

The spine: Inflammatory disc disorders and mimickers



Cliniques universitaires
SAINT-LUC
UCL BRUSSELS

Objectives

- pyogenic discitis
- non-pyogenic discitis
- aseptic inflammatory discitis
- mimickers

Beyond our scope

- Non-haematogeneous infection
(post-operative, contiguity)
- Unusual locations
 - Peridural space infection
 - other joints (zygapophyseal, costo-vertebral and SI joints)
- Unusual germs
- Treatment monitoring
- Imaging of complications

By the end of this presentation, you should

- Recognize specific signs of discitis
- Be familiar with hints and tricks
 - to detect early discitis (False -)
 - to recognize mimickers (False +)

Case 1 64-y-o male ; Chest radiograph for dyspnea



Radiographic features of acute pyogenic discitis

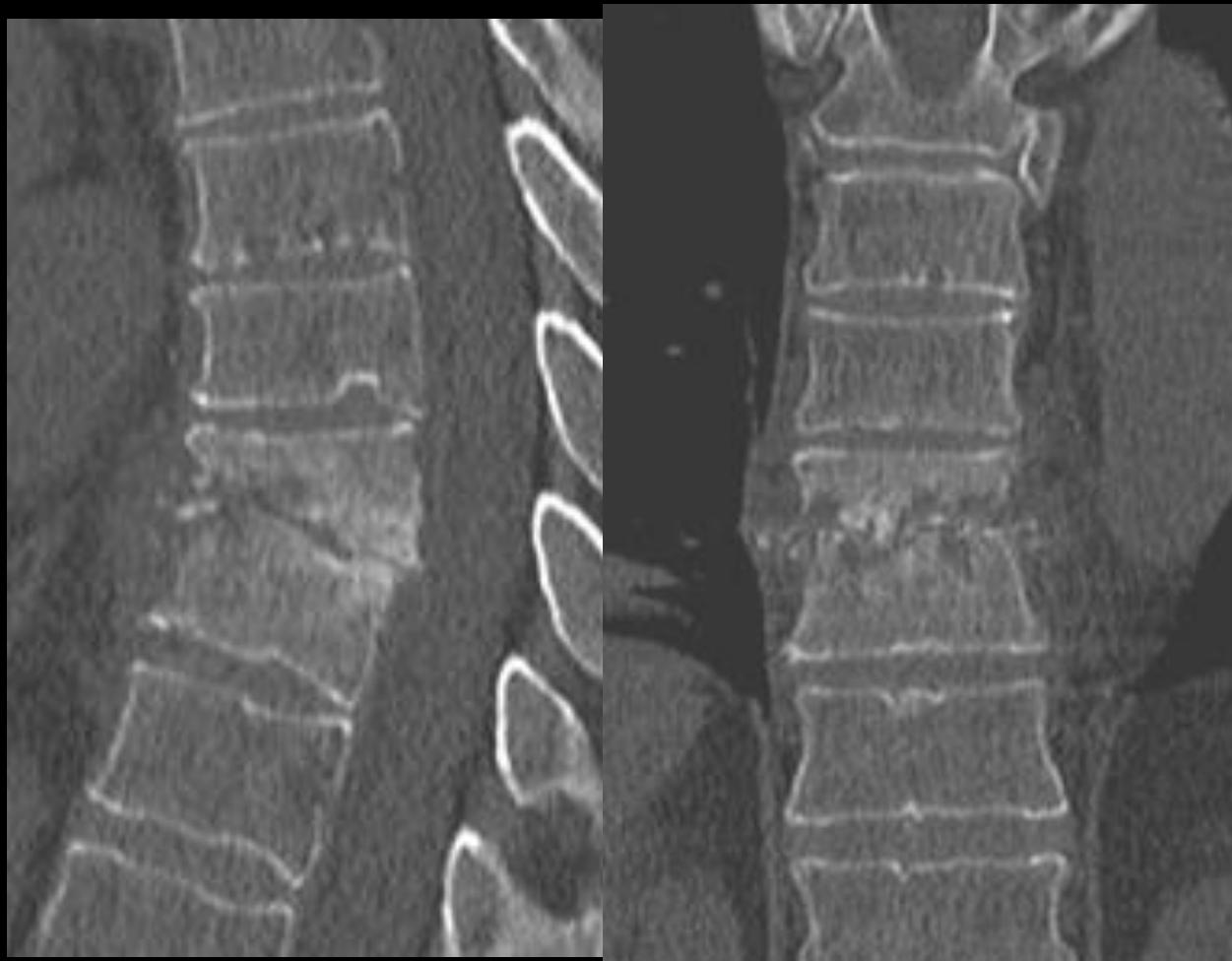


Destruction of

- * intervertebral disk
- * vertebral bone plates

no bone remodeling

CT features of acute septic discitis



- * Soft tissue swelling
- * Destruction of intervertebral disk
- * Destruction of adjacent bones

MR features of acute septic discitis

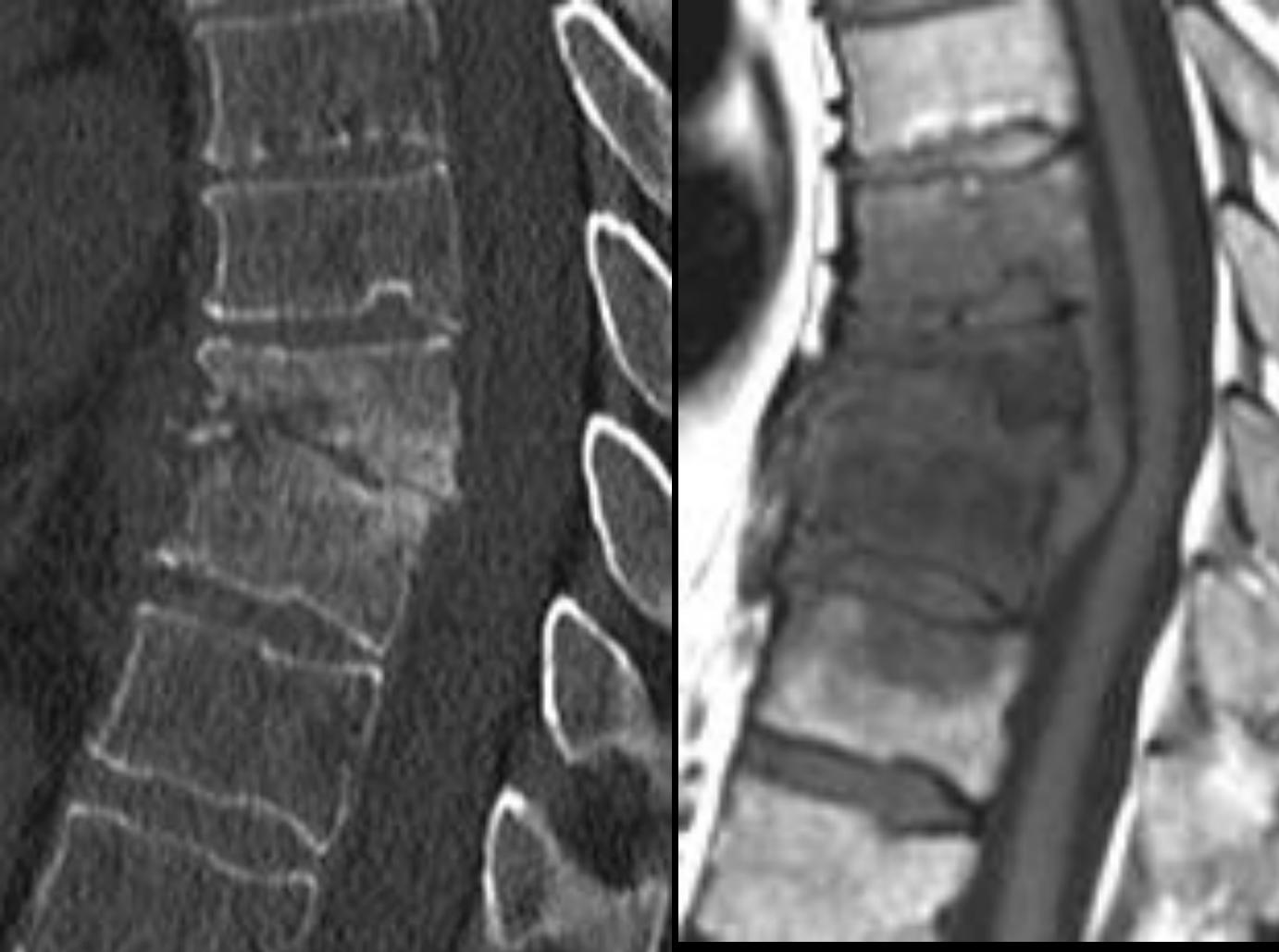


SE T2

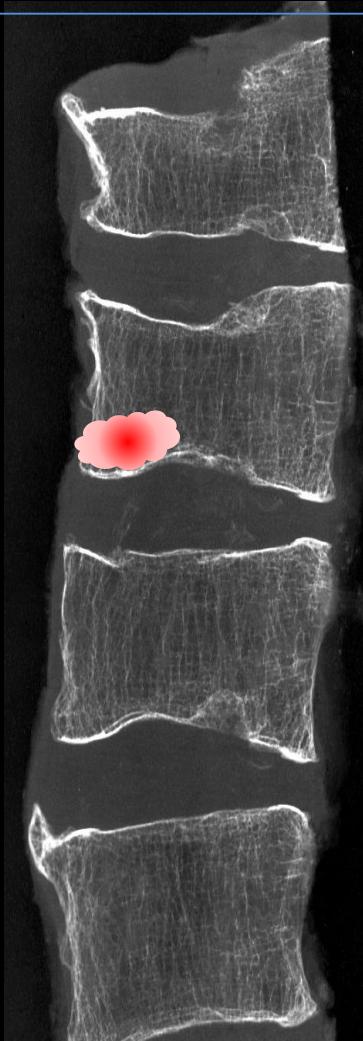
- * Bone marrow changes
- * Soft tissue swelling
- * Destruction of intervertebral disk



MRI is superb for detection of
Bone marrow changes
soft tissue changes (



Time course of pyogenic discitis (10 days)

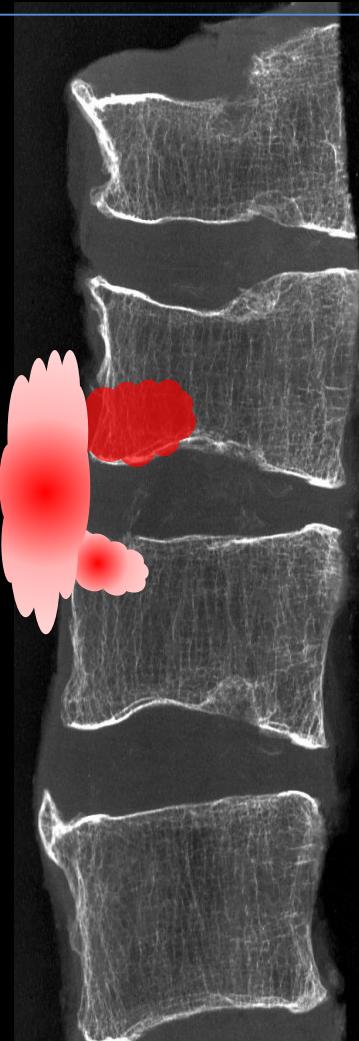


Germs seeding
at periphery
of vertebral body

Time course of pyogenic discitis (10 days)

