superior cortical detail; defines matrix and lesion margins; ~73% sensitivity
  - Limited marrow evaluation
  - CT myelography useful when MRI contraindicated

# Radiography vs CT



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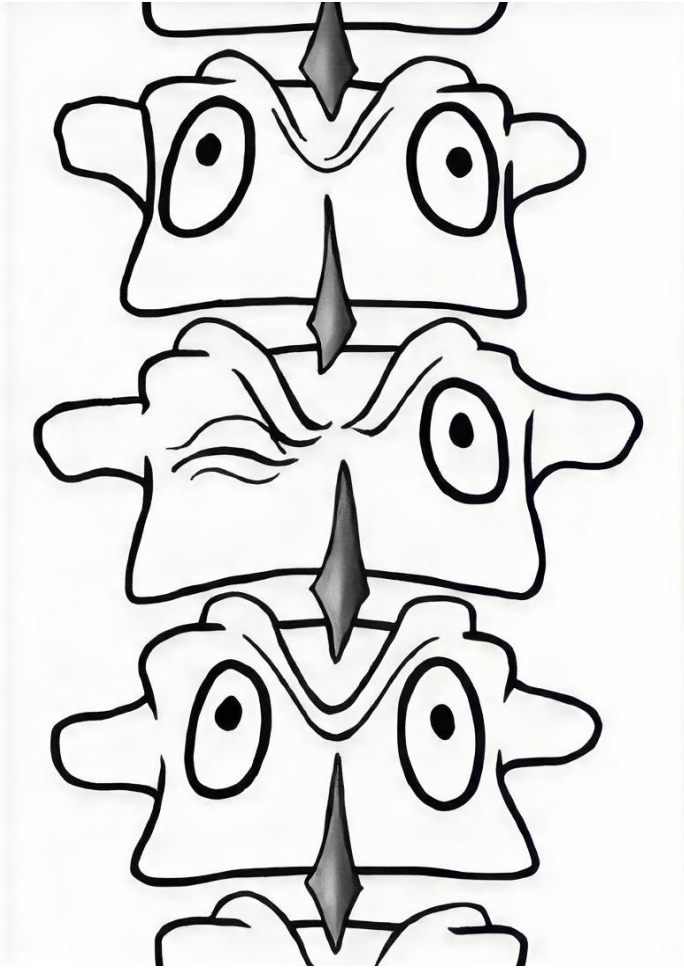
# "Winking Owl" Sign



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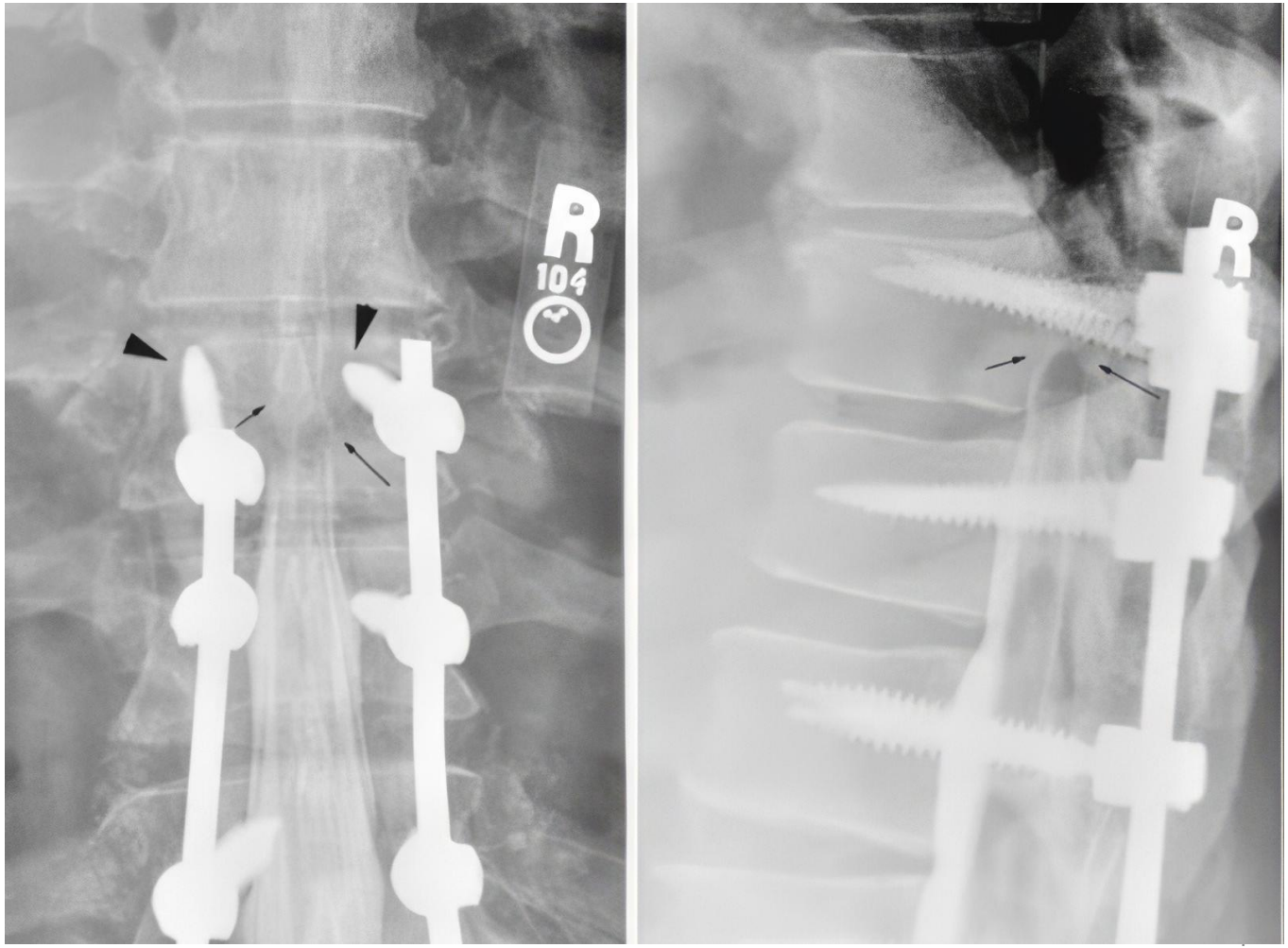
# 60-year-old male with progressive back pain

