

Spine Infection & Mimics

Not all that enhances is infection!

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Disclosures

- No relevant disclosures

Message

- *You need to answer 3 questions to make an accurate imaging diagnosis of spinal infection*

3 Questions to Ask

- *Is there involvement of multiple or single spinal compartments?*
 - *If VB involved, is there endplate destruction & disc involvement?*
- *Is there concomitant brain or other organ involvement?*
- *Is patient immunocompromised? (other clinical data: endemic, time course)*

Outline

- Review imaging appearance of spine infections
- Review associated clinical manifestations
- Review imaging mimics of these infections

Spine Infection

- Challenging imaging diagnosis: “specificity challenge”
- Many non-infectious etiologies can mimic infection
- High morbidity, radiologist has crucial role
- If multiple compartments are involved, spinal infection becomes much more likely
- **CONTRAST MRI IS A MUST**

Spinal Compartments

Extradural

Intradural

Intramedullary

Dura

Subdural Space

Cord

Bones

Subarachnoid Space

Discs

Nerve Roots

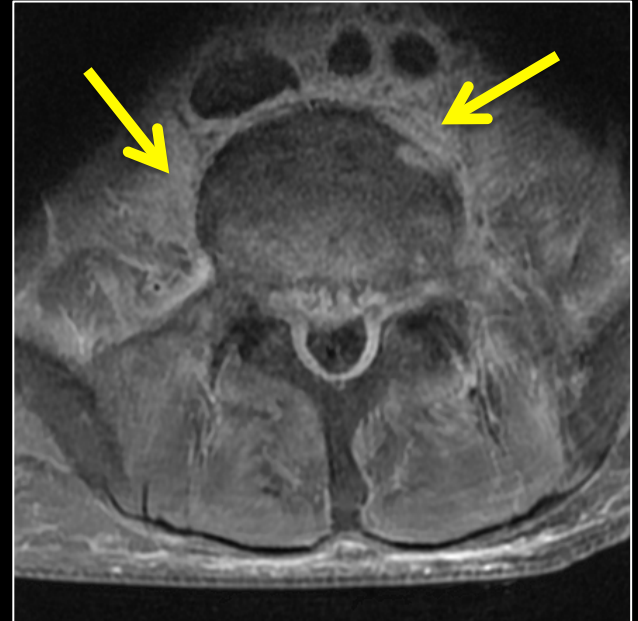
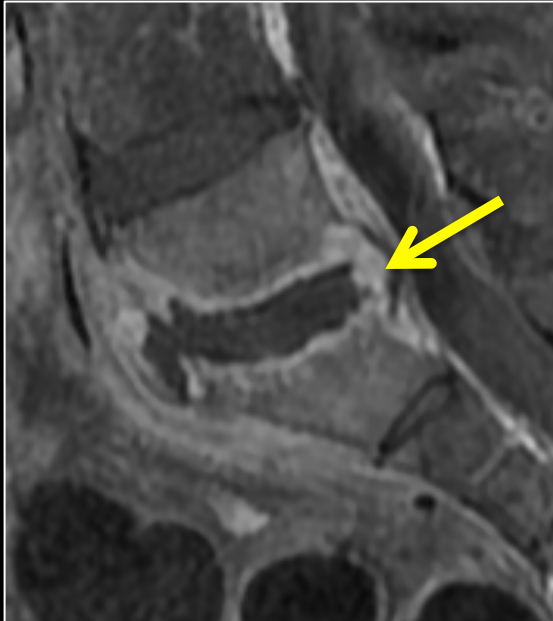
Soft tissues

Leptomeninges

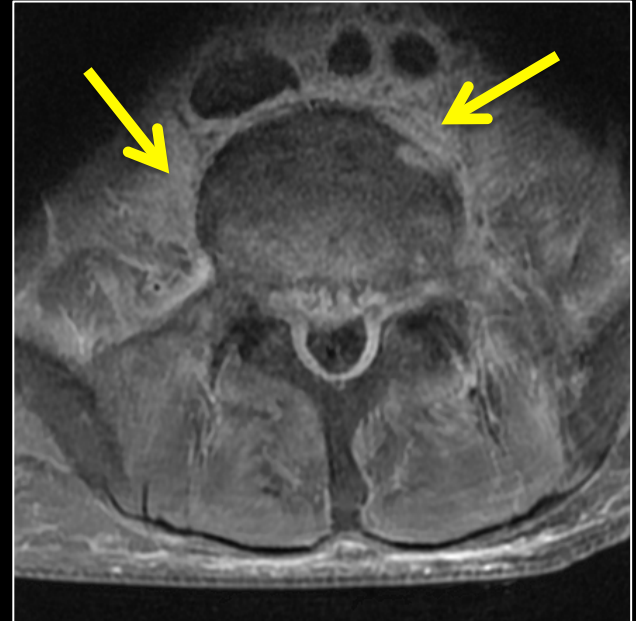
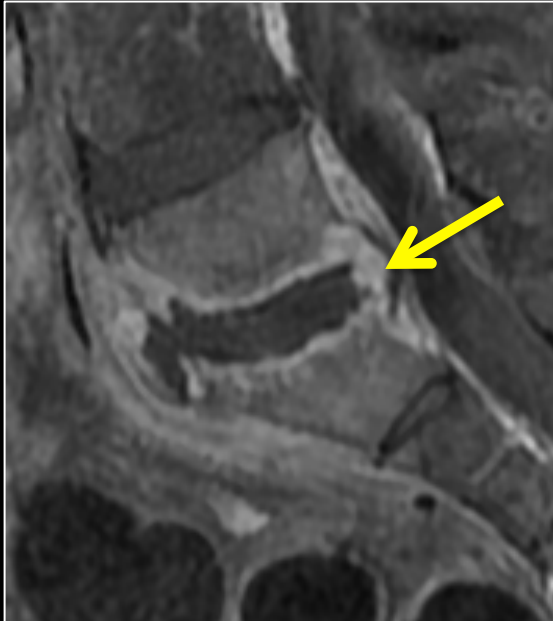
Additional Clues: Pathogens

- Extra-medullary infections most often caused by pyogens
- If the infection is limited to the cord then viral infection is likely

