

Imaging of MSK Infections

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Declarations

- None

Content

- Focus on the imaging findings of spinal osteomyelitis and discitis
- Diagnosis
 - X-ray
 - CT
 - MRI
- Limitations of imaging spinal infections
- Summary

Why Discuss Spondylodiscitis?

- The pathophysiology of MSK infections is the same regardless of the site
 - Imaging findings of pyogenic bone infections are similar throughout body
- Spondylodiscitis has some specific imaging findings and clinical dilemmas
 - Imaging early infections
 - Assessing treatment response

Why Discuss Spondylodiscitis?

- Clinical symptoms are non-specific
 - Back pain, localized tenderness, muscular spasm
 - +/- fever, neurologic compromise
- Blood work is sensitive but not specific: ESR, CRP, WBC
- Biopsy and cultures are not reliable
- Often treat without identifying agent
- Imaging tends to guide treatment

X-ray Findings

- Findings are often delayed 2-8 weeks after beginning of process
- Narrow disc space
- Demineralization
- Loss of endplate margins
- Soft tissue swelling
- More advanced: destruction of endplate and or vertebral body



CT Findings

- CT diagnoses bone destruction earlier than X-ray
- X-ray findings plus:
 - Fragmentation or erosion of bone
 - Soft tissue swelling with obliteration of adjacent fat planes
 - Can see collections such as abscesses