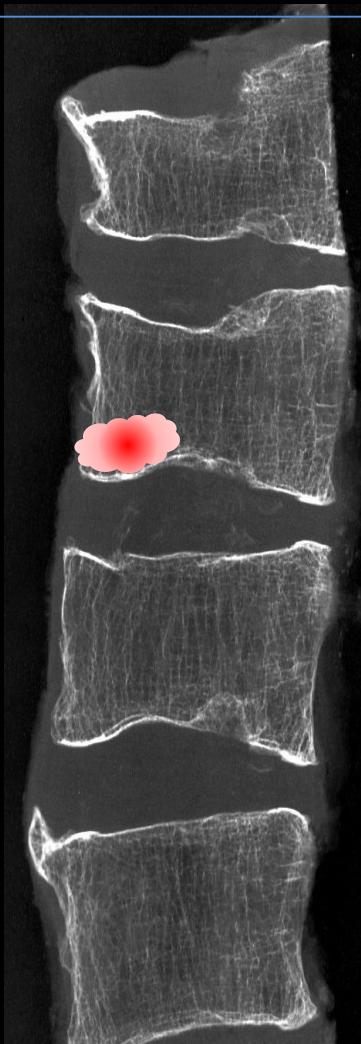


Germs seeding
at periphery
of vertebral body

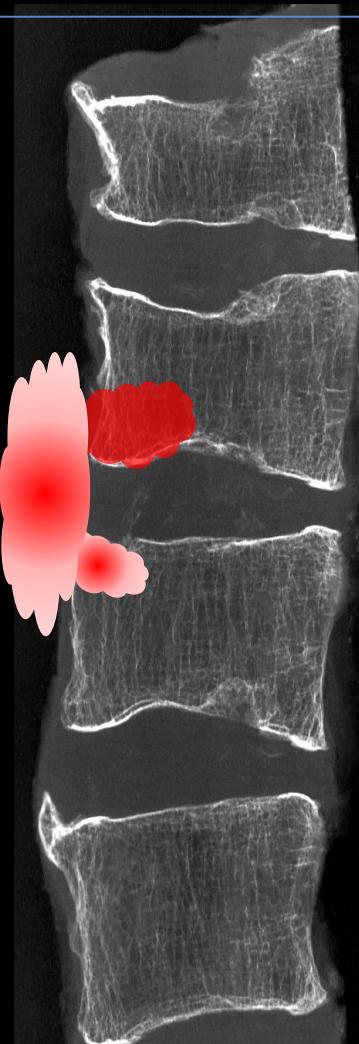


Fast spreading
In adjacent
Soft tissues
vert. bodies

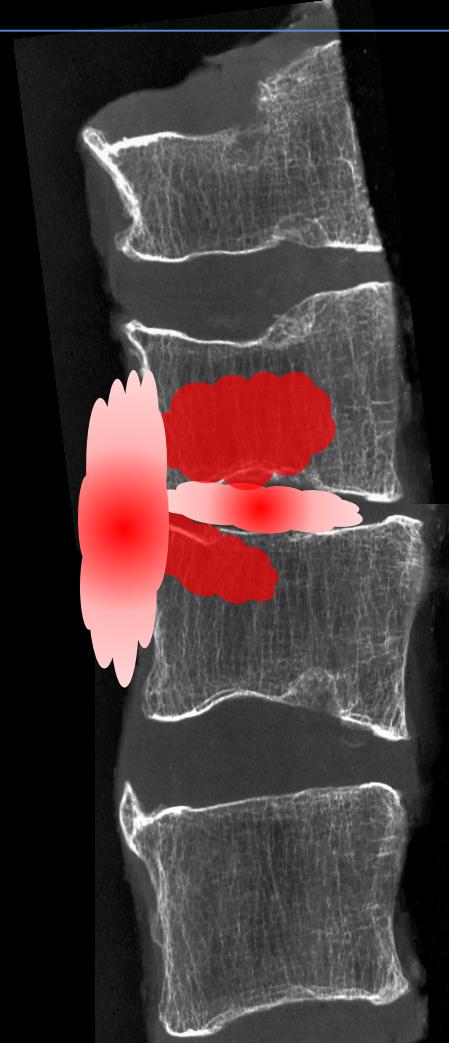
Time course of pyogenic discitis (10 days)



Germs seeding
at periphery
of vertebral body



Fast spreading
In adjacent
Soft tissues
vert. bodies



« Late »destruction of
disk

Specific signs of pyogenic discitis

- Paraspinal/epidural inflammation (98%)
- Fluid-like SI on T2 in disk (96%)
- Vertebral end-plate erosion (84%)

Non specific signs of pyogenic discitis

Decreased disk height (52 %)

Very low SI on T1 in disk (30 %)

multiple levels (16 %)

To recognize disc infection, look at

- Para spinal / epidural soft tissues
- Disk signal intensity on T2
- Vertebral bone plate and bone marrow

Soft tissue changes in

Pyogenic Infection

- At distance from disk
- Ill-delimited
- Variable thickness
- Avascular /Abcess

Aseptic disk disorder

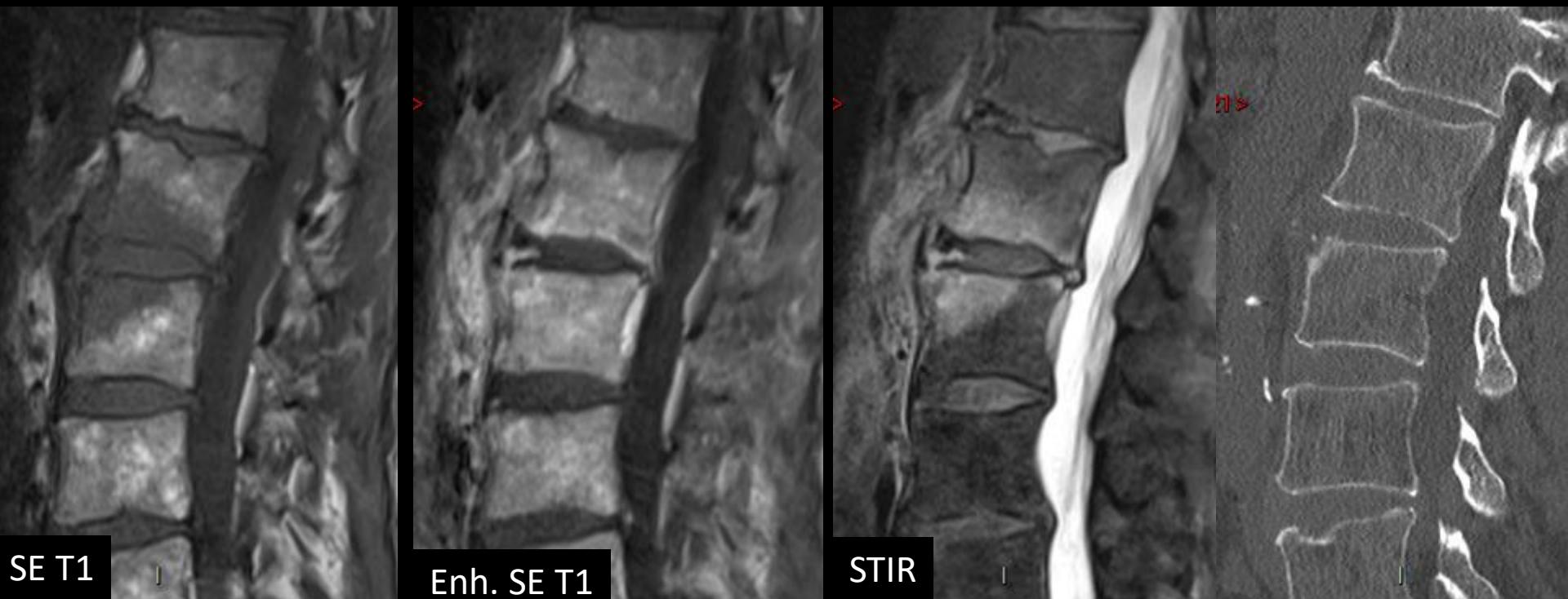
- Limited to peri-discal space
- Well-delimited
- Soft tissue thickening < 10 mm
- enhancement / No abcess

Soft tissue infiltration

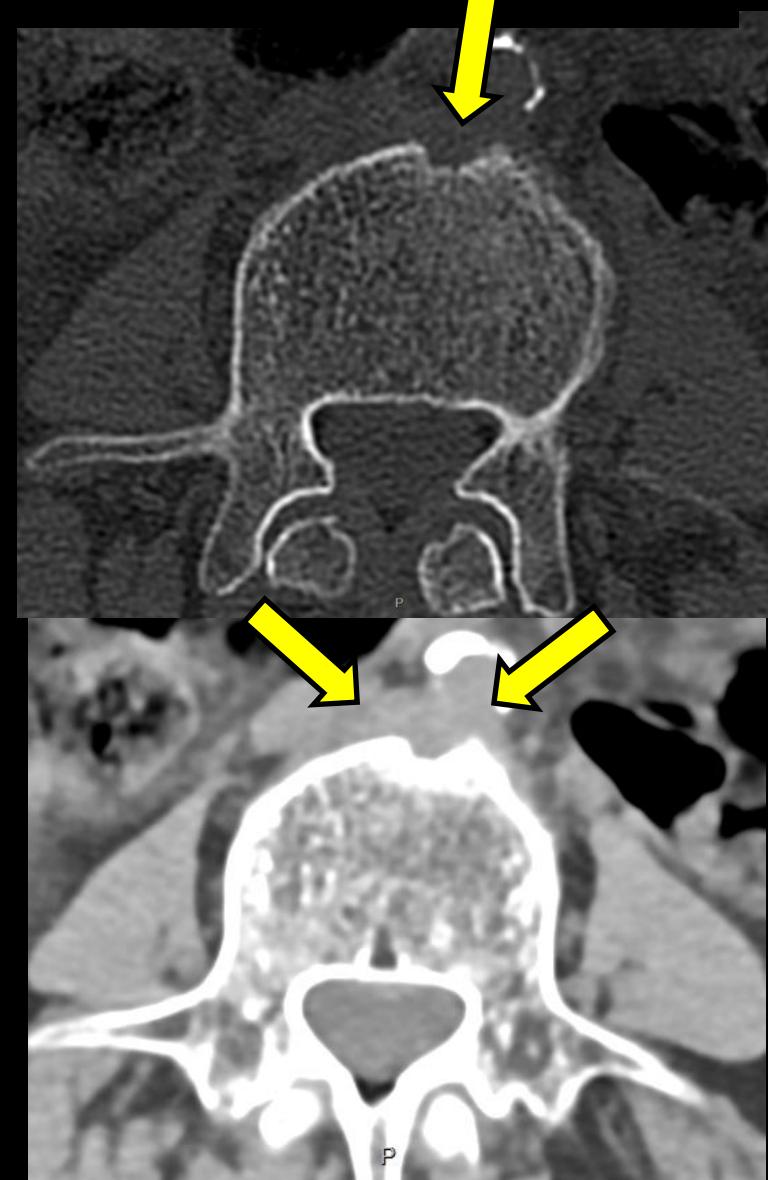
Early indicator of pyogenic discitis

MRI superior to CT

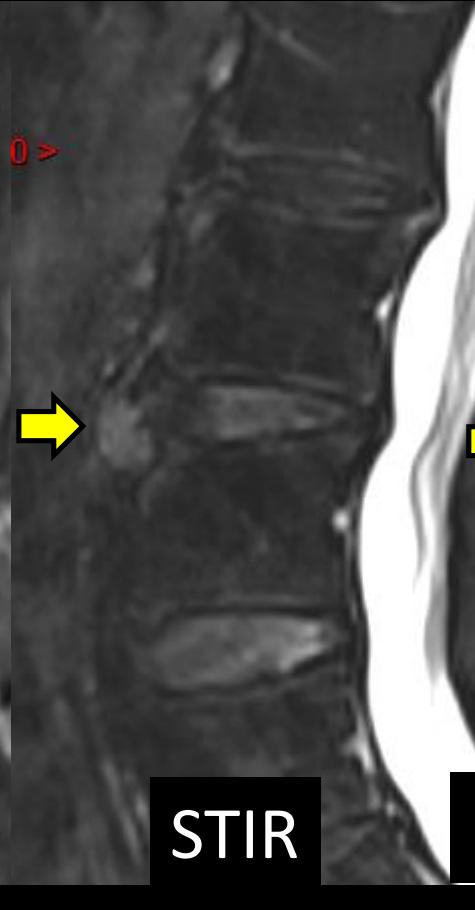
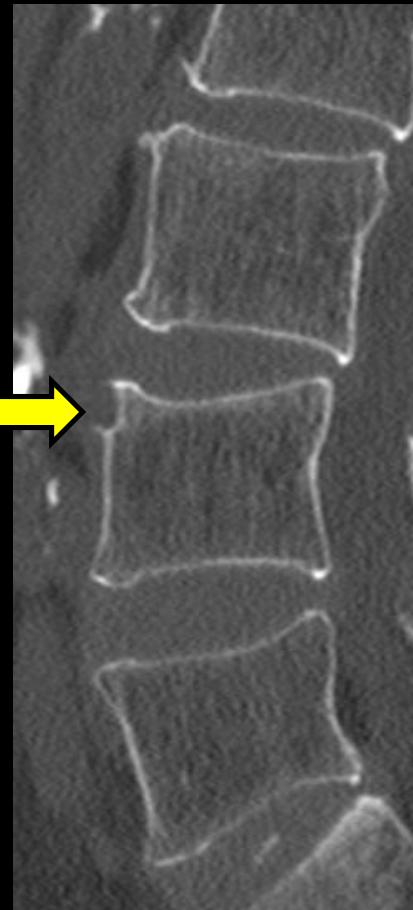
Value of fat-saturated sequences



66-year-old woman; chronic lombalgia
Marginal erosion ? Discitis ?