Case 1: 42 M, IVDU, Fever, Acute Back Pain

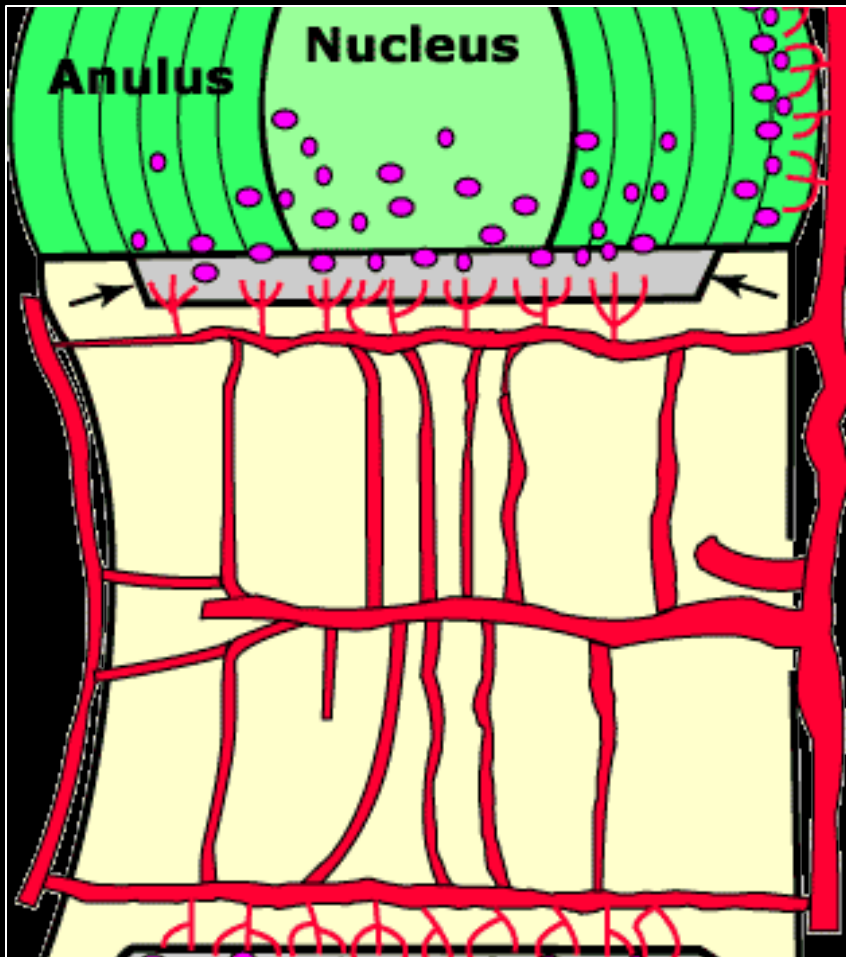


Pyogenic Discitis-Osteomyelitis



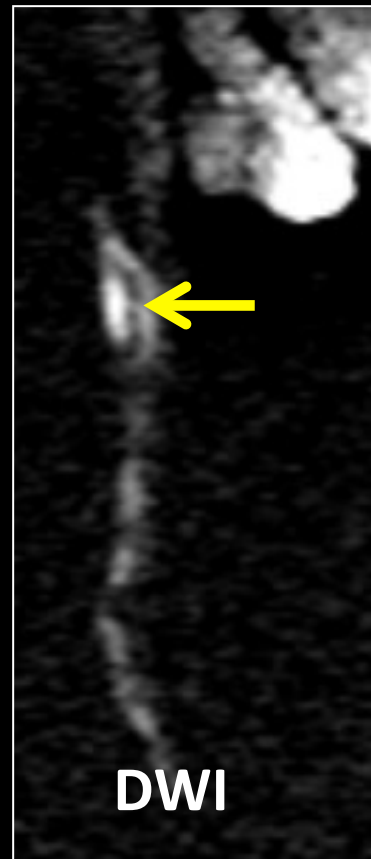
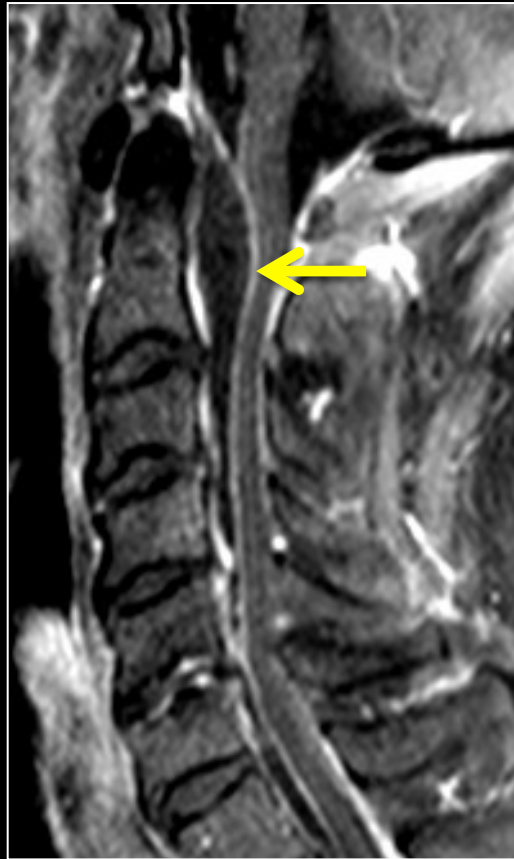
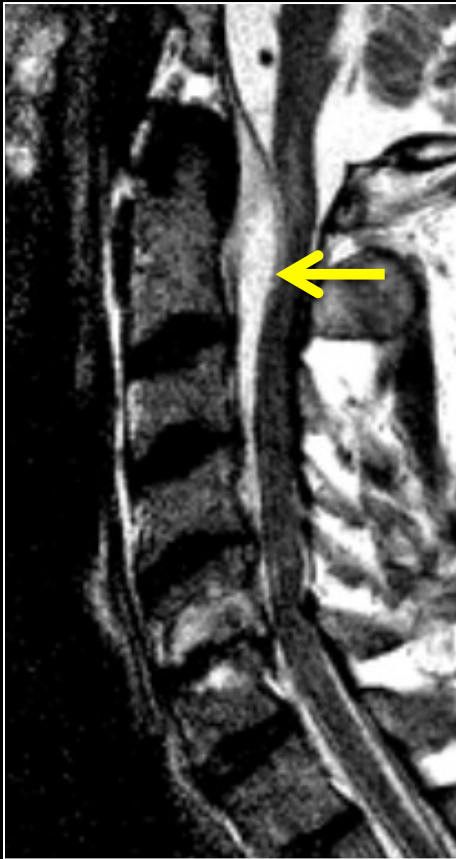
- **Hallmark is endplate erosion with changes in bone marrow on both sides of the disc**
- **Staph Aureus most common**
- *If paraspinal soft tissues are not involved, infection is unlikely*

Pyogenic Discitis-Osteomyelitis



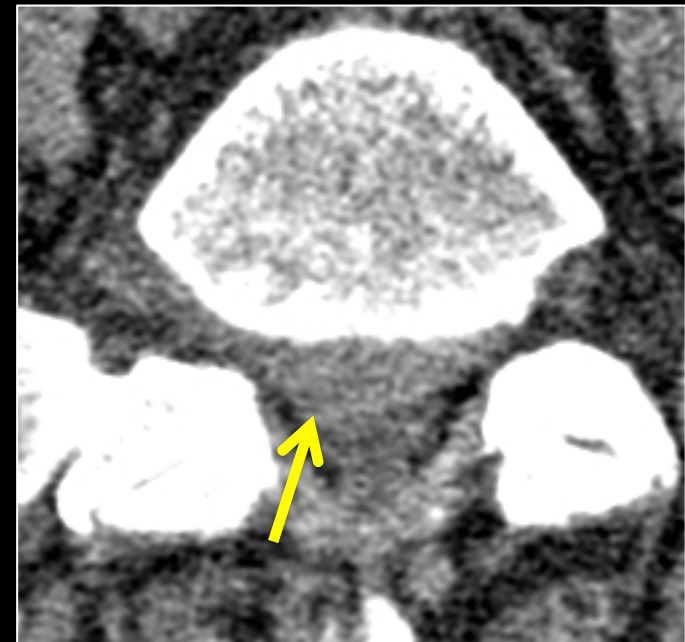
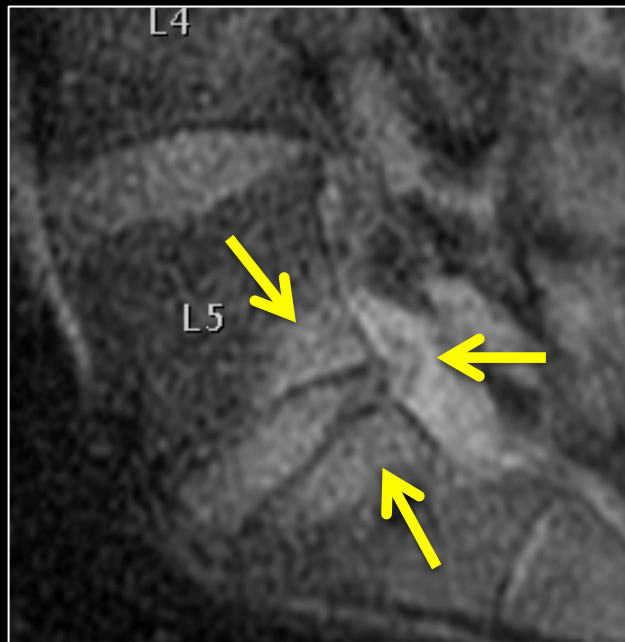
- Hematogenous spread occurs adjacent to the periphery of the end plates
- Infection starts at the anterior margins of the endplates

Discitis with Epidural Abscess



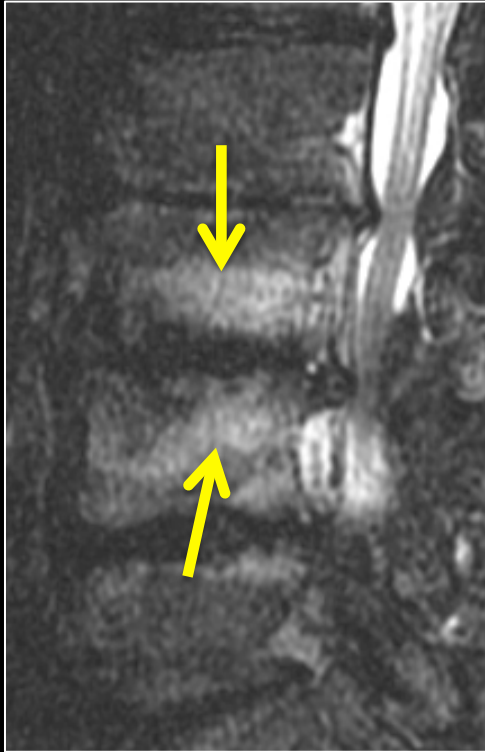
58y M, Hx IVDU with fever

Infection Mimic: Degenerative Disc Disease



52 M acute back pain h/x IVDA

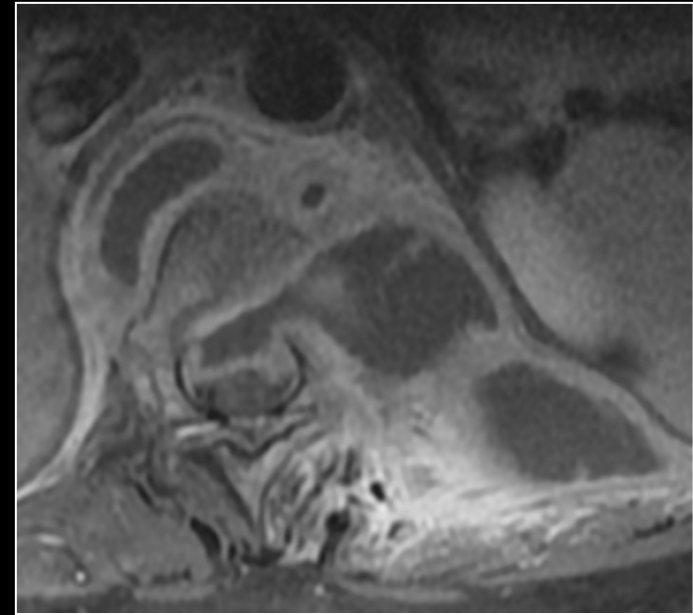
Infection Mimic: Degenerative Disc Disease



DDD

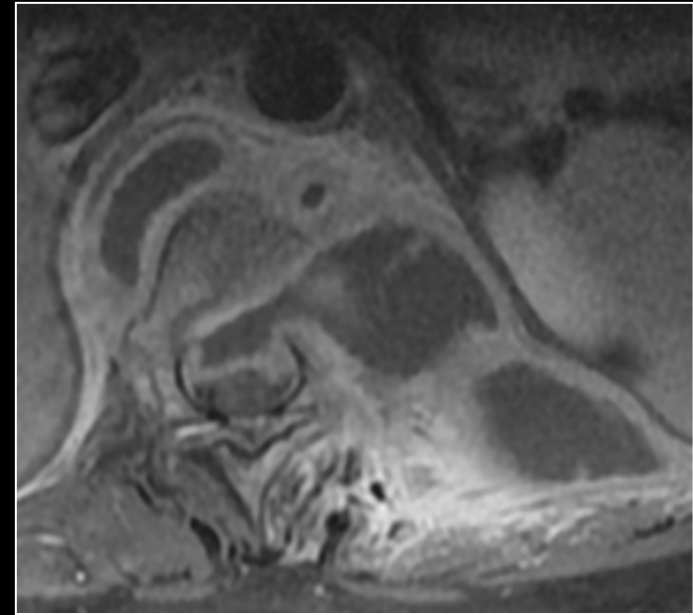
- Lacks soft tissue findings
- Lacks erosions/cortical destruction
- Vacuum effectively r/o infxn