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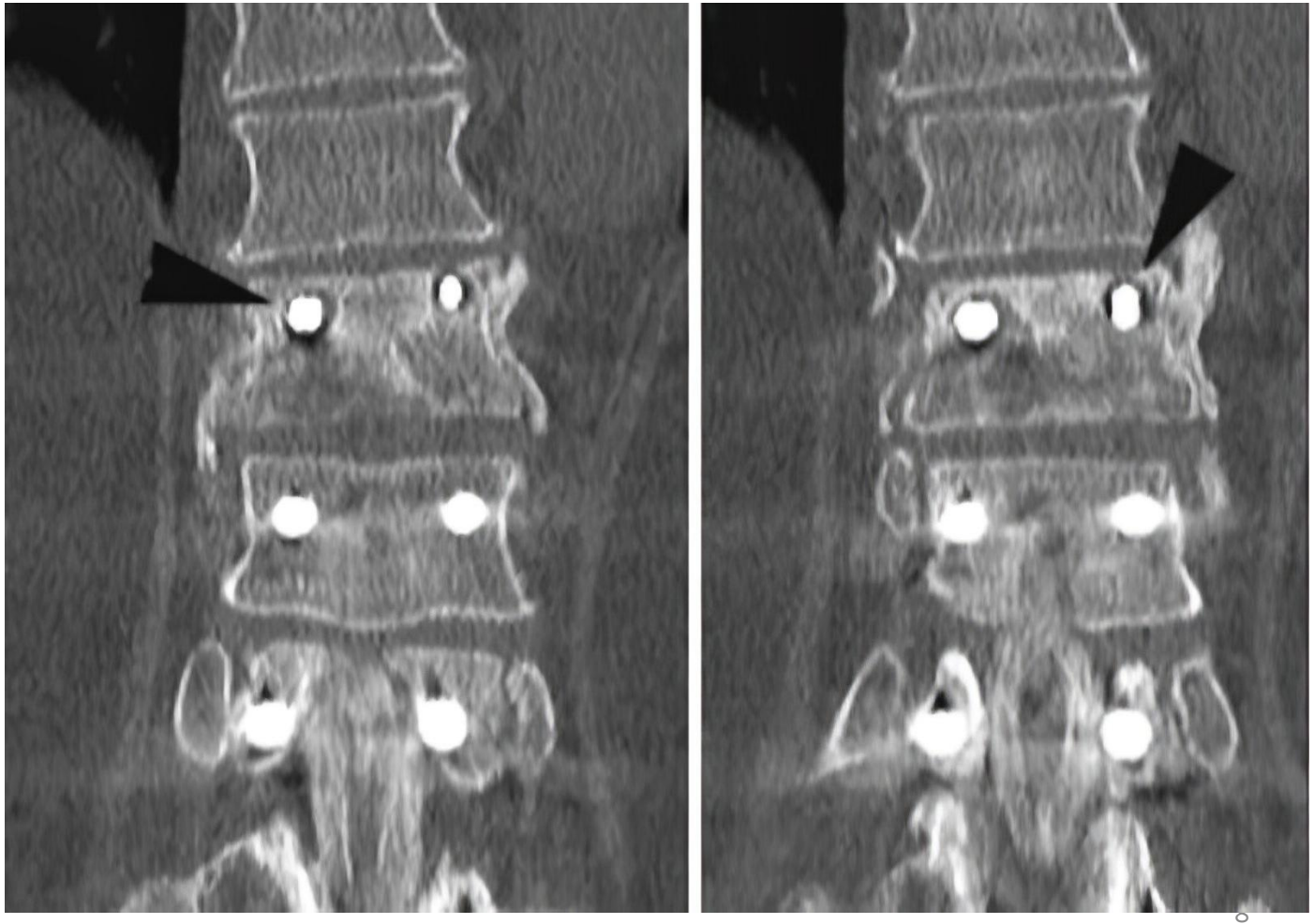