66-year-old woman; chronic lombalgia
Marginal erosion ? No discitis, disc herniation



SE T1

STIR

Enhanced T1

No/limited enhancement
No edema-like changes

- En miroir marrow changes
- Soft tissue changes

- * asymetrical marrow change
- * normal soft tissues



SE T1

STIR

Early discitis



SE T1

SE T2

Spontaneous fracture

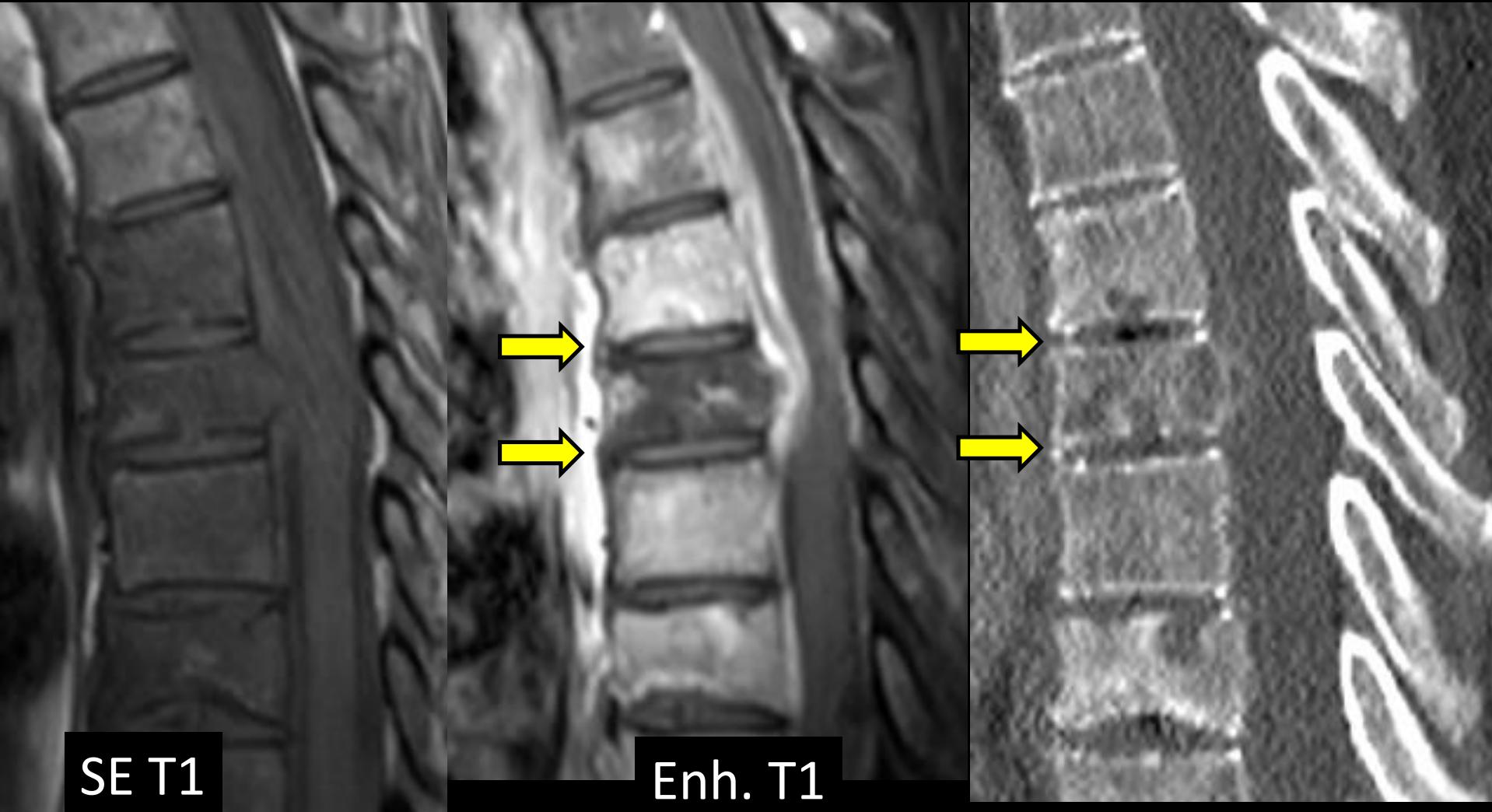
70-year-old woman; pain, altered blood test
Discitis ?



70-year-old woman; pain, altered blood test
Discitis ? Tumor spread !



Good disc, bad news (tumor)
Bad disc, good news (infection)



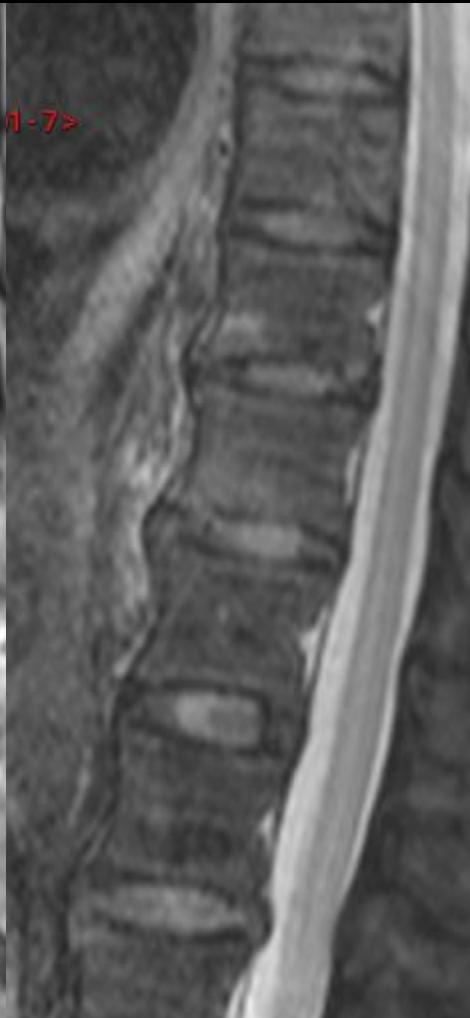
How to optimize the detection of soft tissue changes ?