Case 2: 33 Female, Fever, Back Pain



**33F from India, sub-acute
back pain, low grade fever**

Tuberculous Osteomyelitis

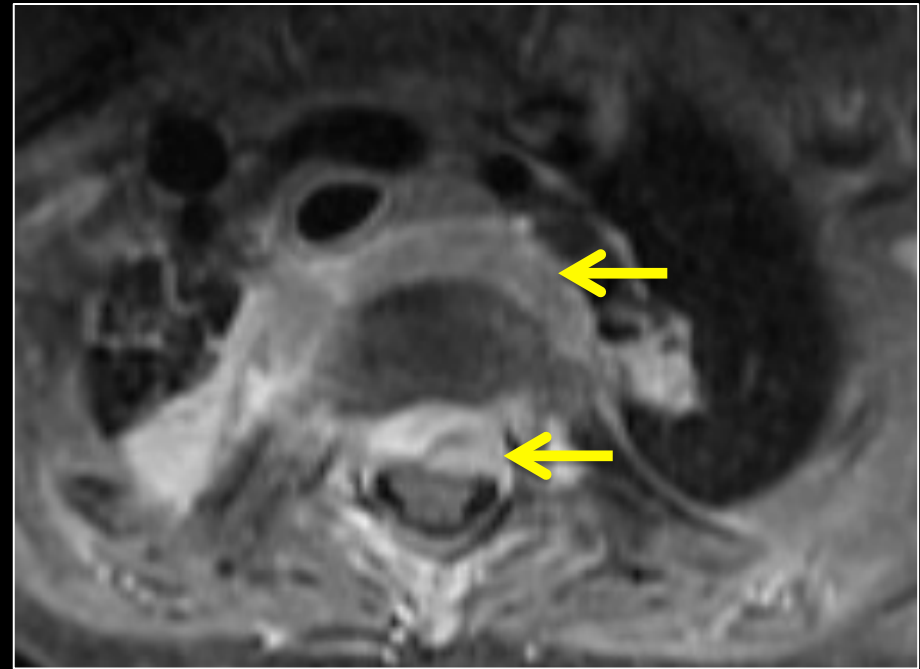


33F from India, back pain, low grade fever

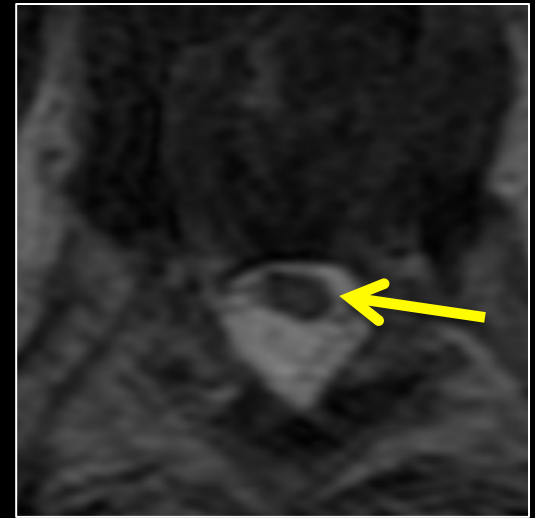
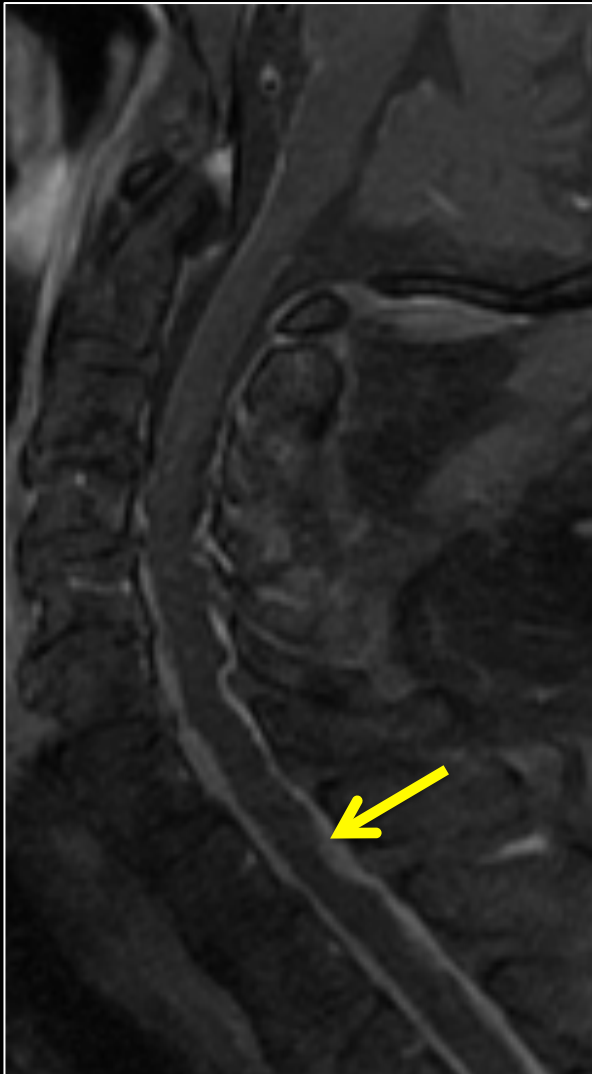
Pyogenic vs Tuberculous Spondylitis

	Pyogenic	Tuberculous
Disc	Always involved	Spared in early course of disease
Vertebral body	Spares posterior elements	Posterior elements; skip lesions
Soft tissues	Abscesses not as large	Large paraspinal abscesses; bone fragments characteristic
Spinal Segments	Usually lumbar	Usually thoracic
Spread pattern	Usually one segment	Subligamentous spread to multiple levels
Clinical Course	Acute presentation	Chronic, insidious progression

Infection Mimic: LCH



Case 3: 80M, history of recent spinal surgery, worsening back pain, LE weakness

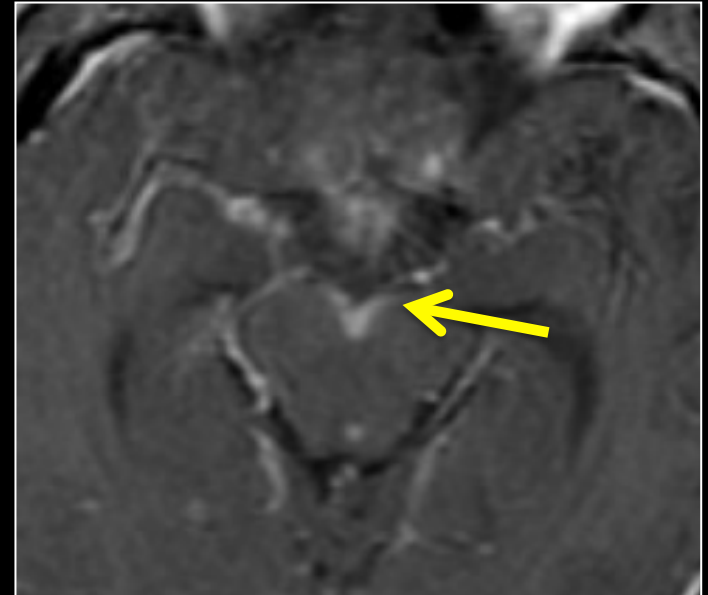
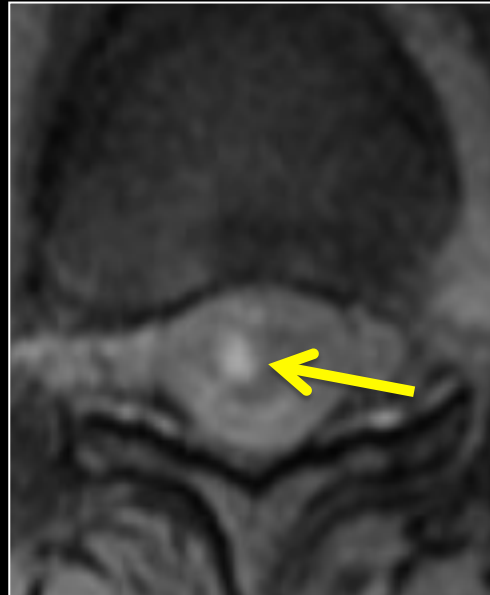
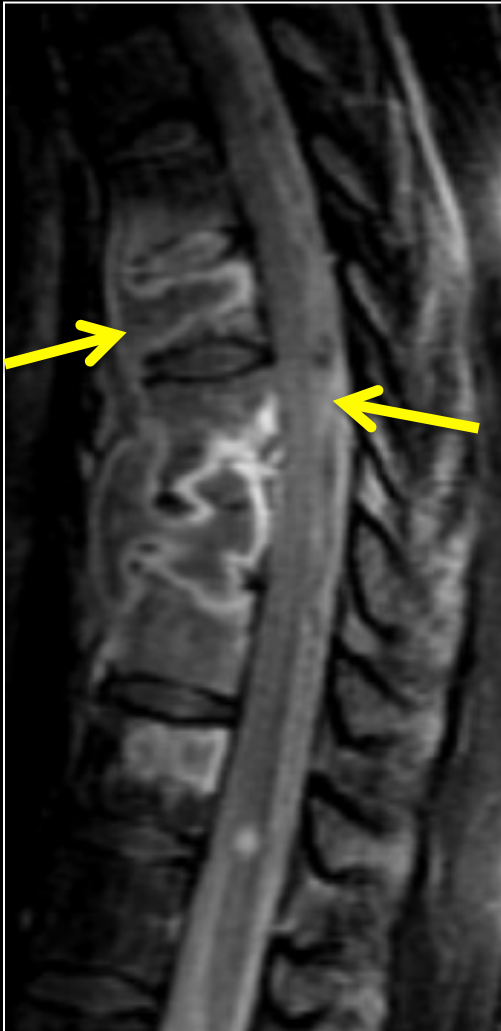


Multicompartmental Bacterial Infection



- Surgical Dx:
 - Subdural Staphylococcal abscess with cord involvement & meningoradiculitis
- Clues:
 - Multiple compartments
 - Hx of recent surgery

Case 4: 44 HIV+, Pakistani male, headache, fever, back & neck pain



Basilar Meningitis:

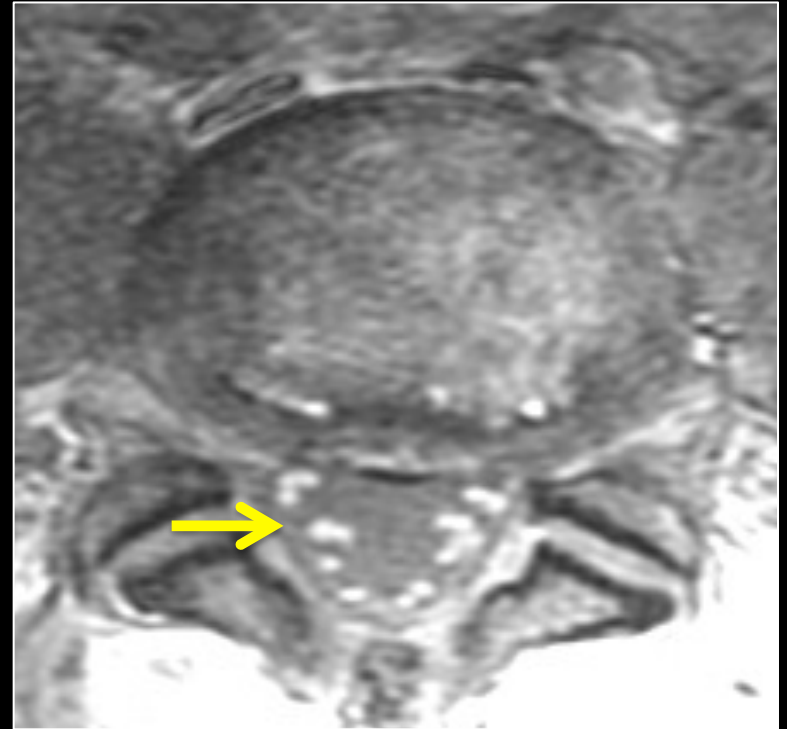
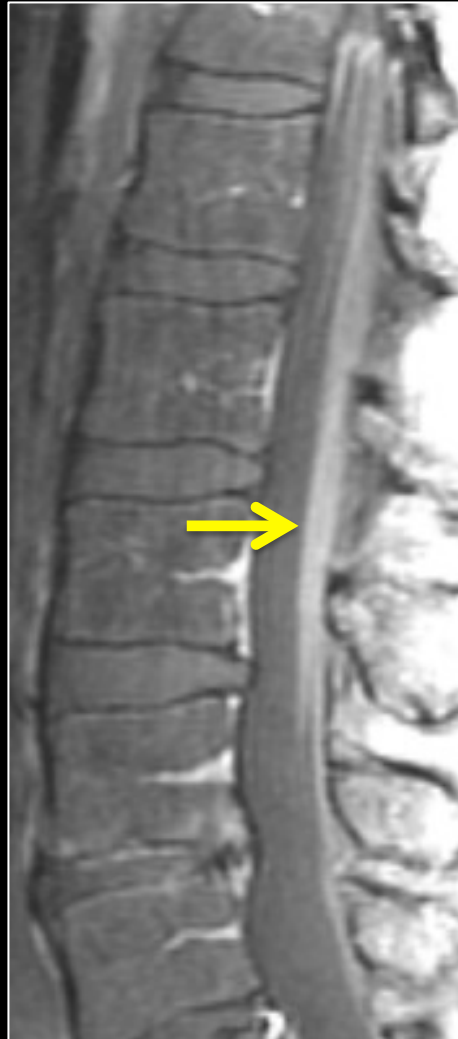
- TB, fungal
- Lymphoma
- LP carcinomatosis
- Neurosarcoïd