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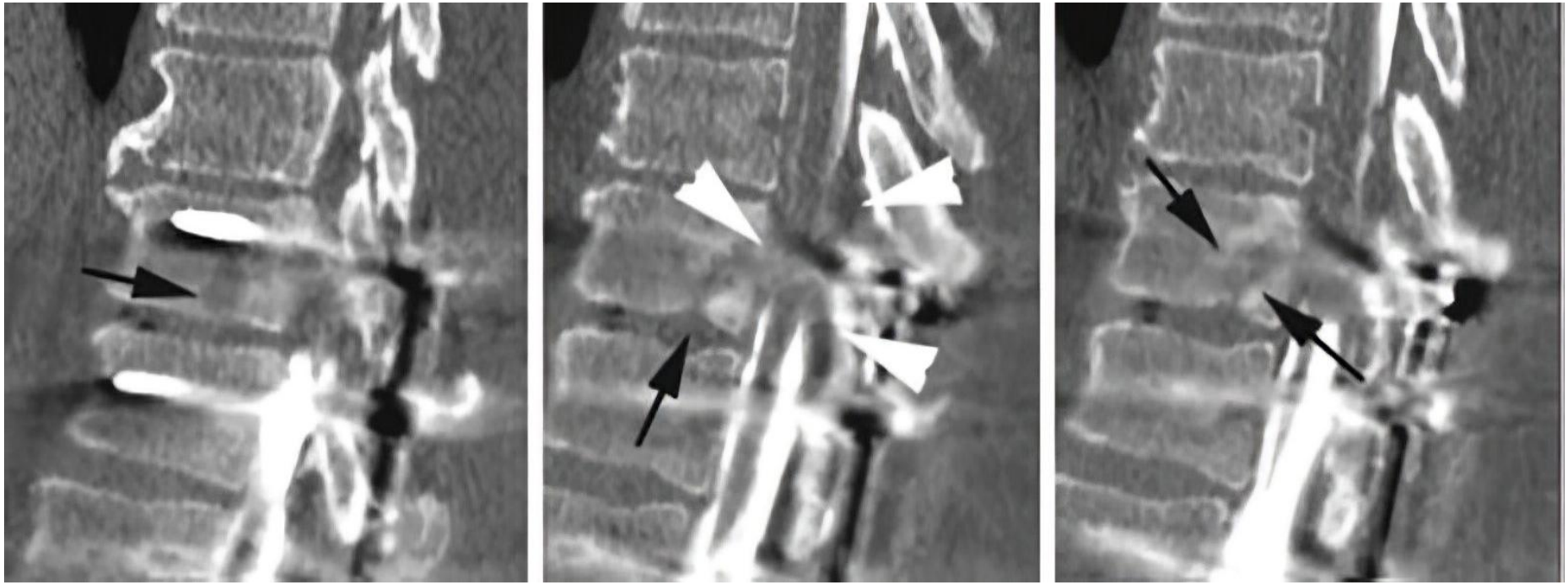