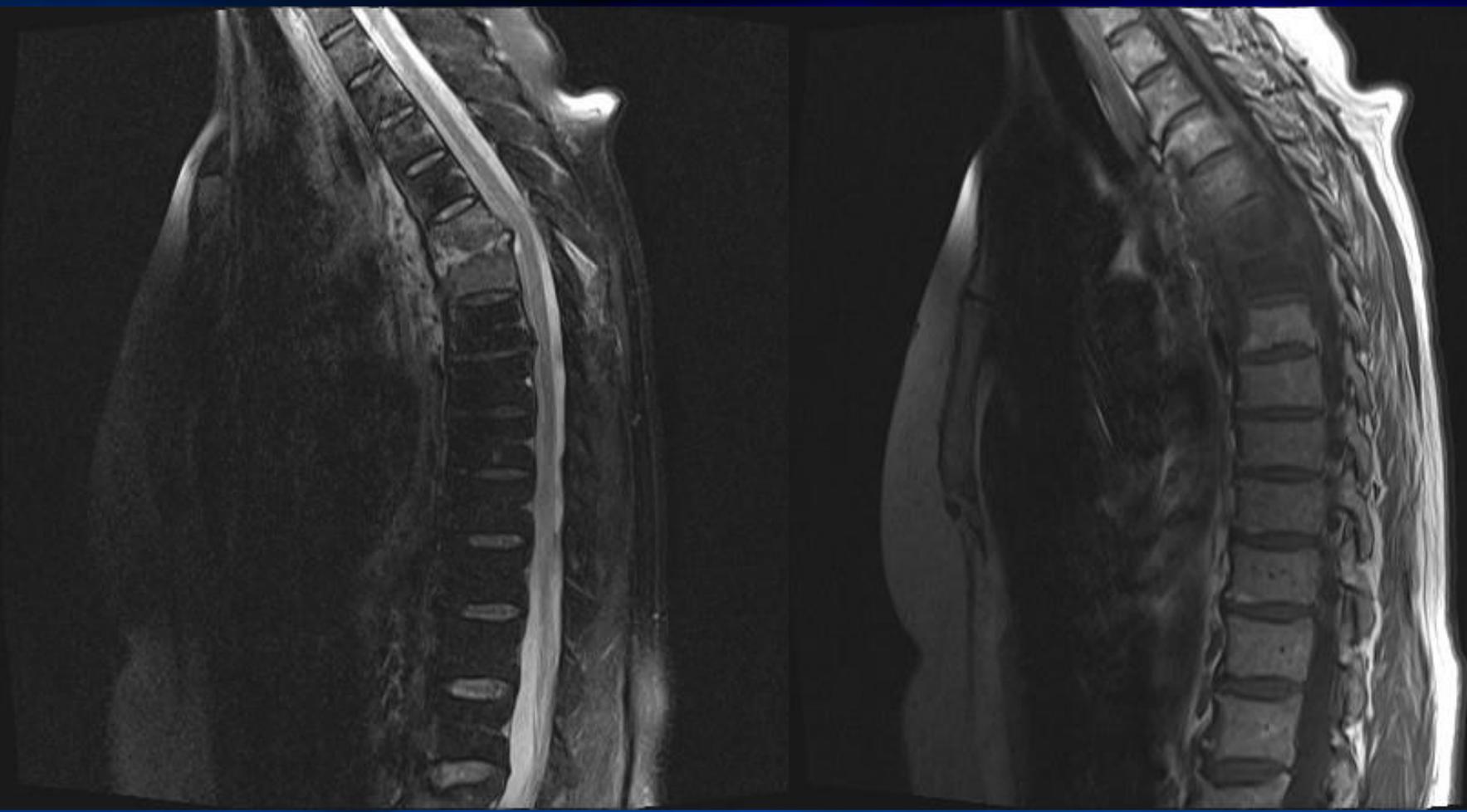
MRI in Spondylodiscitis

- The workhorse of spinal infection imaging
- Readily available
- Prospective studies show comparable accuracy with traditional nuclear imaging

	MRI	Gallium and Bone scan
Sensitivity	96%	90%
Specificity	92%	100%
Accuracy	94%	94%