Tuberculous Meningitis



- Most common granulomatous spinal meningitis
 - +/- myelitis, radiculitis
- Clinical clues:
 - Hx TB, endemic, AIDS
- Imaging clues:
 - Avid LP enhancement
 - Co-existing disc/osteo.
 - Image brain, lungs
- CSF confirms dx

Case 5: 43 Male, AIDS, Acute Weakness

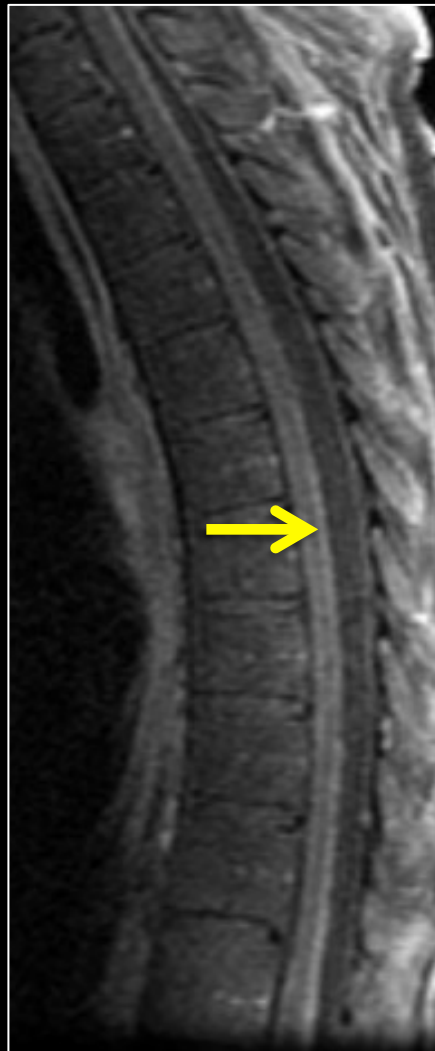
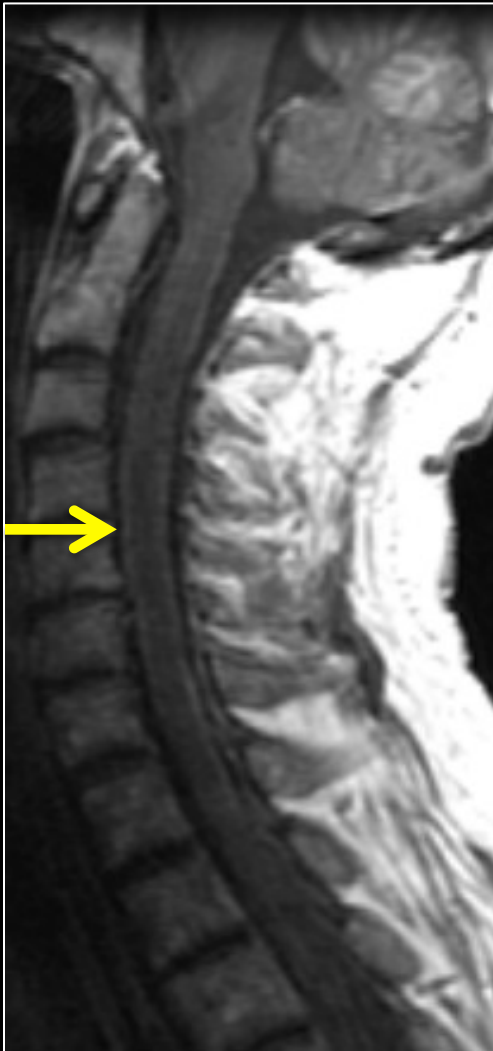


Herpes Virus: CMV



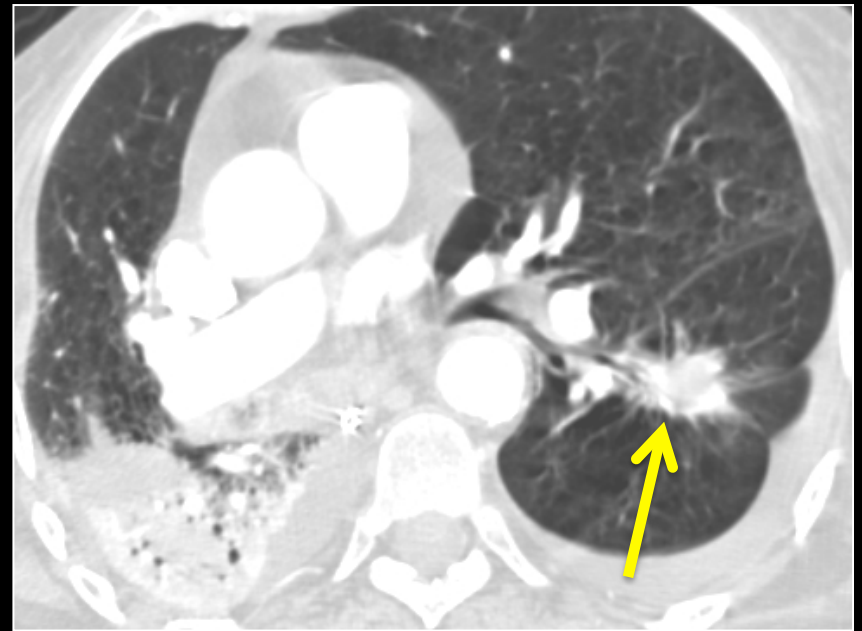
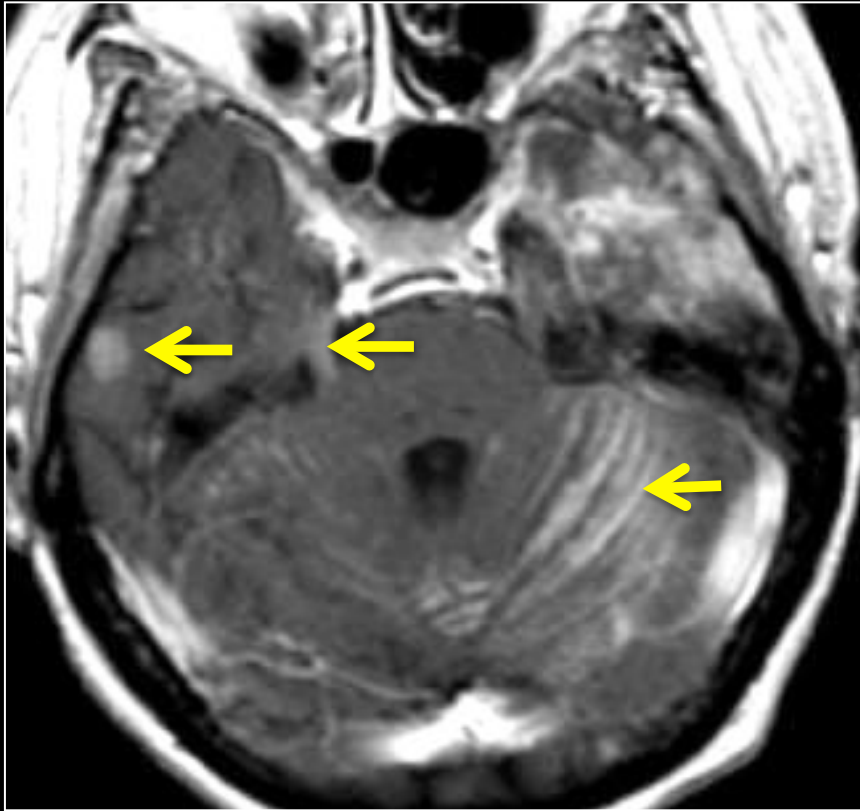
- Opportunistic, meningitis, LS polyradiculitis
- Clinical clues:
 - (Sub)acute ascending flaccid paralysis of lower limbs in immunocompromised patient
- Imaging Clues:
 - Involvement of nerve roots
 - *Smooth* cauda equina & pial enhancement
 - Look for brain involvement