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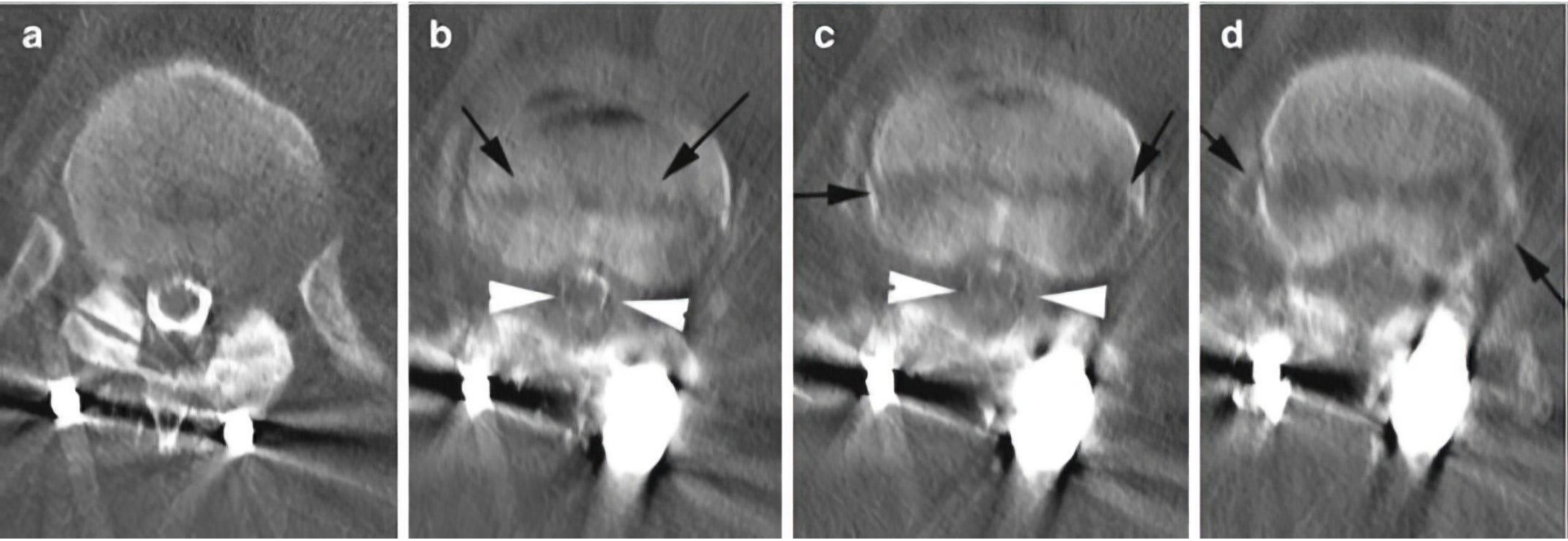

# Magnetic Resonance Imaging

- Most sensitive/specific modality (~90%/96%); detects marrow, epidural, and cord involvement
- Most mets are T1 hypointense, ± T2/STIR hyperintense, and usually enhance
- Predominantly osteoblastic mets (e.g., prostate) may be T2/STIR hypointense and not enhance
- Best for cord compression
- Some limitations (artifacts, incompatible devices)

# 51 y/o female with breast cancer


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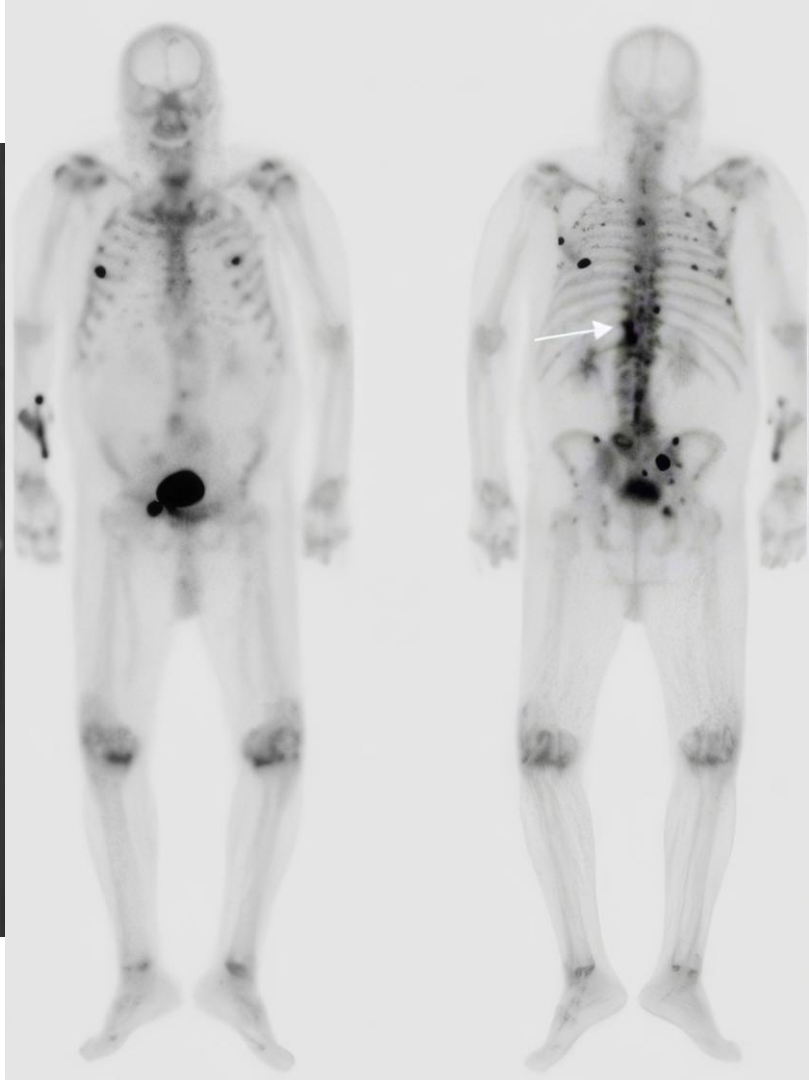
# Bone Scintigraphy & SPECT