1. Fat-saturated sequences
2. Look at para-sagittal images
3. Obtain coronal fat-saturated images

Value of Fat-sat. enh. T1-W for detection of Sft tissue infiltration



SE T1

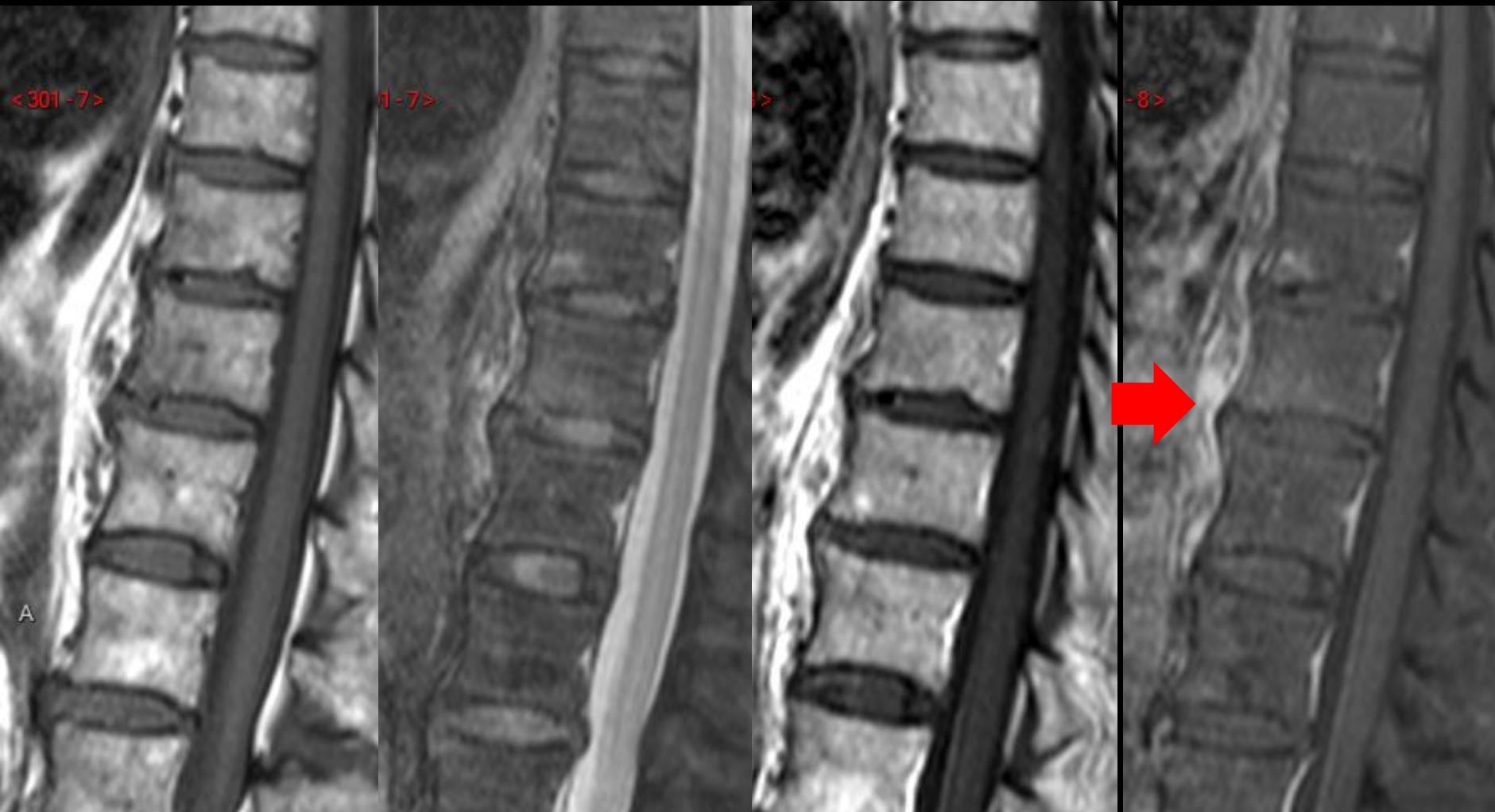


STIR



Enh. T1

Value of enh. fat-sat. T1 for detection of soft tissue infiltration



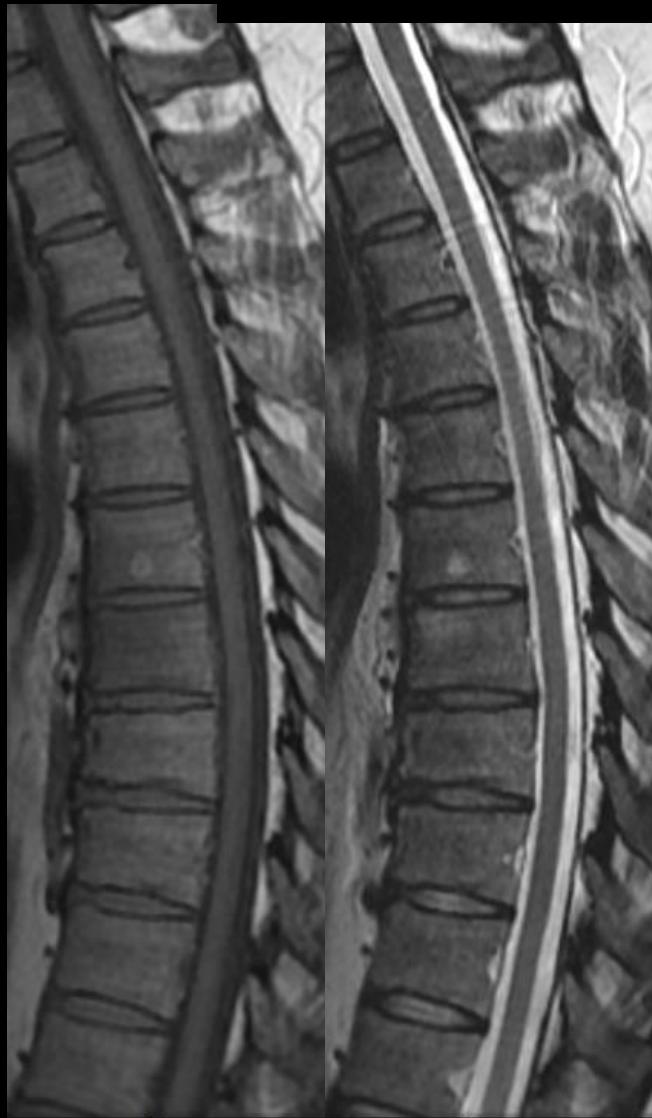
SE T1

STIR

Enh. T1

Enh. Fat sat T1

Detection of extension of soft tissue infiltration



SE T1

SE T2

Detection of extension of soft tissue infiltration

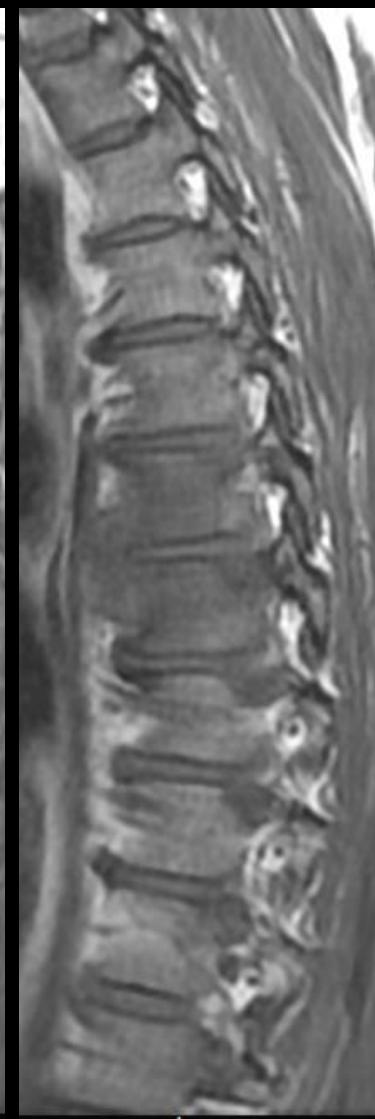
!! Pay attention to the most lateral sections !!



SE T2



SE T1

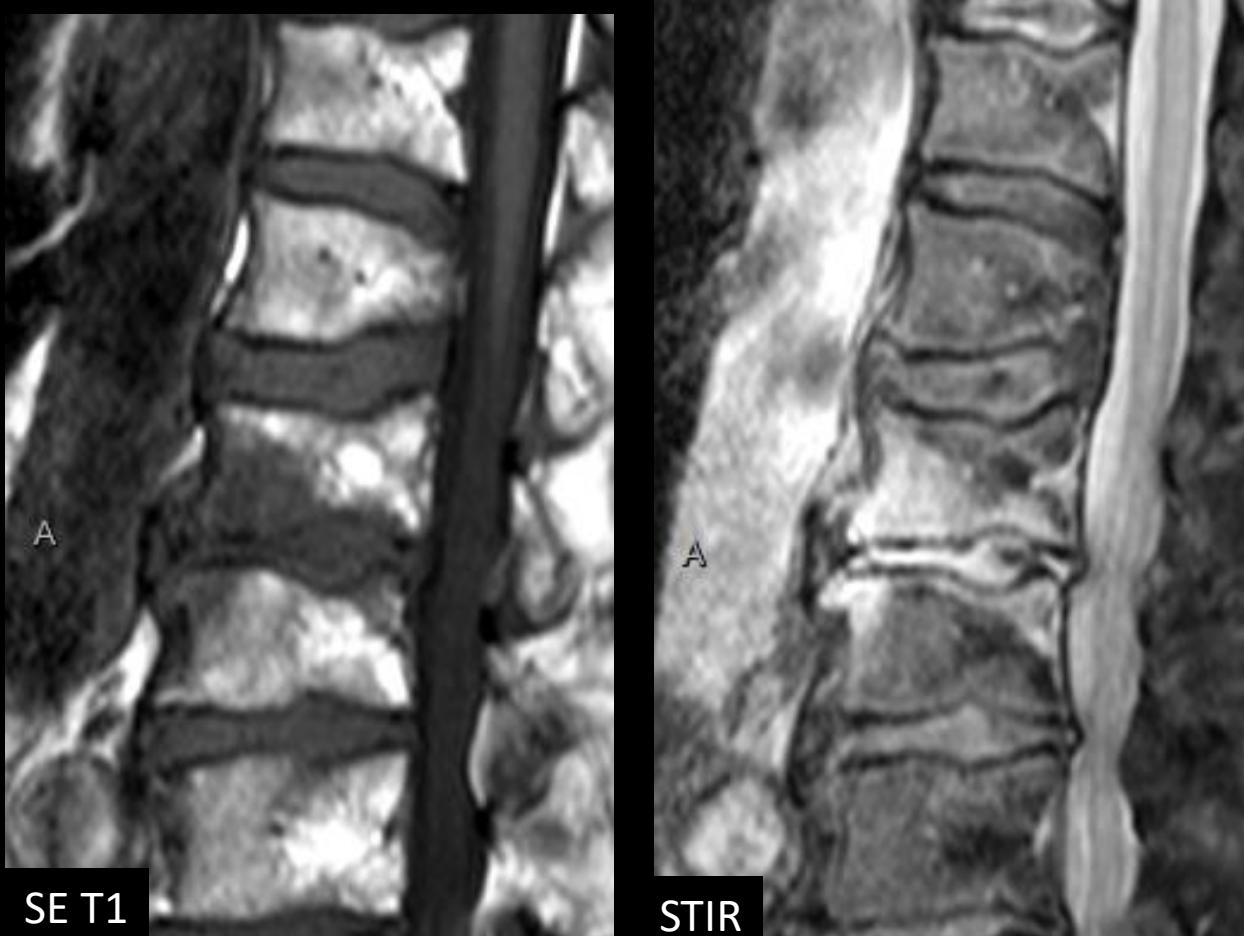


SE T1



SE T1

Coronal plane for detection of extension soft tissue infiltration



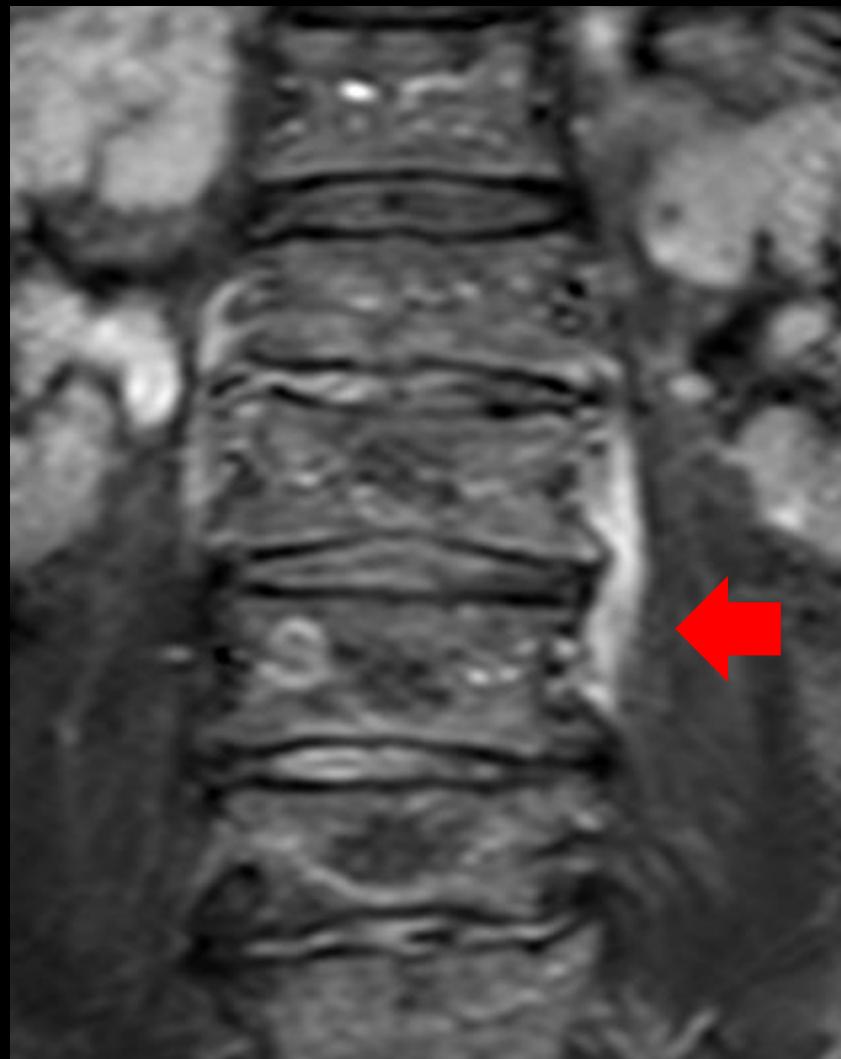
Septic discitis

- * Bone marrow infiltration
- * Disk destruction (high signal)
- * Soft tissue changes ?

Coronal plane for detection of extension Soft tissue infiltration



Coronal STIR



Fat sat enh SE T1

Comment optimiser la CARACTERISATION de l'infiltration des tissus mous ?

L'atteinte des tissus mous = pathologie active

Septique

Néoplasique

Traumatique

.....

Comment optimiser la CARACTERISATION de l'infiltration des tissus mous ?