Infection Mimic: Carcinomatous Meningitis

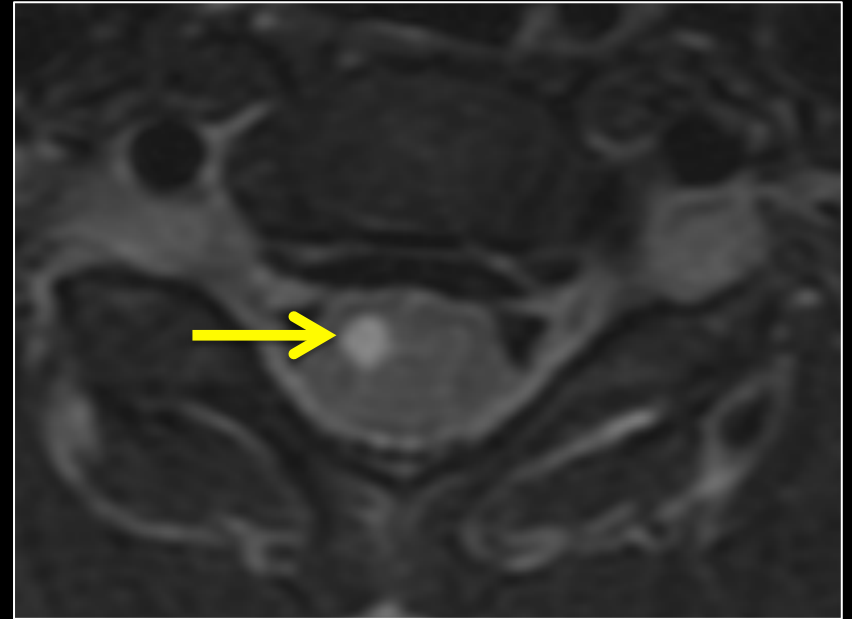
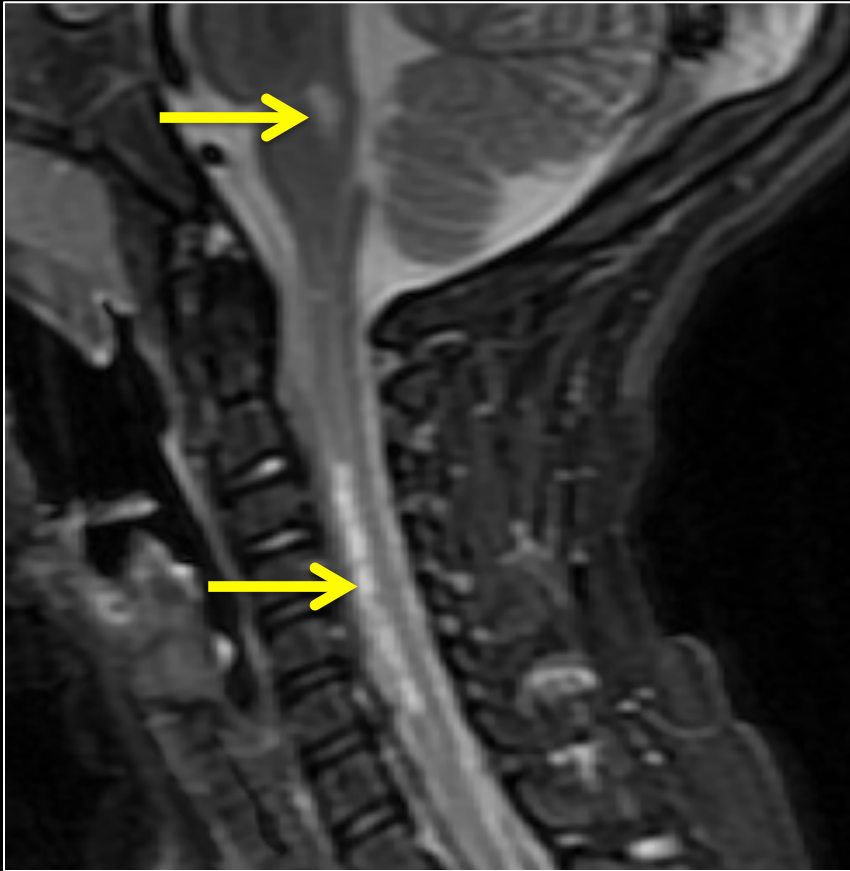


**58M Smoker
Cough &
Weakness**

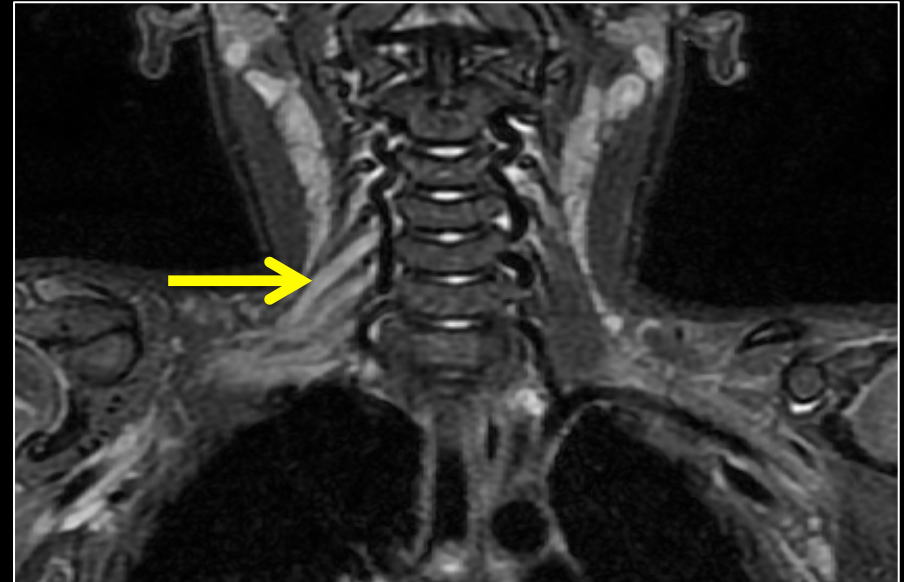
Infection Mimic: Carcinomatous Meningitis



Case 6: 3-year-old boy with right arm acute flaccid paralysis

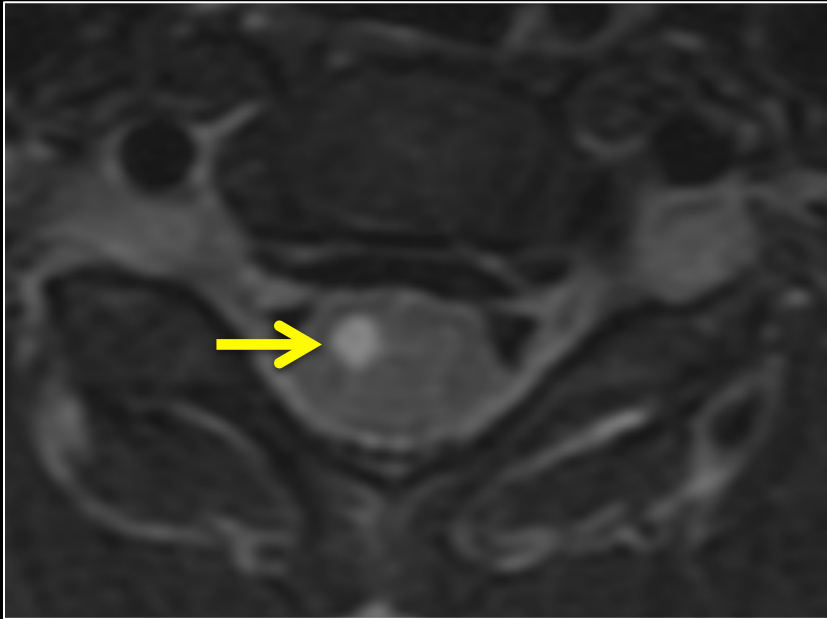


Enterovirus- Poliomyelitis



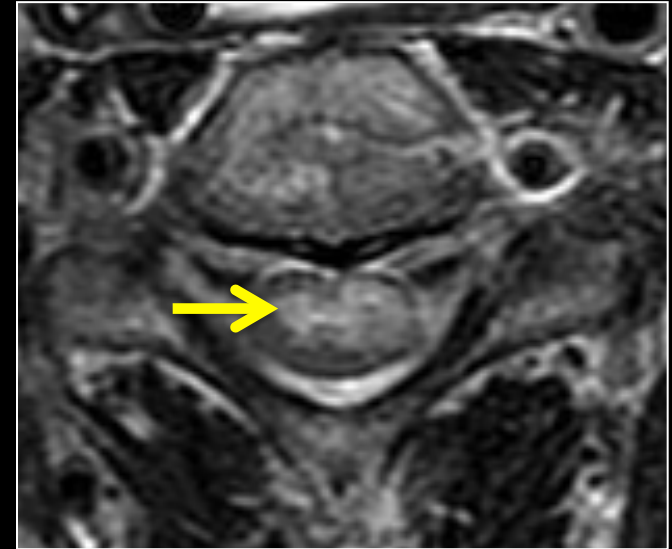
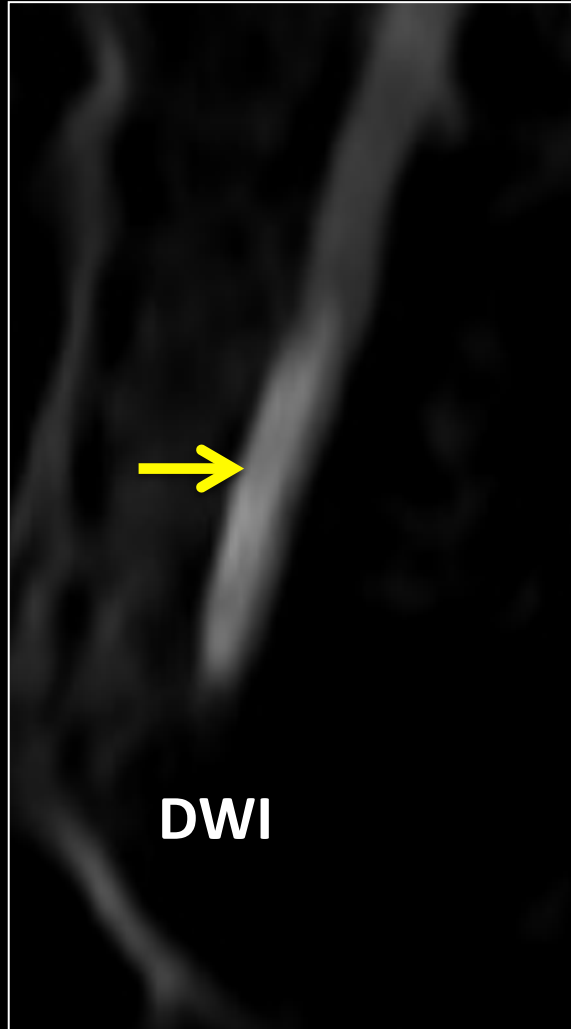
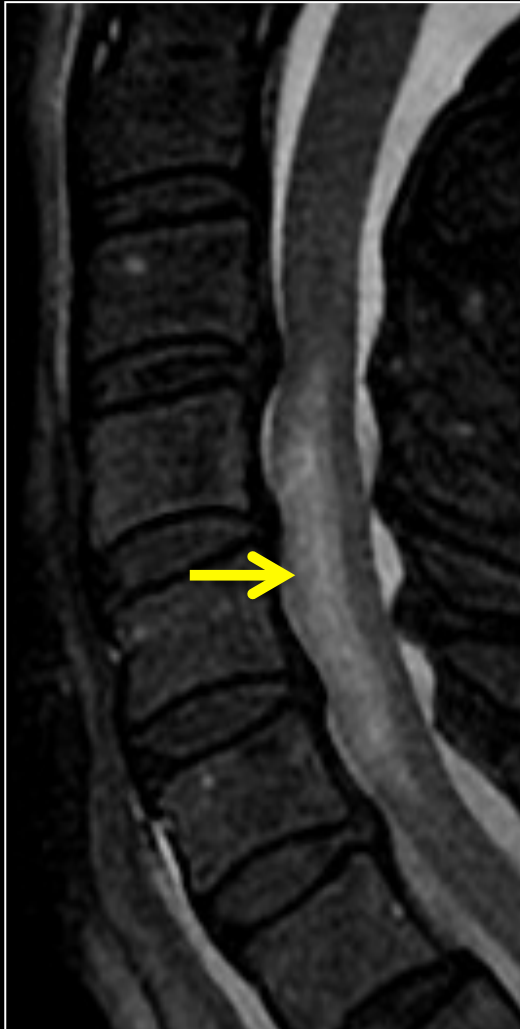
**3M Right Arm Acute
Flaccid Paralysis**