- Whole-body Tc-99m bone scan; reflects osteoblastic activity
- False negatives in myeloma/aggressive lytic tumors; false positives & flare phenomenon
- Sensitivity ~78% (↑ to ~87% with SPECT)

# 79 y/o male with prostate cancer



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# "Superscan"

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# Positron Emission Tomography

- PET detects metabolic activity; common tracers: FDG and NaF
- NaF → osteoblastic activity; FDG → metabolically active tumor
- High sensitivity (~90% and ~97% with PET/CT fusion)

# 41 y/o male with back pain




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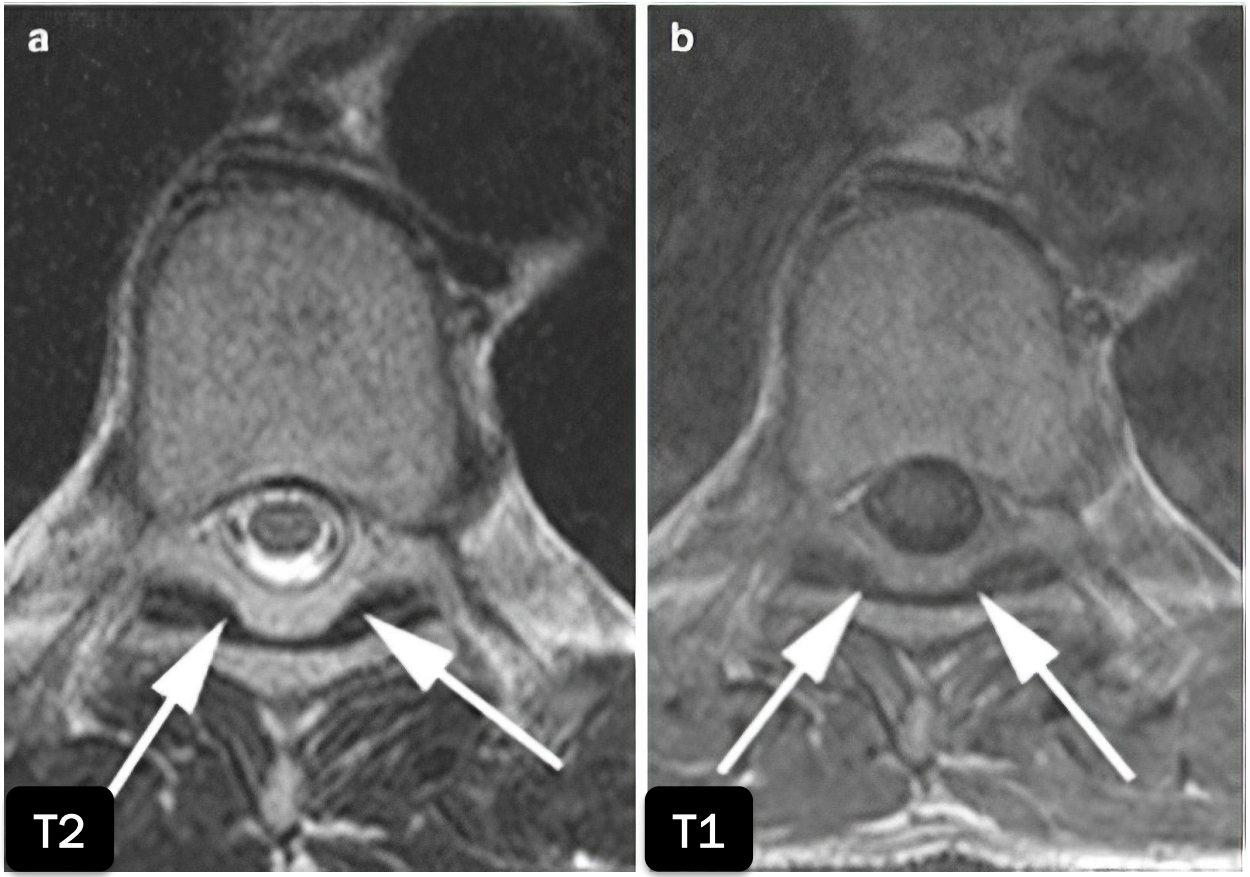
# 41 y/o male with back pain

