RADY 401 Back Pain: Vertebral Compression Fracture and Treatment

Shawn Ahuja August 2022
Focused patient history and workup

- 79 year old female
- PMHx of osteoporosis, hypothyroidism, hypo-gammaglobulinemia, small fiber sensory neuropathy.
- Reports lower back pain for the past three weeks with:
  - Radiation down the legs and toes
  - New onset urinary incontinence and weakness in the last two weeks
  - Mild relief with oxycodone (10mg, q6hr prn)
- Seen in the ED 10 days prior for atraumatic back pain with radiation to the right hip
- At present, PE is only pertinent for pain upon palpation over the lower thoracic and lumbar spine with no step-off, deformity, or + straight leg sign. No saddle anesthesia or stool incontinence.
- Originally received XR of the lumbar spine and right hip with pelvis. Received lumbar MRI today.
List of imaging studies

• X-Ray (Lumbar Spine; AP, Lateral, Ferguson)

• MRI Lumbar Spine (without and with contrast)
Non-patient images from Radiopaedia and Restore Medical Partners

Lumbar X-ray (lateral view)
Lumbar X-ray (lateral view)

- Reduction in height
- Aortic vascular calcification
- Narrows Disc Height
- Sclerosis marked in black
- Reduction in height

Non-patient images from Radiopaedia and Restore Medical Partners
Classic Findings CXR

• Typically involves the anterior and superior aspects of the vertebral body with sparing of the posterior body
• Key feature to look for is a difference in height between the anterior and posterior aspects of the vertebral body in excess of 3 mm which shows a **wedge-shaped deformity**. *(known as Dowager’s hump when accentuating the kyphosis of the thoracic spine)* \(^1\)
• **Alternatively**, the compressed body is typically >20% shorter than the body above or below it. \(^1\)
Lumbar MRI T1(left) vs T2 (right)
Lumbar MRI T1 (left) vs T2 (right)

Diffuse degenerative disc disease reflected by lack of intensity in the vertebral disks on T2 MRI. There is hyperintensity in L4 and T10 suggesting edema (red circles.) Compression of the spinal cord is also appreciated.

Hypointensity in the bone marrow of L4 and T10 suggesting a subacute fracture. There is also disc protrusion reflected by the red circles.
Lumbar MRI T1 FS w Contrast vs STIR
Lumbar MRI T1 FS w Contrast vs STIR

Contrast enhancement at L4 and T10 suggesting a reactive process in line with a subacute fracture.

Hyperintensity at L4 and T10 on STIR demonstrating distinction from bone marrow fat.
The typical MRI findings in an acute vertebral compression fracture are hypointensity on T1-weighted images, hyperintensity or heterogeneous intensity on T2-weighted images, and hyperintensity on fat-suppressed T2-weighted images or on short-inversion time-inversion recovery images.²
Typical acute osteoporotic compression fracture in a 72-year-old woman. Sagittal T1-weighted MR image (400/12) shows compression fractures of T12 and L1 with normal residual bone marrow signal intensity in the vertebral bodies. Retropulsion of a bone fragment (arrow) is present at the posterior portions of the vertebral bodies.\(^3\)
(Same patient as before) Sagittal turbo spin-echo T2-weighted MR image (3,200/99, echo train length of 11) shows that the collapsed vertebral bodies are relatively isointense to adjacent vertebrae. Hypointense bands (arrows) are present in the superior portions of the collapsed vertebrae.³
On initial presentation, the L4 compression fracture was considered non-destabilizing and did not warrant surgical intervention.

Followed up with pain management for pain regimen as well as PT/OT. Kyphoplasty was considered as a potential referral.

After onset of incontinence, weakness, and worsening pain refractory to medical management, IR was consulted and a shared decision was made to pursue Kyphoplasty.

Pain went from a 10/10 with movement to at worst 5/10 with PT!
Indications:
- VCF 2/2 osteoporosis, myeloma, metastasis, or vertebral angioma
- Intractable pain
- NO neurological symptoms!

Contraindications:
- Coagulation disorders
- Unstable fracture or vertebra plana (complete collapse of the vertebrae)

Efficacy:
- 92% of patient within a systematic literature review found pain relief post procedure.

Complications:
- Cement extraversion, though less than 1% have invasion into vital structures such as the vena cava, lungs, heart, or kidney.
Back to our patient . . .

We can now appreciate restoration of the vertebral body height as well as a new opacity which is the cement added!
Clinical considerations

- VCF is typically due to Osteoporosis (with women affected more than men) but may be due to a secondary cause such as infection or malignancy.
- Typically, asymptomatic or painful with no neurologic defects.
- Conventional spine radiographs should be your first study of choice when suspecting this.
  - MRI may be considered to differentiate between osteoporosis from malignancy as well as determining the age of the fracture.\(^3\)
## Imaging considerations

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<thead>
<tr>
<th>Modality</th>
<th>X-Ray</th>
<th>MRI</th>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>85.6%±6</td>
<td>82%*7</td>
</tr>
<tr>
<td>Specificity</td>
<td>67.6%±6</td>
<td>92%*7</td>
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<tr>
<td>Cost</td>
<td>$88-114 (2-3 VW, Lumbar)*</td>
<td>$1,033-1,342 (w/o contrast, followed by contrast)*</td>
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<tr>
<td>Radiation exposure</td>
<td>2.2 mSV (AP), 1.5 mSV (lateral)³</td>
<td>None ☺</td>
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<td>Appropriate use?</td>
<td>YES!</td>
<td>Not our first line choice, but appropriate given the neurological symptoms the patient developed</td>
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*When AVH is 75% or higher of the adjacent vertebral body in an acute fracture
*When the low signal intensity band is noted on MRI
UNC Top 3 Takeaways

1. START WITH A 2 VW PLAIN FILM WHEN SUSPECTING AN OSTEOPOROTIC VCF
   Specifically, look for the reduction in the anterior vertebral height relative to the posterior height or a wedge-shaped deformity

2. WHEN UTILIZING MRI, LOOK AT YOUR FS AND STIR SEQUENCES
   Hyperintensity as well as a reduction in height will further support this diagnosis

3. REFER TO IR (or the appropriate service depending on institution) FOR KYPHOPLASTY IF INDICATED
   Medically intractable pain, stable fracture, lack of coagulopathy and neurological symptoms
References