Enterovirus



- Clinical Clue:
 - Young patients
 - Acute flaccid paralysis
- Imaging Clues:
 - Anterior horn cells
 - Co-existing encephalitis
 - Co-existing nerve root enhancement

Infection Mimic: Spinal Cord Infarction

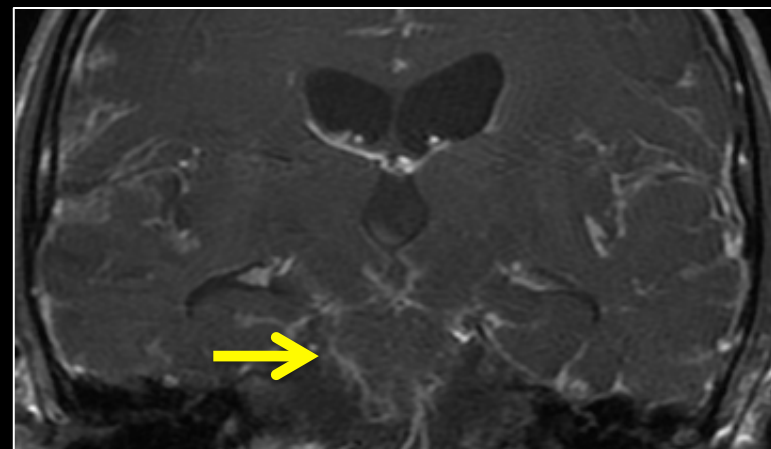
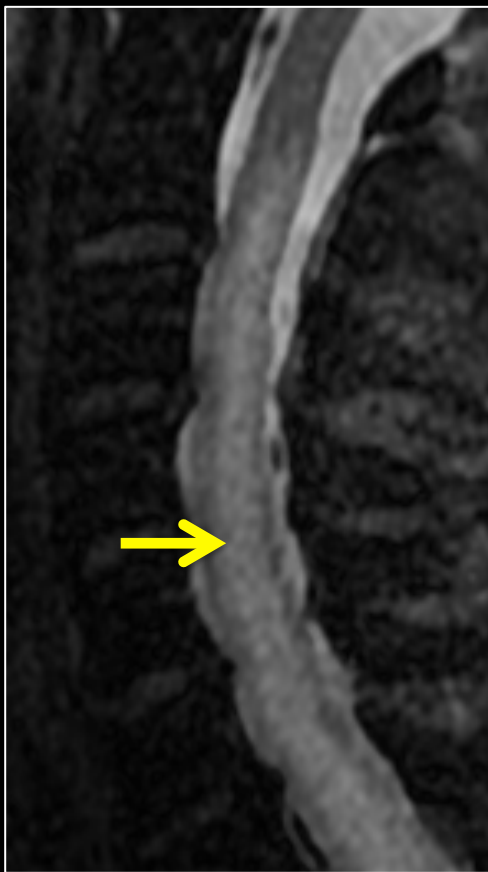


82F acute quadriparesis

Imaging of Myelitis

- Viral etiologies most common
- Classic lesion on imaging is that of transverse myelitis:
 - Predominantly central
 - Extends over more than 2 segments
 - Involves more than 2/3 of cross sectional area of cord
- Cord expansion may be present, +/- enhance
- If immune compromised: CMV, HSV, VZV
- If clinical sx are episodic or fluctuating then it is usually not SCI (except cysticercosis)

Case 7: 66 Male, HIV+, 3d hx left buttock rash, numbness, weakness, S2 & S3 dermatomes, urinary retention



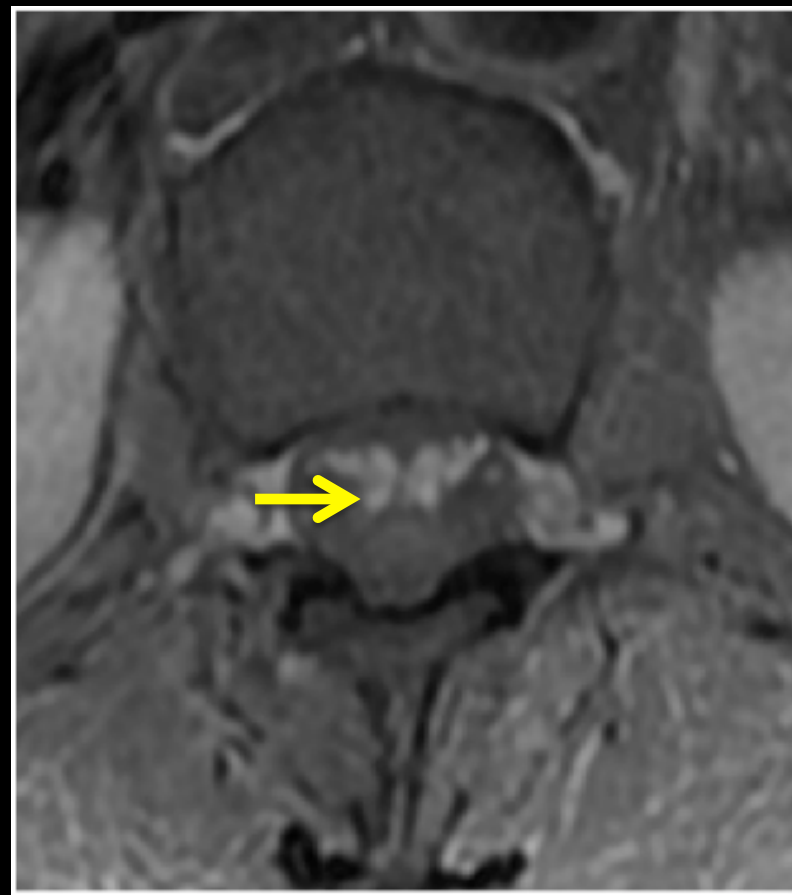
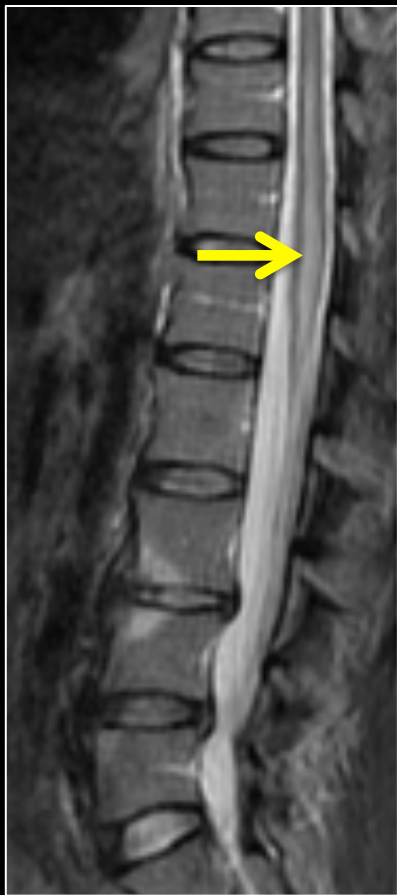
Herpes Virus: VZV Meningoradiculomyelitis

- Clinical clues:
 - Dermatomal rash
 - History of shingles
 - Immunocompromised
- Imaging clues:
 - Multicompartmental spine & brain involvement
 - LP & parenchymal
 - Vasculopathy in brain



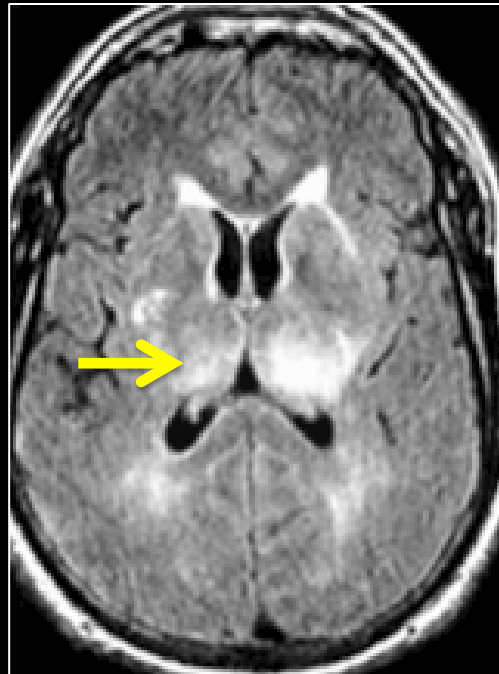
CSF: lymphocytic pleocytosis
PCR+ for Varicella zoster
RX: Acyclovir and steroids

Case 8: 47 F, RA, Subacute onset LE Weakness



West Nile Meningoradiculomyelitis

- Clinical Clues:
 - Radiculitis
 - Poliomyelitis like syndrome
 - Endemic region
- Imaging Clues:
 - Ventral nerve root & conus enhancement
 - Anterior horn cell involvement
 - Look for associated encephalitis