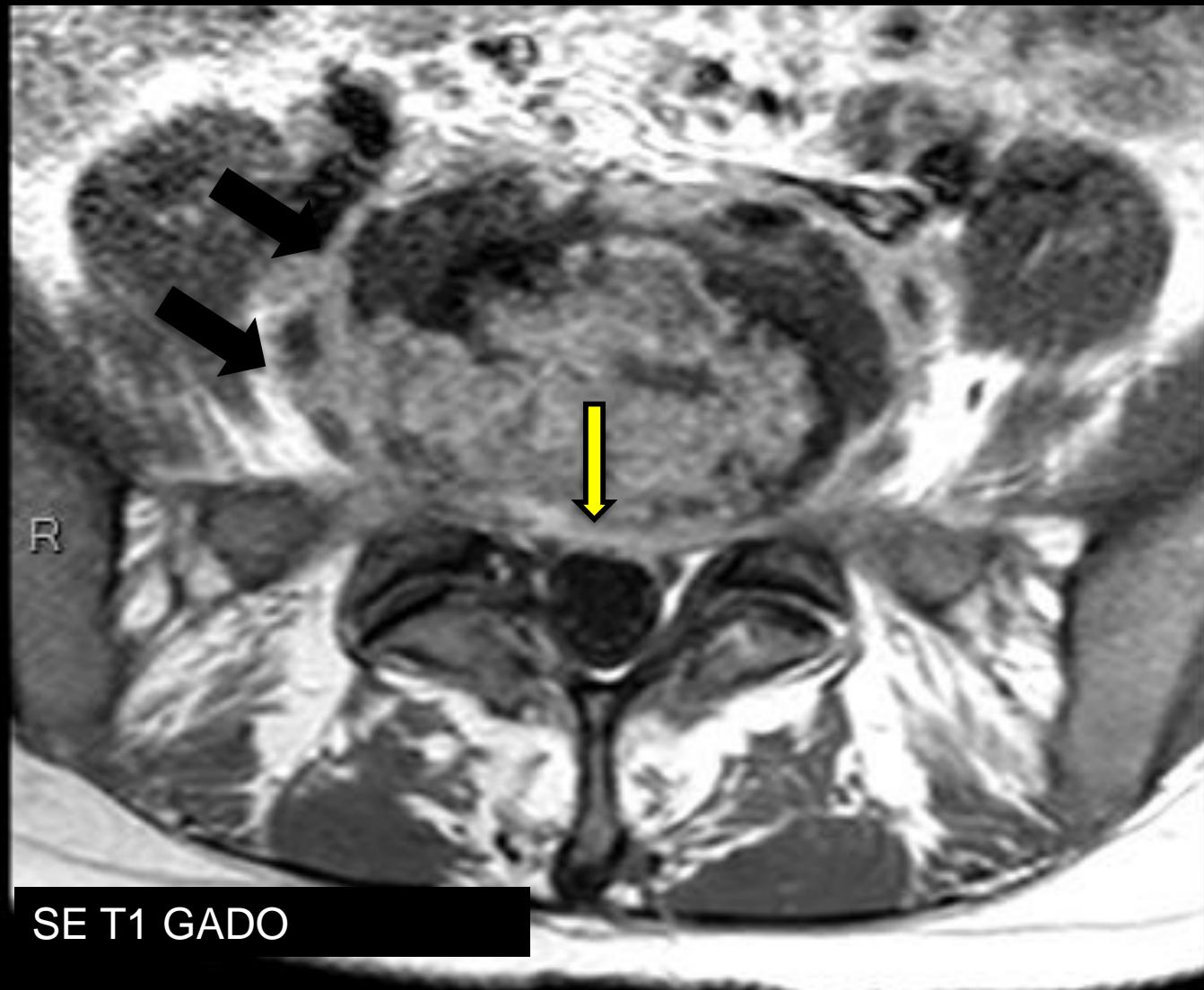
Tissus mous	Septique pyogène	Néoplasique
Débord transverse	Global	Parfois focal
Débord longitudinal	Extensif, distal	Limité, focal
Aponévroses adjacentes	détruites	respectées
Vaisseaux adjacents	En place	déplacés
Nécrose	Tres souvent, hyper T2	Souvent, signal variable

Comment optimiser la CARACTERISATION de l'infiltration des tissus mous ?

1. Effet de masse réduit (Infiltration si pyogène >< refoulement si néo)
2. Destruction des aponévroses si pyogène (Signe de l'embrase de rideau si néo)
3. Abcès si pyogène (nécrose tumorale si néoplasique)

Débord dans tissus mous

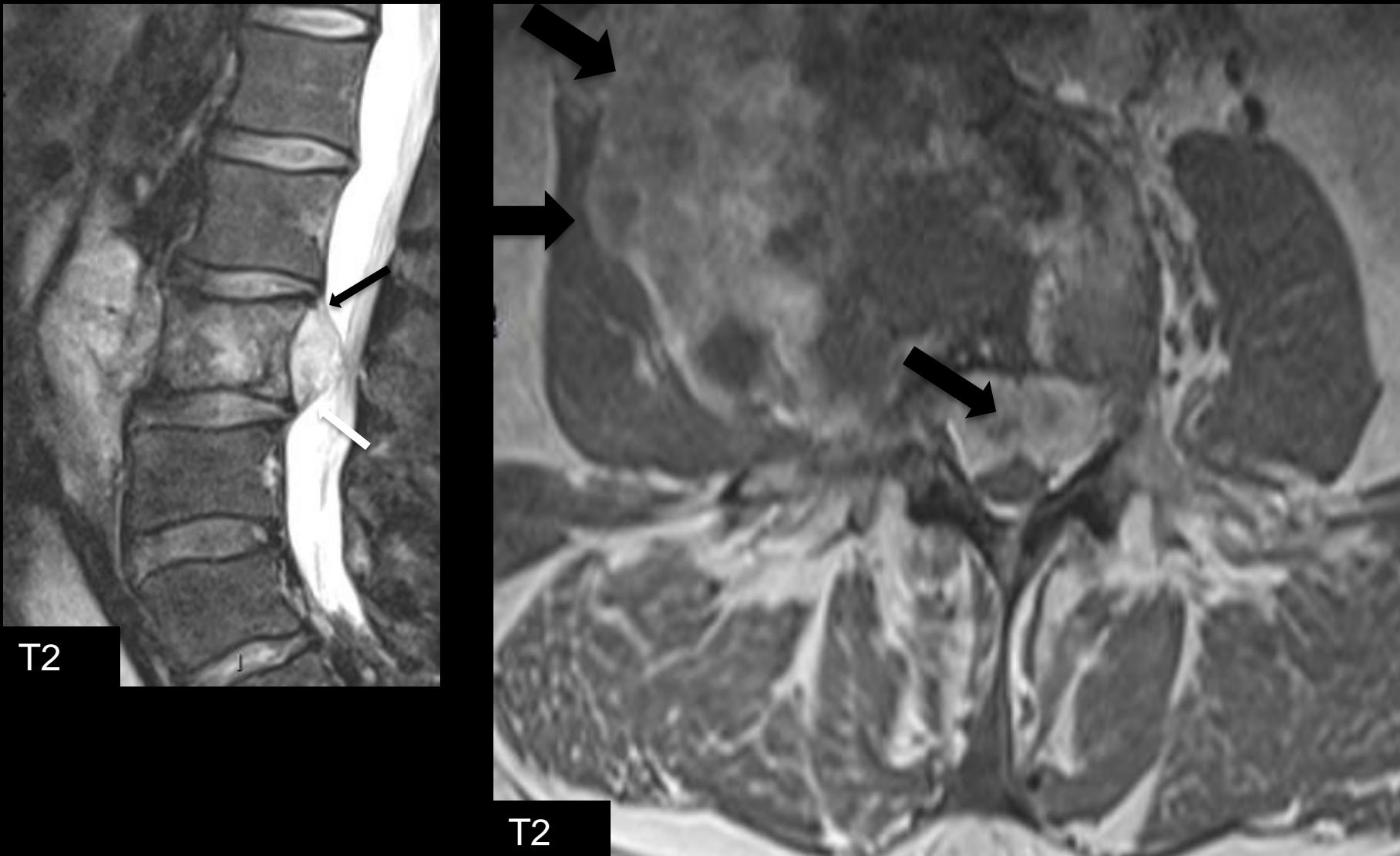
Pathologie septique: débord circonférentiel, global



Spondylodiscite

Débord dans tissus mous

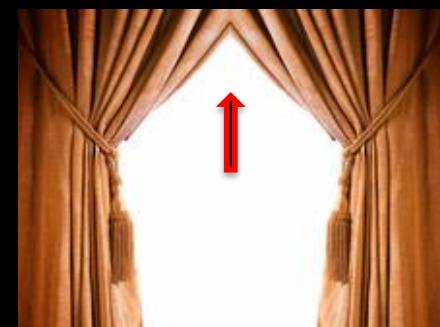
pathologie néoplasique: débord focal, asymétrique



Néoplasique

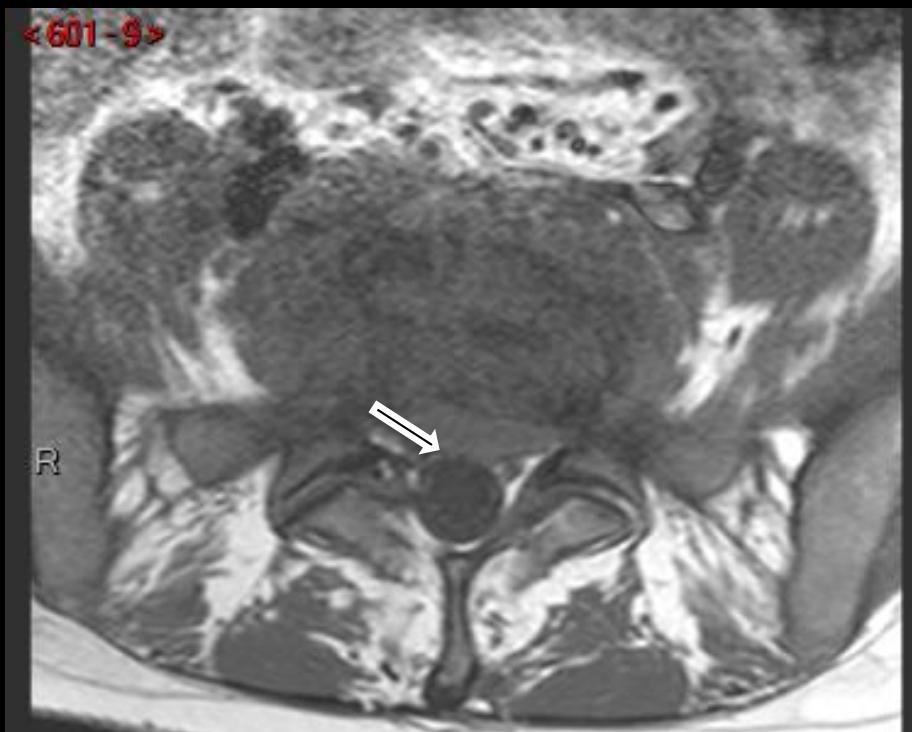
TISSUS MOUS

Signe de l'embrase de rideau

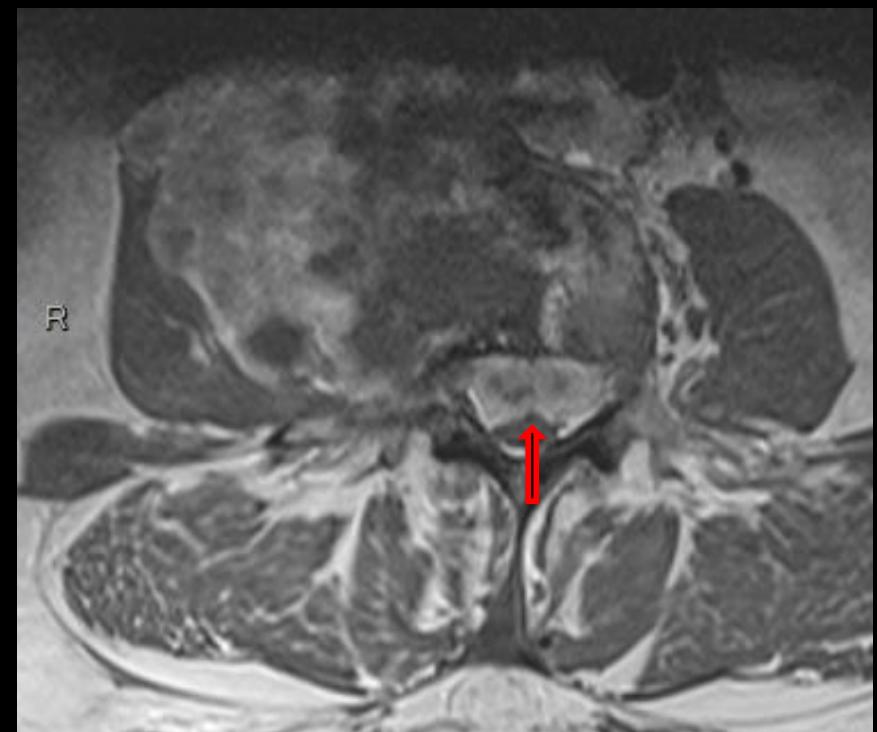


PYOGENE

NEOPLASIQUE



Destruction de l'insertion
du lgt longitudinal postérieur



Incisure centrale liée à la persistance
de l'insertion du lgt longitudinal postérieur