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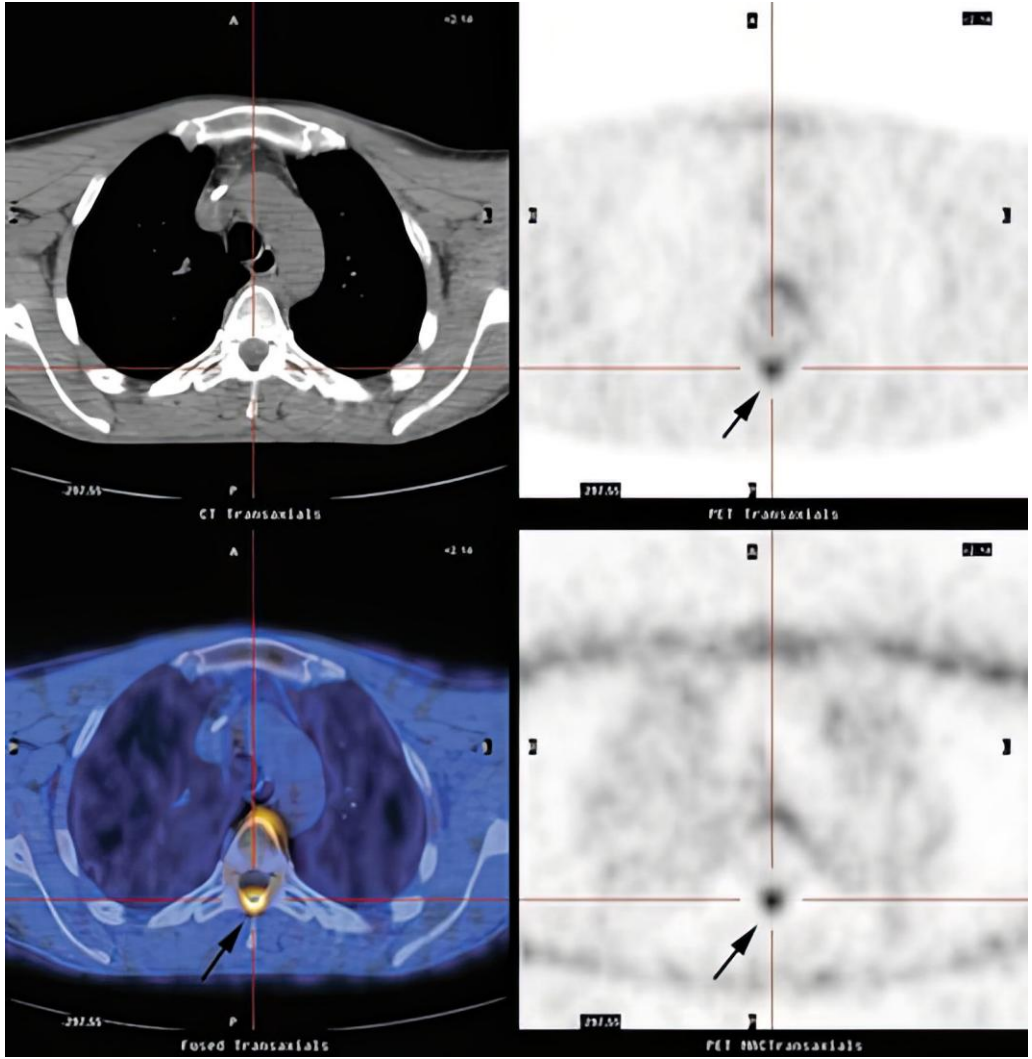
# 41 y/o male with back pain

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# Spinal Instability Neoplastic Score

### Location

**0 points:** Rigid (S2-S5)
**1 point:** Semi-rigid (T3-T10)
**2 points:** Mobile spine (C3-C6, L2-L4)
**3 points:** Junctional (occiput-C2, C7-T2, T11-L1, L5-S1)

### Pain

**0 points:** No pain
**1 point:** Occasional pain (not mechanical)
**3 points:** Mechanical pain or relief with rest

### Type of Lesion

**0 points:** Blastic
**1 point:** Mixed
**2 points:** Lytic

### Spinal Alignment

**0 points:** Normal
**2 points:** De novo deformity (kyphosis/scoliosis)
**4 points:** Subluxation/translation

### Vertebral body collapse

**0 points:** No collapse
**1 point:** No collapse, but >50% involvement
**2 points:** <50% collapse
**3 points:** >50% collapse