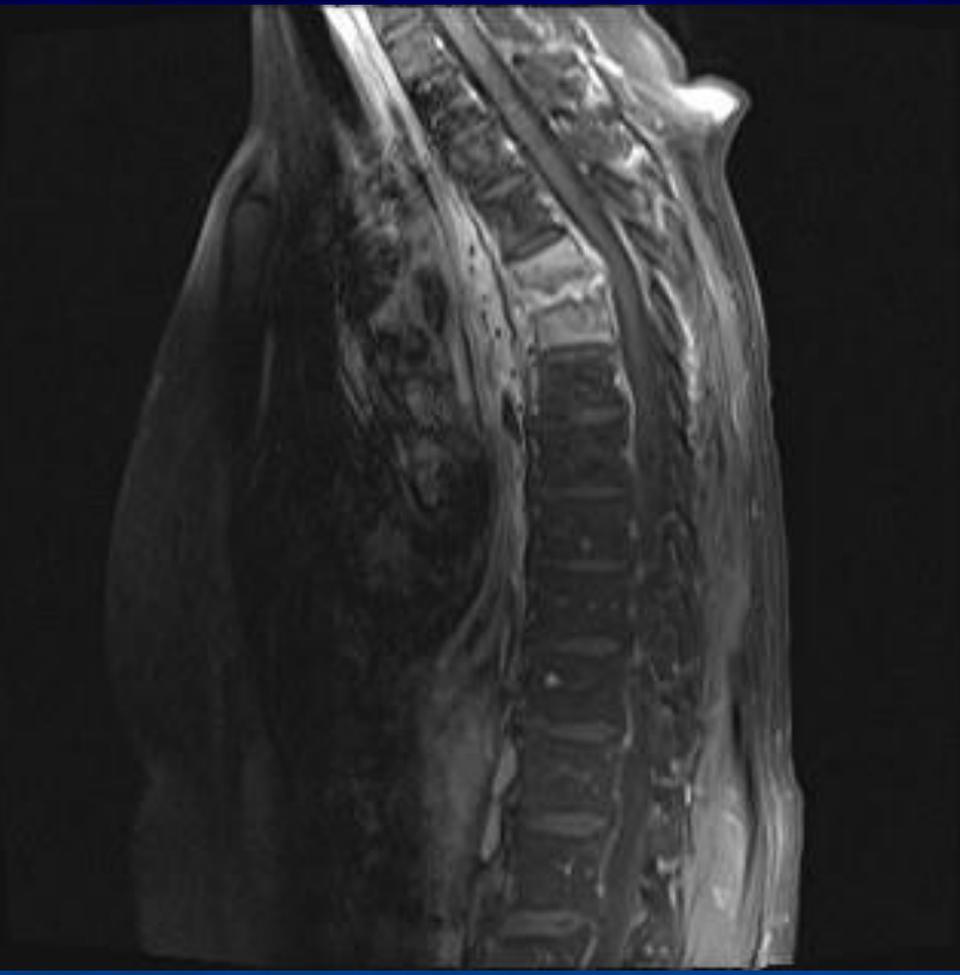
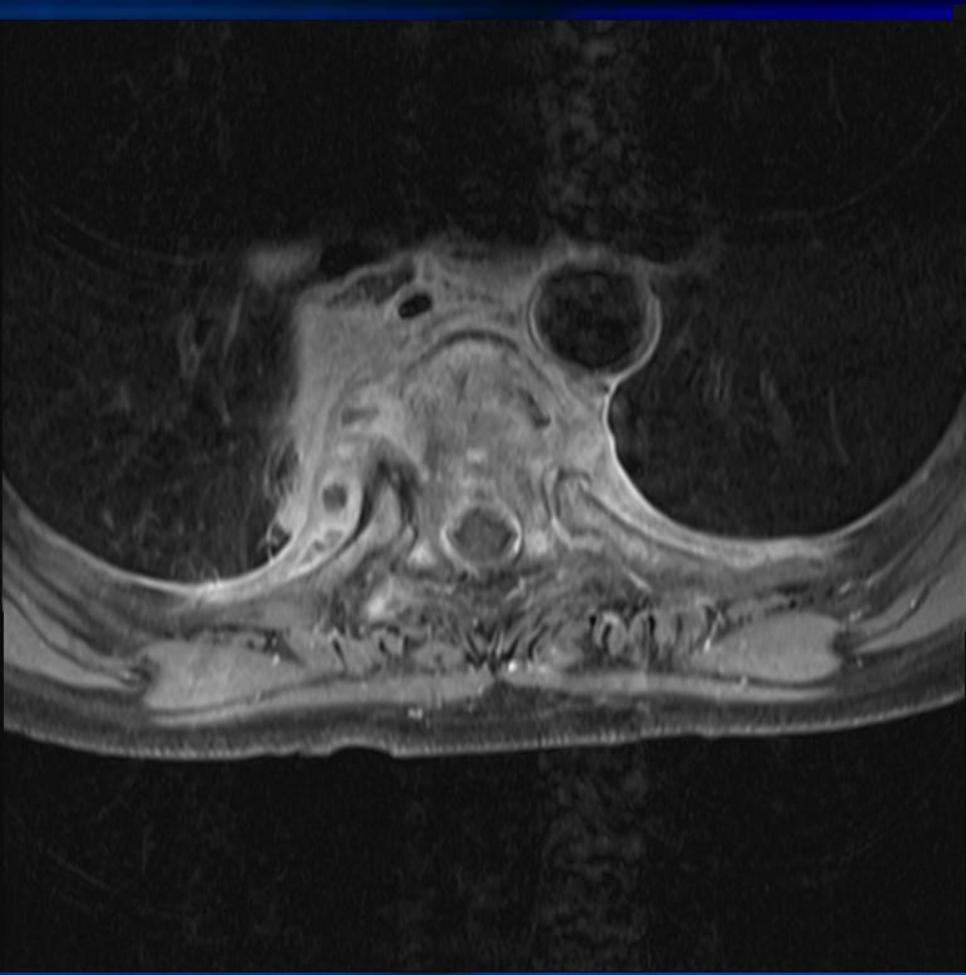
MRI Findings

- Marrow: low T1 and high T2 signal areas in the bone (mostly edema)
 - Better seen on fat saturated or STIR sequences
 - Often precede destructive changes
- Disc: high T2 signal at the disc space
 - Lose the normal intranuclear disc cleft
 - Disc space height loss
 - Disc material may herniate into soft end plate or into spinal canal



MRI Findings

- Cortex: lose complete margin between the endplate and disc, best seen on T2 imaging
- Enhancement: diffuse and homogeneous through affected marrow and most infected discs
- Soft tissues: extension into the paraspinal and epidural spaces
 - May be granulomatous tissue/phlegmon or abscess
 - DWI: shows restricted diffusion in abscess
- Adjacent findings of septic arthritis (facets)





MRI Limitations

- Early infection findings may be non-specific
 - Normal
 - Localized endplate edema
 - May need repeat in 1 week to reassess
- Post-Tx findings:
 - Lag healing phase of osteomyelitis (weeks – months)
 - Pt may be clinically improving with no change on MRI
 - Concurrent degenerative changes