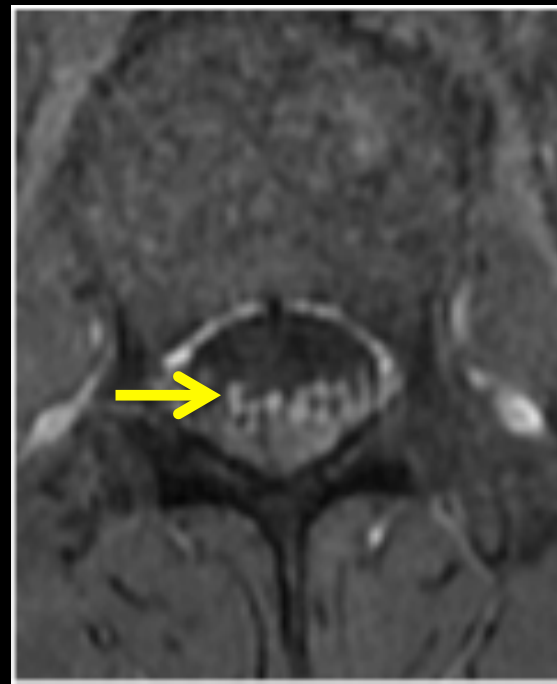
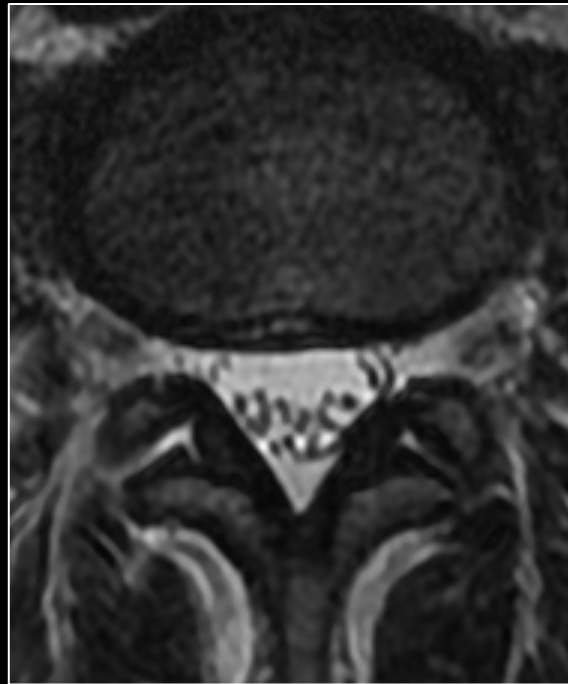
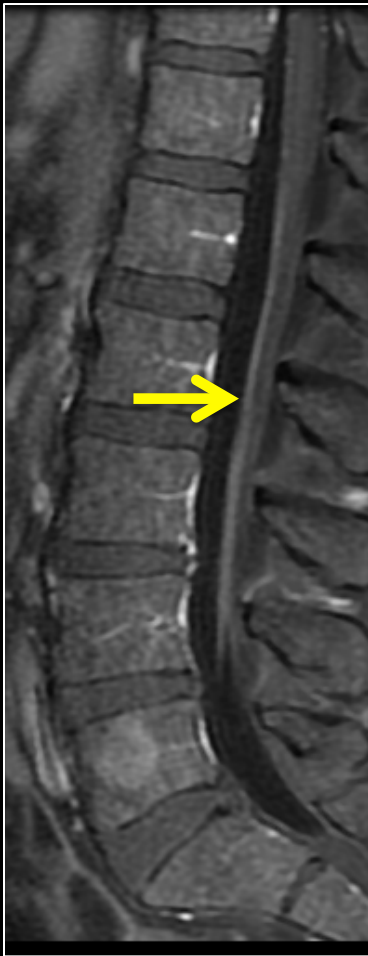
**47 yo with RA presenting with short-onset
paraparesis
IgM + for West Nile**

West Nile Virus

- Arbovirus – arthropod borne
- Infects birds, humans, & vertebrates
- Africa, E. Europe, Asia & Middle East
- Closely related to St. Louis & Japanese encephalitis viruses

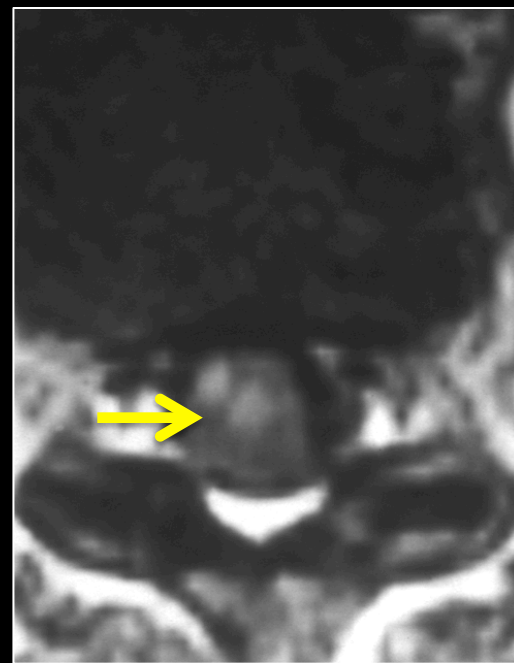
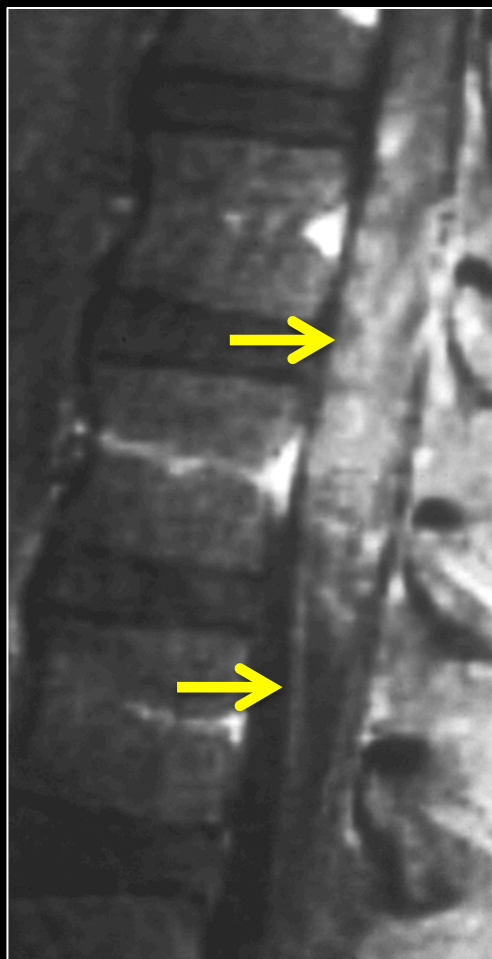
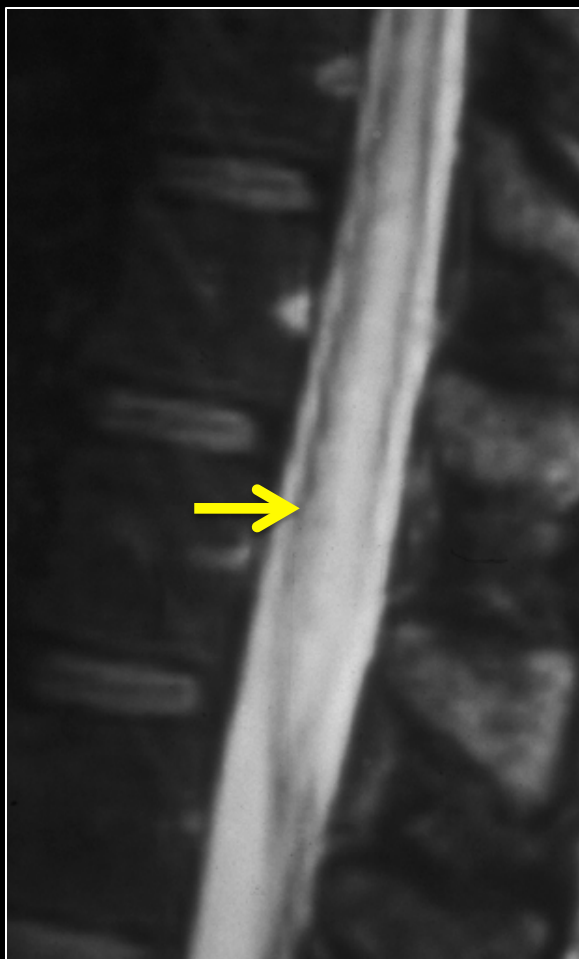


Infection Mimic: AIDP

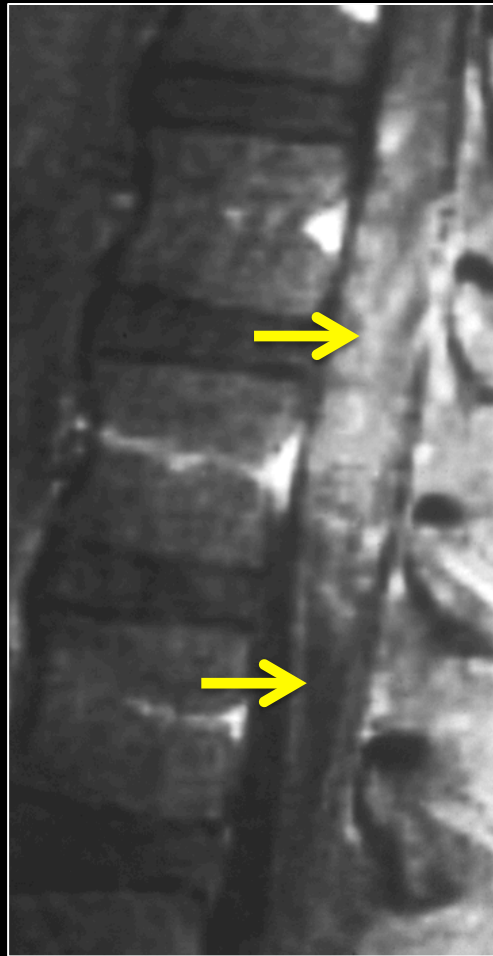
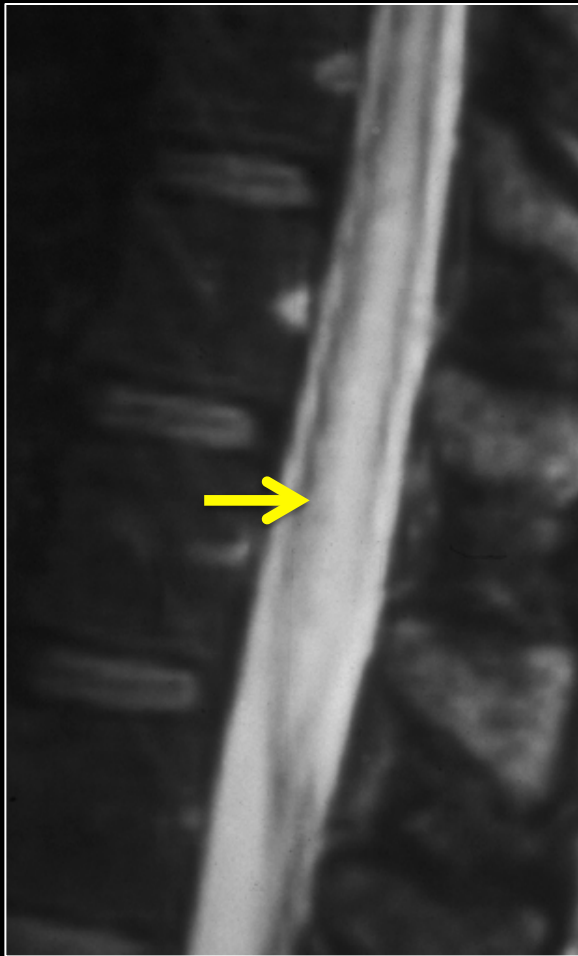