TISSUS MOUS

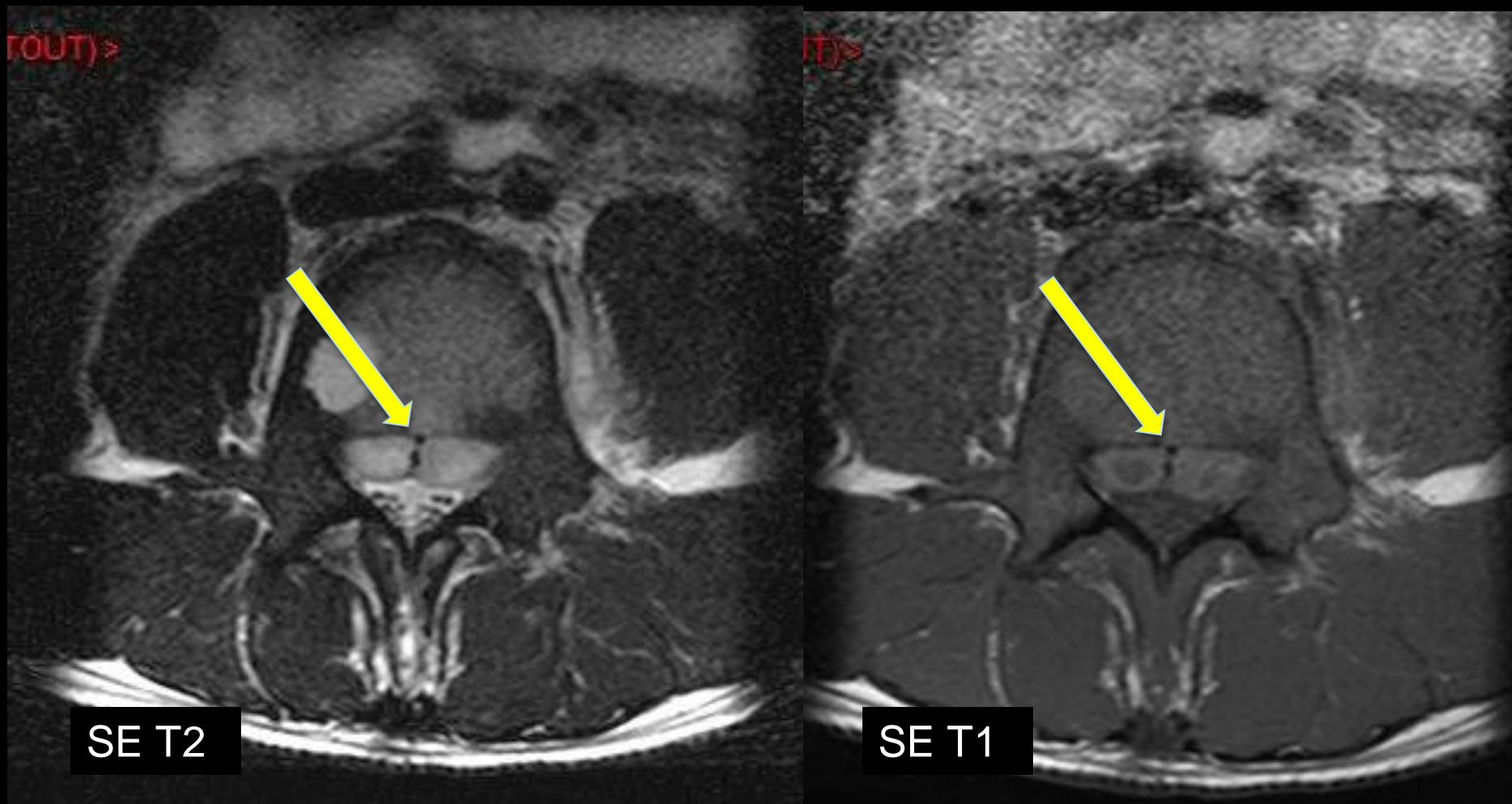
PYOGENE VERSUS TUMORAL

TISSUS MOUS	DISCITE	TUMEUR os
Fréquence	élevée	variable
Effet de masse	Réduit infiltre	Variable Refoule
Signe de l'embrace de rideau	absent	présent
Nécrose	Oui hyperT2	Oui variable

TISSUS MOUS

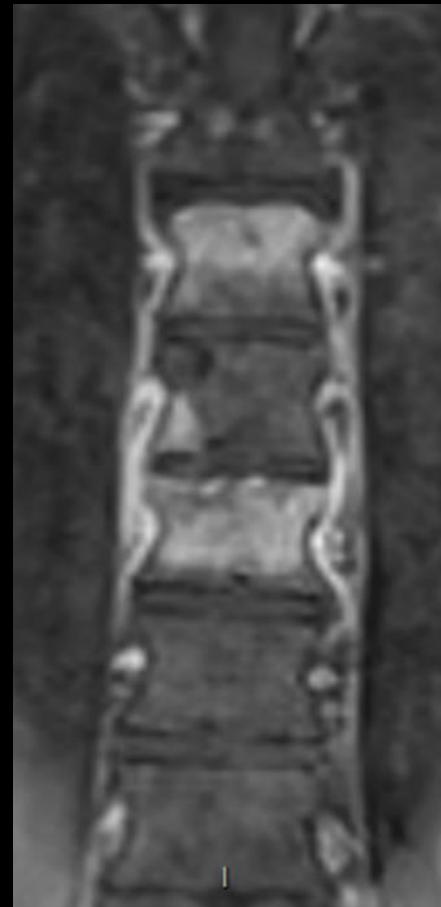
Faux + du signe de l'embrase de rideau

Germes non pyogènes (BK)!!!

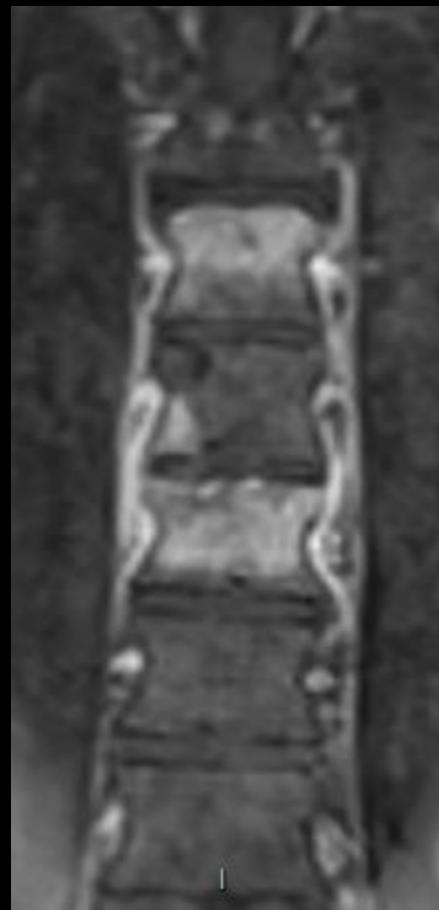
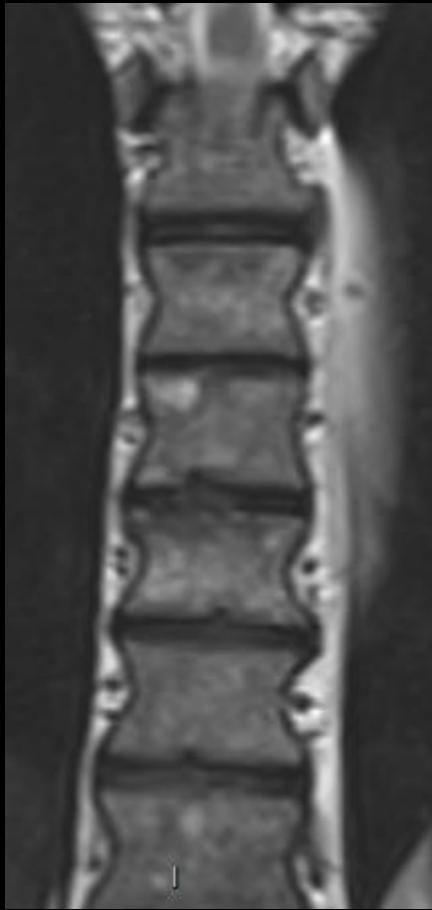


Tissus mous para-spinaux

Absence de déplacement/refoulement des vaisseaux



Infiltration inflammatoire des tissus mous (SAPHO)



TISSUS MOUS

DD pyogène versus néoplasique : +/- OK

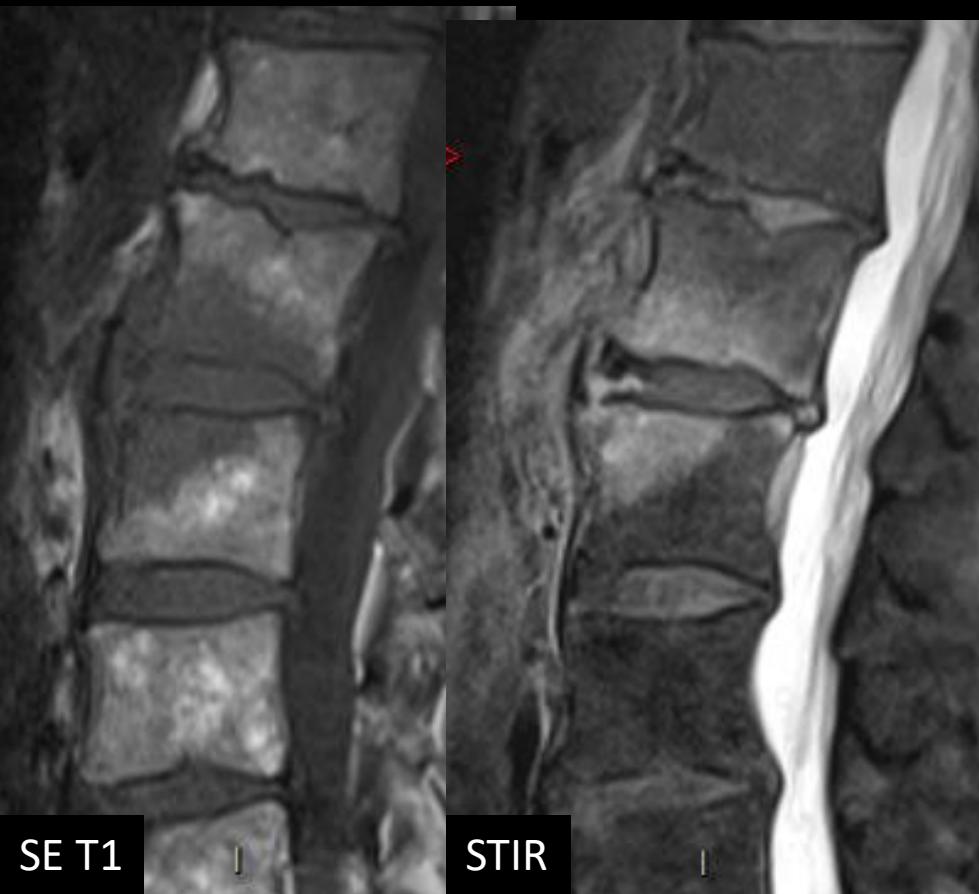
DD difficile voire impossible avec autre cause