MRI Findings in Healing

- Stable disc space height
- Decreased T2 signal at disc space
- Decreased T2 signal in the endplates and marrow (decreased edema)
 - Fatty replacement of VB marrow (late finding)
- Vertebral body fusion (late finding)
- Soft tissues return to normal

*Following images are from 1
year apart*

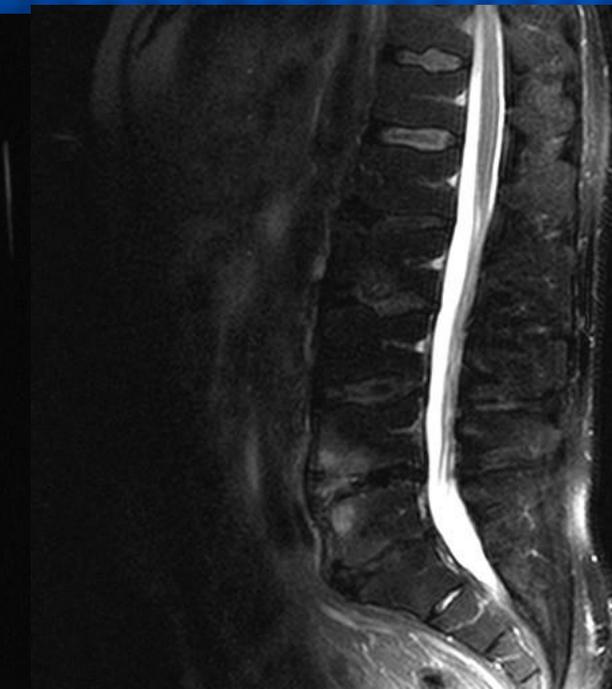


Follow up MRI

- Always some residual inflammation and enhancement
- Are the findings from:
 - Healing bone, disc and soft tissue
 - Ongoing infection
 - Progressing degeneration
 - A mixture of any or all of the above

Follow up MRI

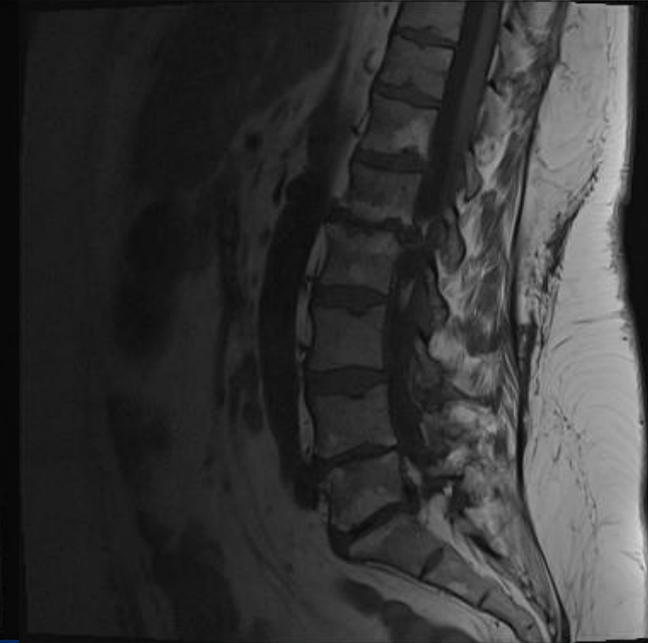
- Following studies are 6 weeks apart
- Pt completed course of Abx
- Clinically improved with less pain and no fever



MRI Findings in Healing

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These same findings can also be seen in degenerative changes of the spine