**37M ascending paralysis
2 weeks post-viral infection**

Case 9: 50 M from Africa, Progressive LE Weakness

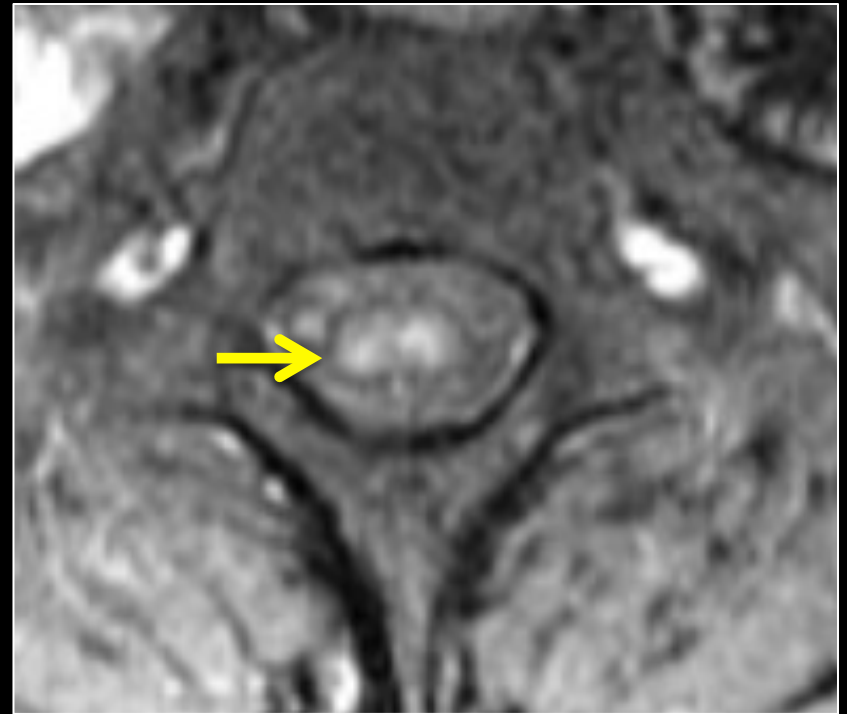
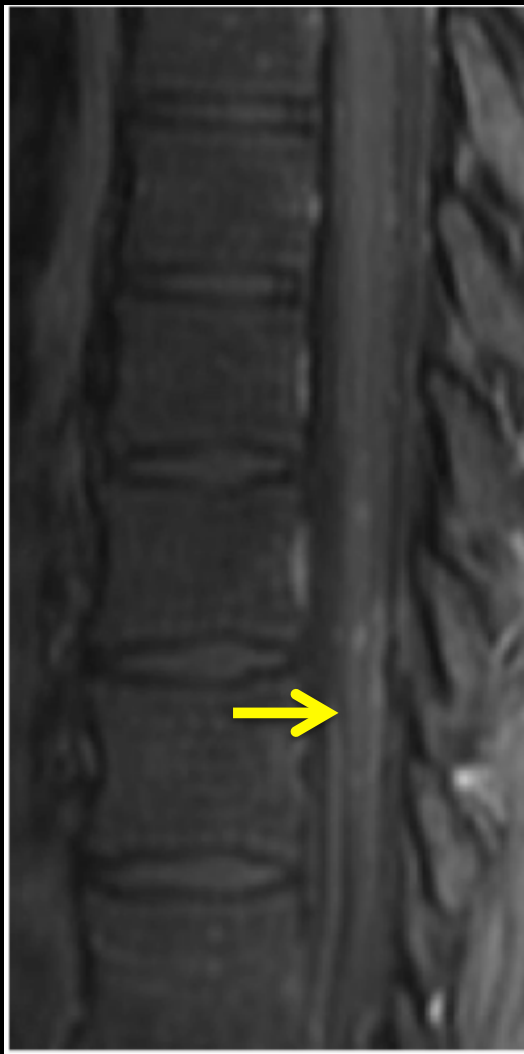


Schistosomiasis



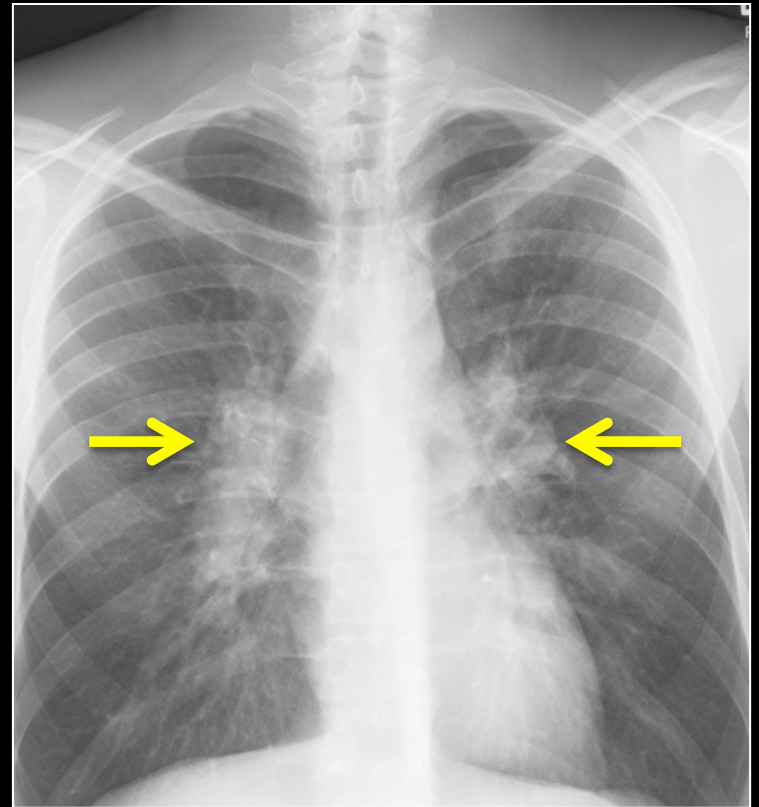
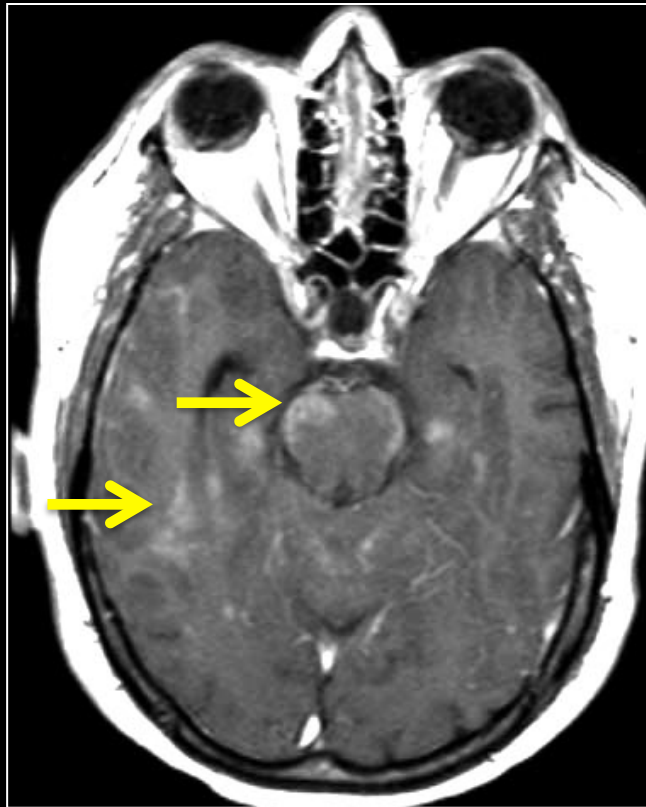
- Clinical Clue:
 - Pt from endemic area
- Imaging Clues:
 - Conus involvement
 - Central linear enhancement with surrounding nodules

Infection Mimic: Sarcoidosis

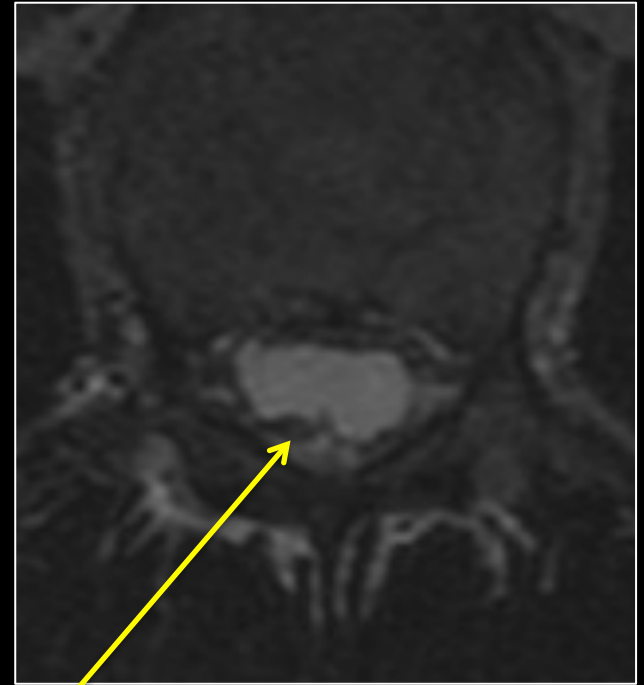
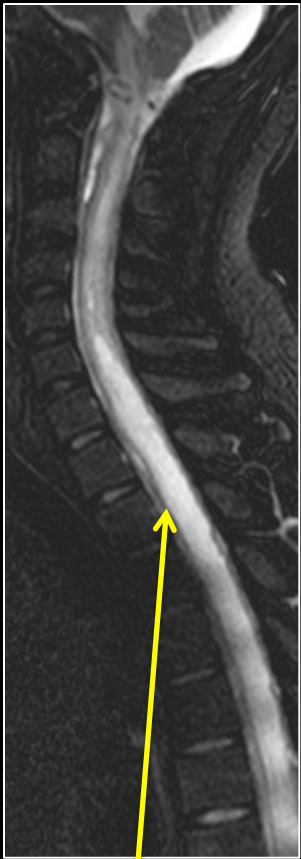


37M LE weakness

Infection Mimic: Sarcoidosis



Complications of Chronic Infection



Pre-syrinx
Chronic Cocci.

Arachnoiditis
Neurocysticercosis

Take Home Points

- Imaging diagnosis of spinal infections is challenging
- By knowing answer to 3 questions you can make an accurate imaging diagnosis of spinal infection
- Recognizing infection & localizing it accurately more important than identification of specific organism
- Contrast enhanced MRI a must!
- Consider infection mimics in differential dx.

3 Questions to Ask

- *Is there involvement of multiple or single spinal compartments?*
 - *If VB involved, is there endplate destruction & disc involvement?*
- *Is there concomitant brain or other organ involvement?*
- *Is patient immunocompromised? (other clinical data: travel hx, time course)*

Thank You

- **Questions???**
- **Contact: Vinil.shah@ucsf.edu**