Fracture sur ostéoporose

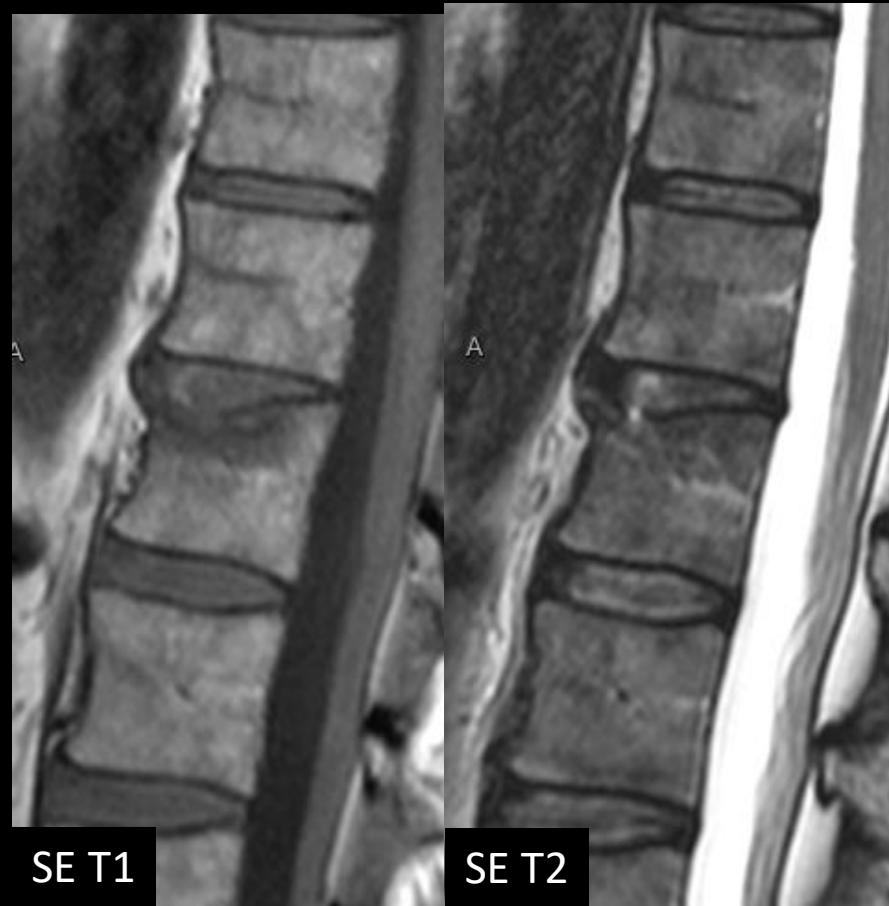
Discite pyogène

- * Distribution en miroir
- * Tissus mous atteints



Tassement spontané

- * Distribution asymétrique
- * Tissus mous normaux



Messages

Pour reconnaître une discite pyogène...

- Regarder les tissus mous
- Optimiser la détection des anomalies (FAT SAT, Gado, plan parallèle à l'axe de la colonne, coupes les plus latérales)
- Optimiser la caractérisation des anomalies (signe de l'embrace de rideau, attention aux fractures!)

To recognize disc infection, look at

- Para spinal / epidural soft tissues
- Disk signal intensity on T2
- Vertebral bone plate and bone marrow

Disk destruction in pyogenic discitis



SE T1

STIR

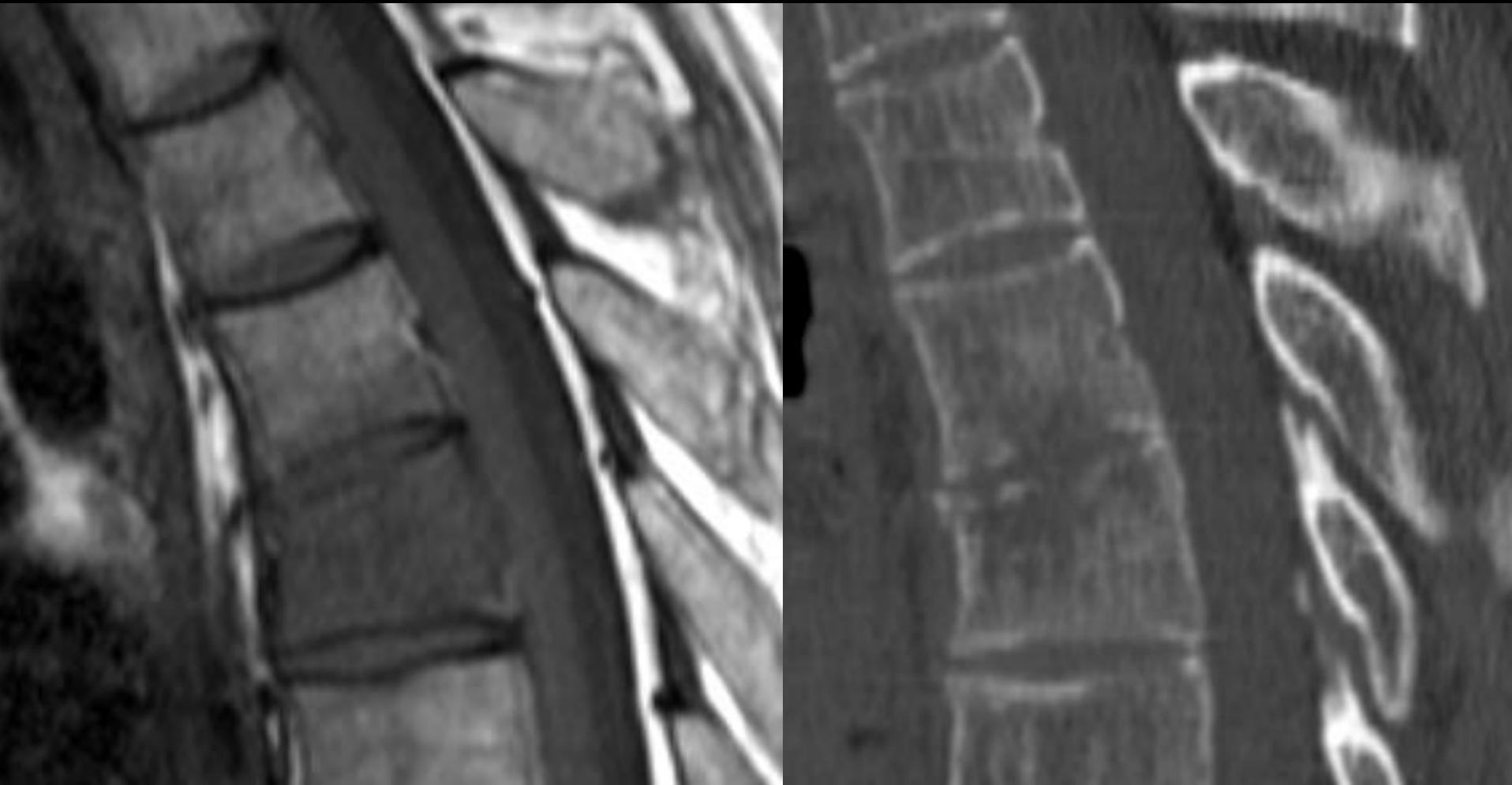
Septic discitis

- * Bone marrow infiltration
- * Disk destruction (high signal)
- * Soft tissue changes ?

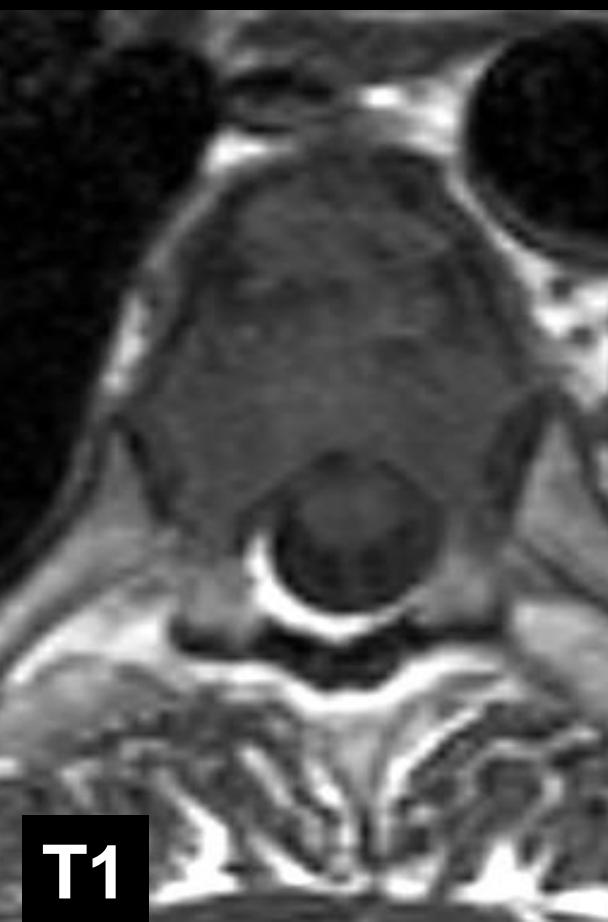
T1

T2

T1 + Gd



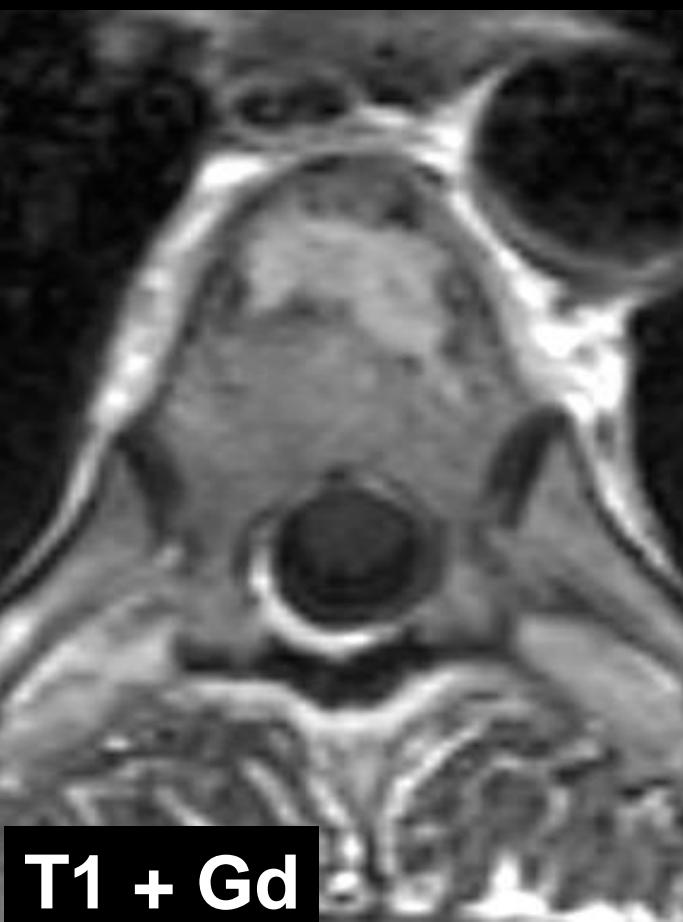
Early pyogenic discitis !!