### Posterior element involvement

**0 points:** None
**1 point:** Unilateral
**3 points:** Bilateral

### Total Score

**<6 =** stable
**7-12 =** potentially unstable
**13-18 =** unstable

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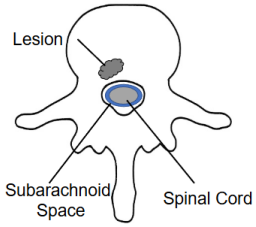
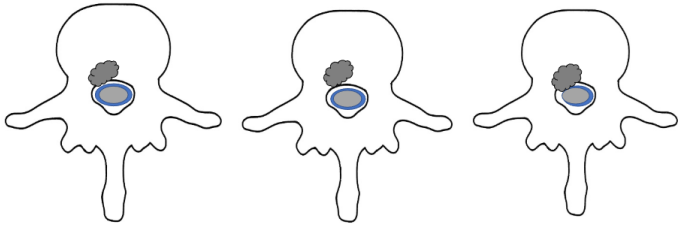
# Epidural Spinal Cord Compression (ESCC) scale

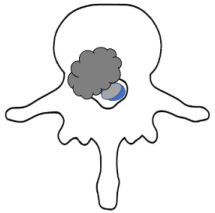
**Grade 0:**
Bone-only disease



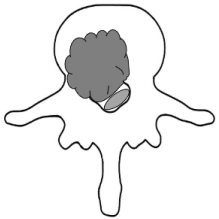

**Grades 1a, 1b, 1c:**
-1a: Epidural extension only.
-1b: Deformation of the thecal sac, without cord abutment
-1c: Deformation with cord abutment



**Grade 2:**
Spinal cord compression, with CSF visible around the cord



**Grade 3:**
Spinal cord compression, no CSF visible around the cord



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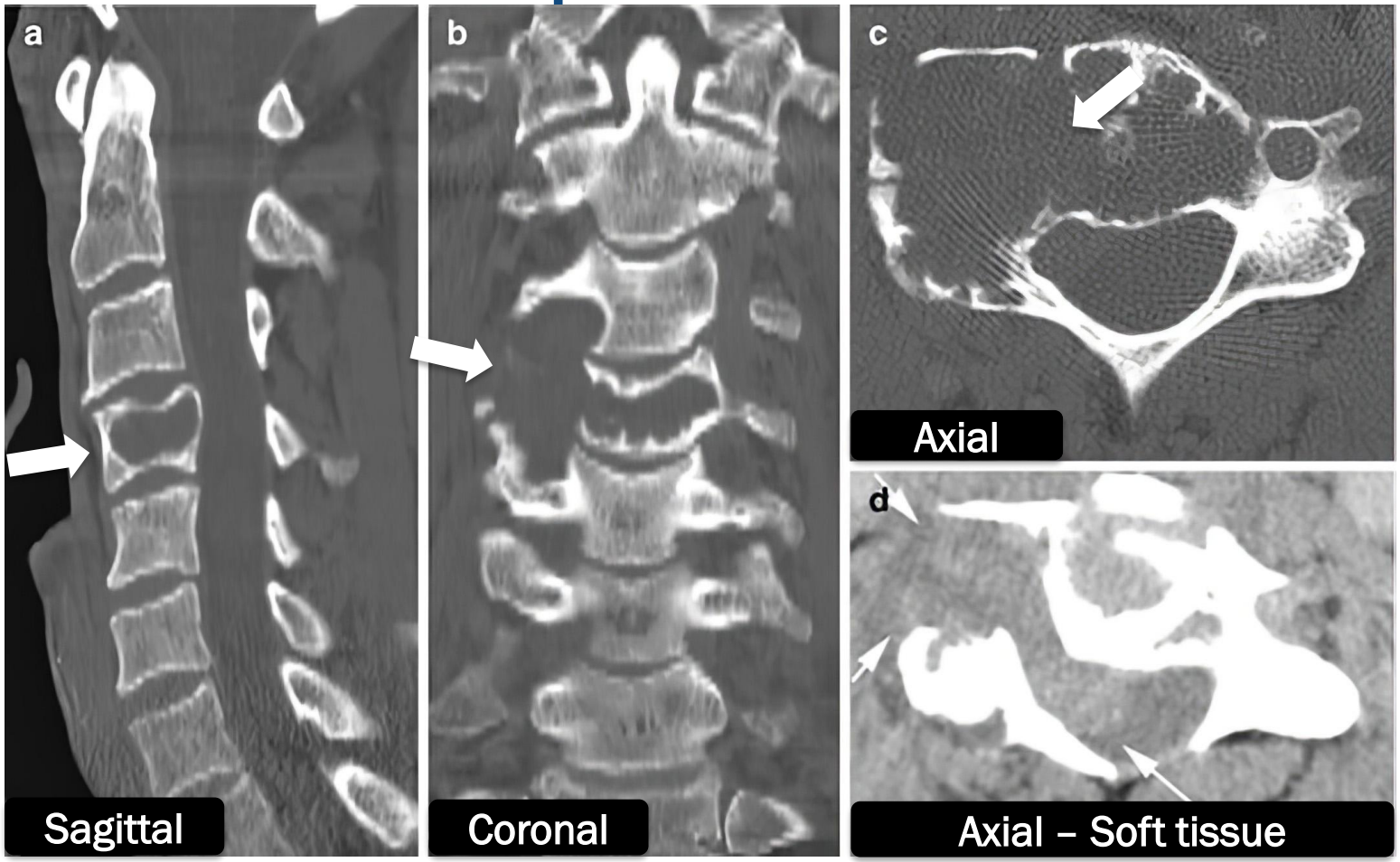
# 42 y/o male with new spinal mass