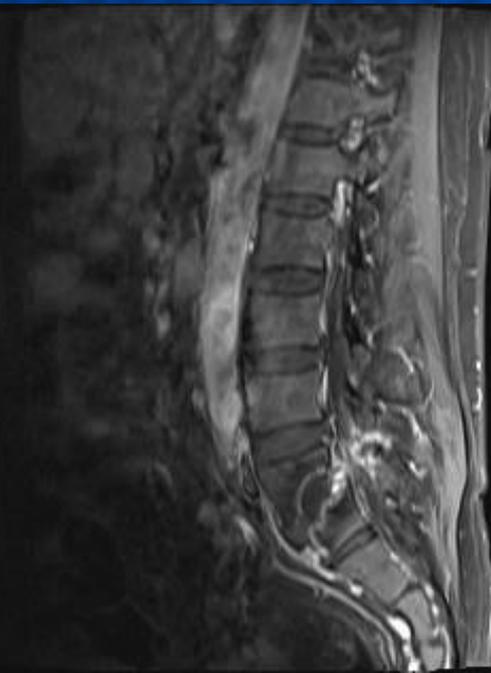
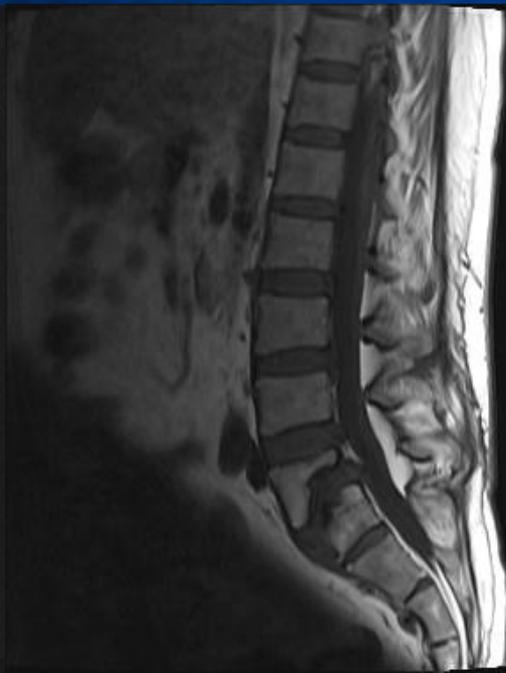
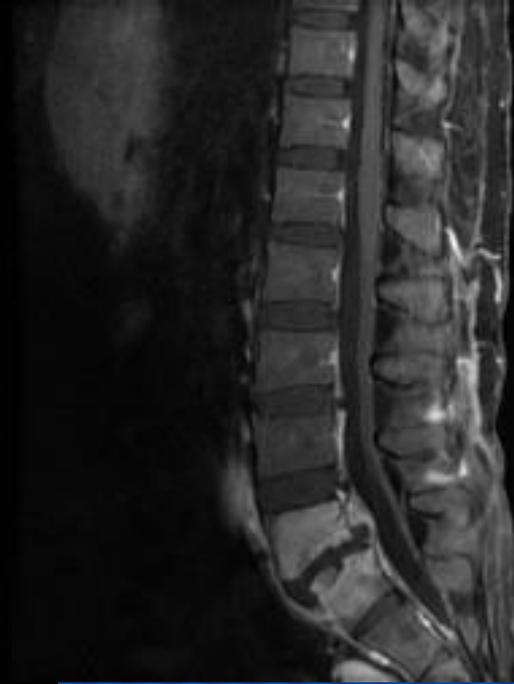
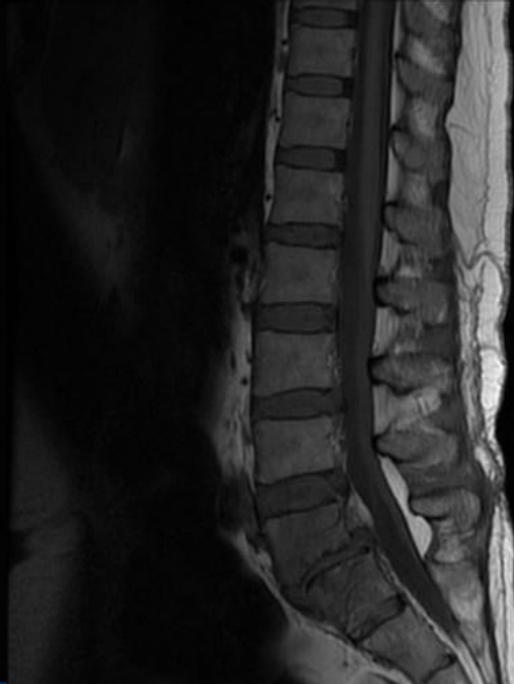


- Early infection
- Healing infection
- Degenerative disc disease and spinal instability

These all have overlapping imaging findings

Follow up Study

- The following are 16 months apart
- Ongoing back pain and mildly abnormal blood work
- Continued infection?
- PET scan and 2 years of clinical follow up were negative for infection



Summary

- Focus on pyogenic spinal infections
- Typical imaging findings
- MRI is good for diagnosis
- Limitations of follow up imaging

Thank you