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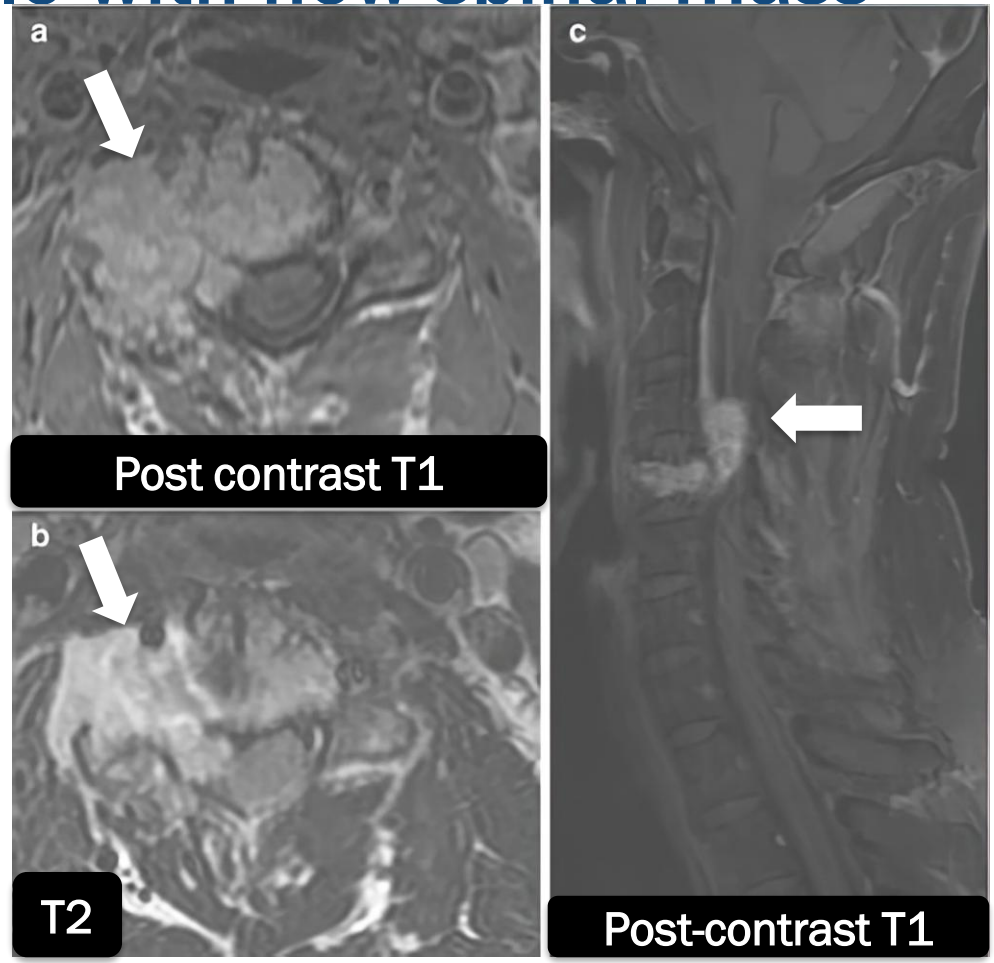


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# 42 y/o male with new spinal mass

## Spinal Instability Neoplastic Score

| | |
|---|---|
| Location | 2 (C3-C6 mobile spine) |
| Type of Lesion | 2 (lytic lesion) |
| Spinal Alignment | 2 (de novo kyphosis) |
| Vertebral Body Collapse | 2 (<50% collapse) |
| Posterior Element | 1 (unilateral involvement) |
| Imaging SINS | 9 |
| + Pain | 0 (none), 1 (occasional), 3 (mechanical) |
| **Total SINS** | **9-12 (potentially unstable)** |

## Epidural Spinal Cord Compression Score

Grade 3 (spinal cord compression w/o visible CSF)

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# Key Points

- MRI: best for marrow, epidural, cord involvement
- CT: cortical detail, fractures, tumor matrix
- Bone scan / PET: whole-body staging and lesion specificity
- SINS & ESCC: spine stability and cord compression grading

# References


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