T1



T2



T1 + Gd

Hints and tricks

- Look at soft tissues (anterior posterior)
- Look at most lateral sections
- Coronal images provide better view of lateral soft tissues
- Enhanced Fat sat T1

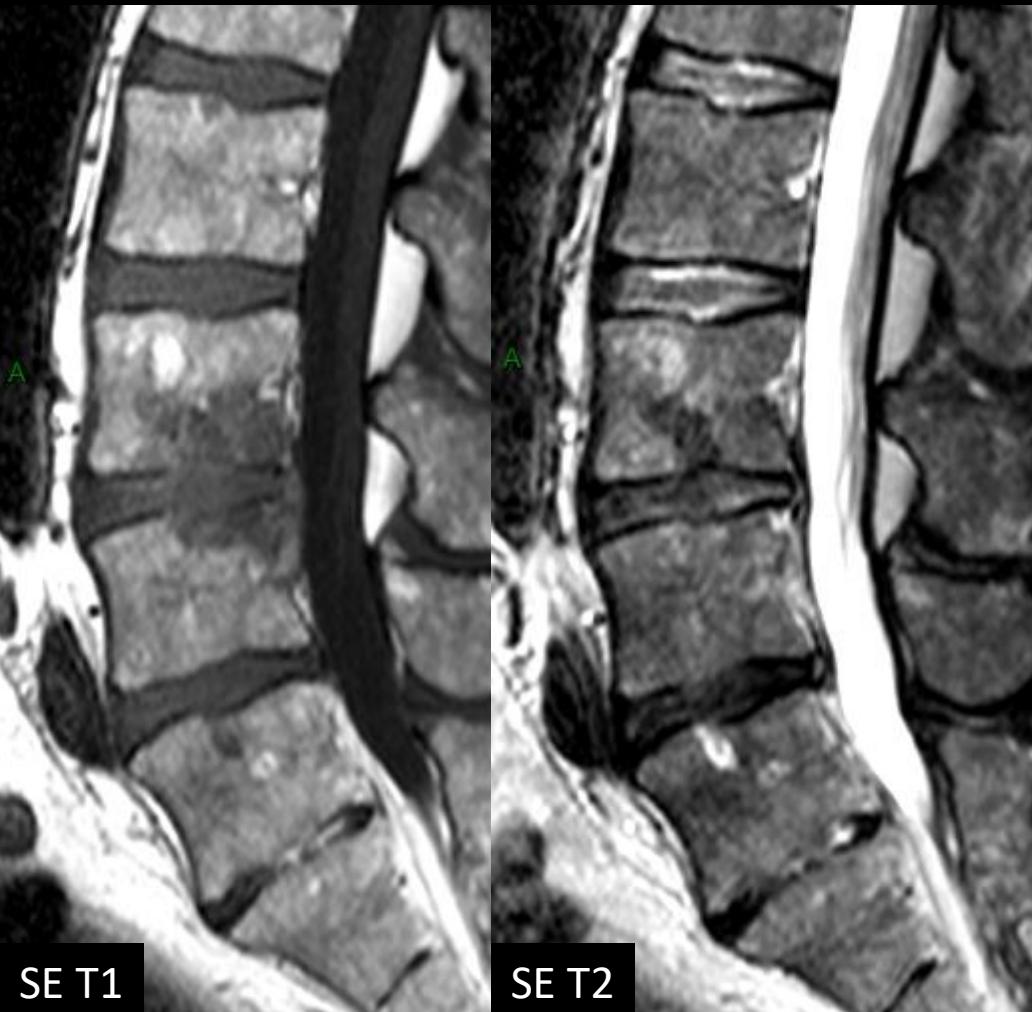
Watch out !

Soft tissues changes can be limited in selected situations

- early discitis
- discitis in immuno-compromized patients
- treated discitis

Acute lumbar pain

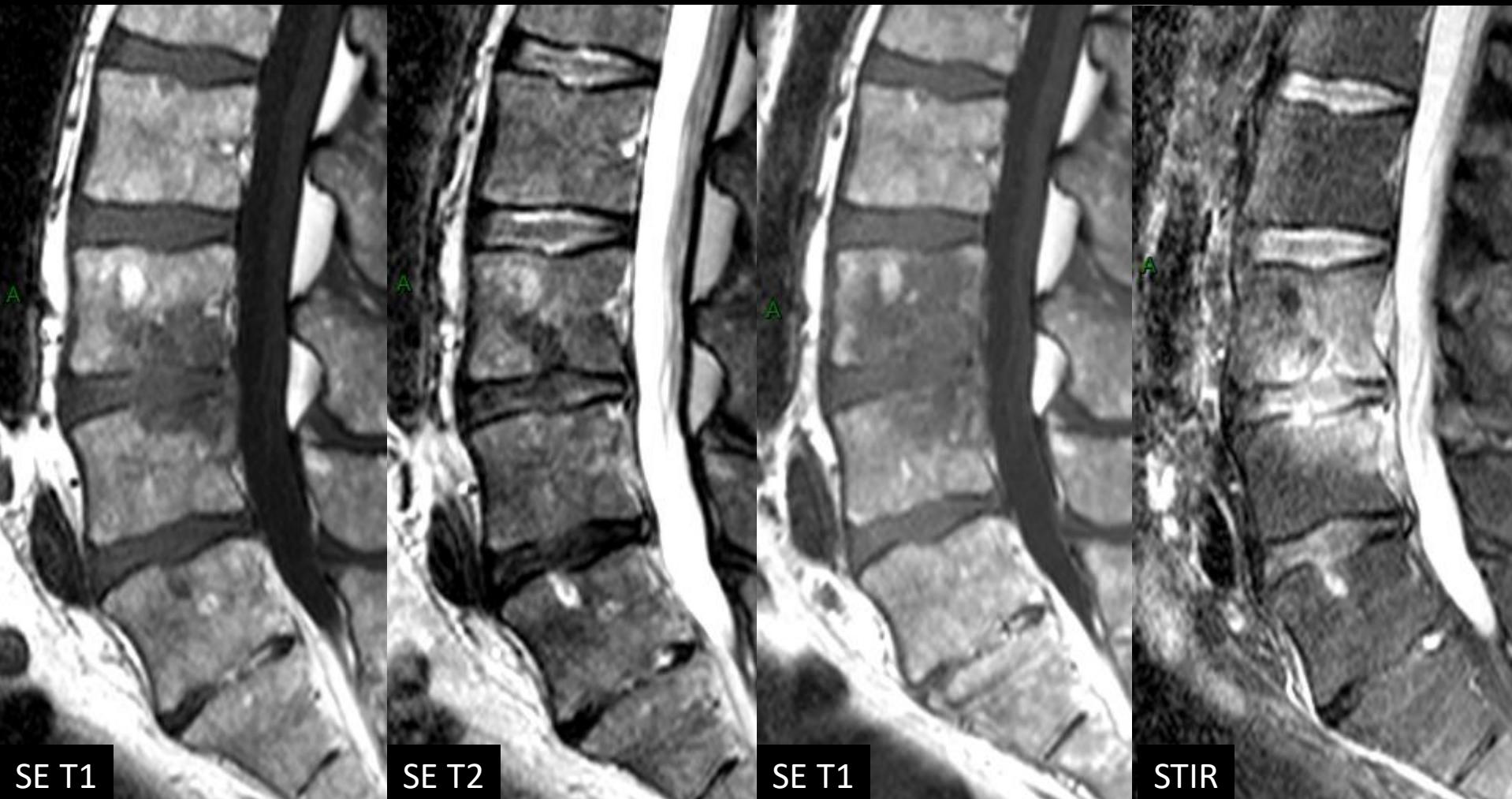
Modic 1 changes ?



Initial MRI

Acute septic discitis ?

10 days later
Acute septic discitis !



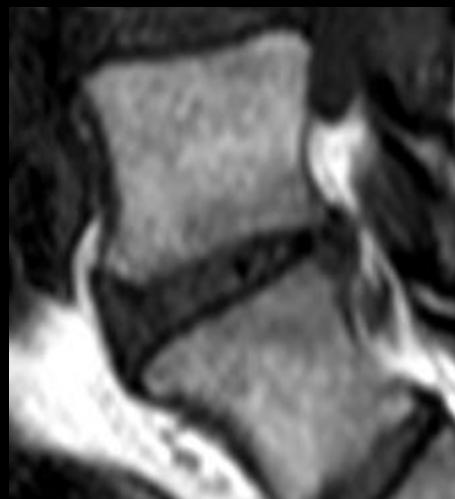
Hints and tricks

- Look at soft tissues (anterior posterior)
- Look at most lateral sections
- Coronal images provide better view of lateral soft tissues
- Enhanced Fat sat T1
- Short time follow-up MRI can help (even if Ab treatment is started)

Limited changes over time in degenerative disk disease



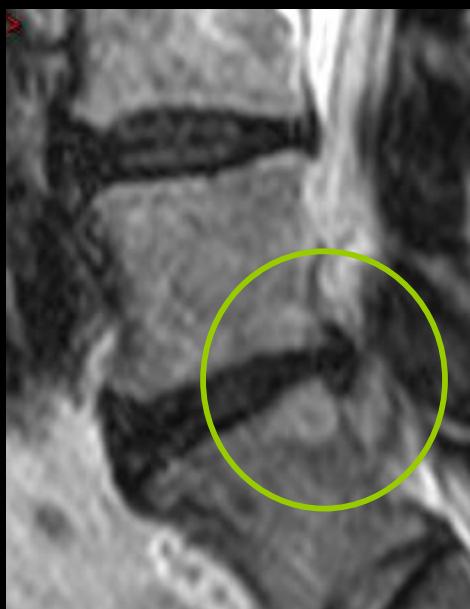
SE T1 2009



2010



2011



SE T2 2009



2010



2011

Acute lumbar pain Modic 1 changes ?



Initial MR

18 days later
Acute septic discitis



Watch out !

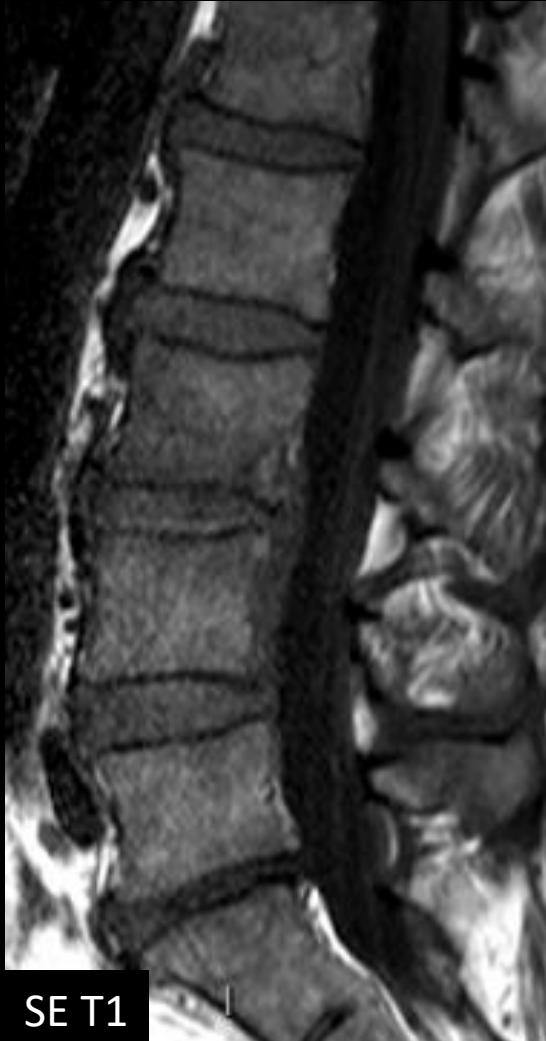
Soft tissues changes can be limited in selected situations

- early discitis
- discitis in immuno-compromized patients
- treated discitis

Immunocompromized patient (treated CLL)

Acute lumbar pain since 2 weeks

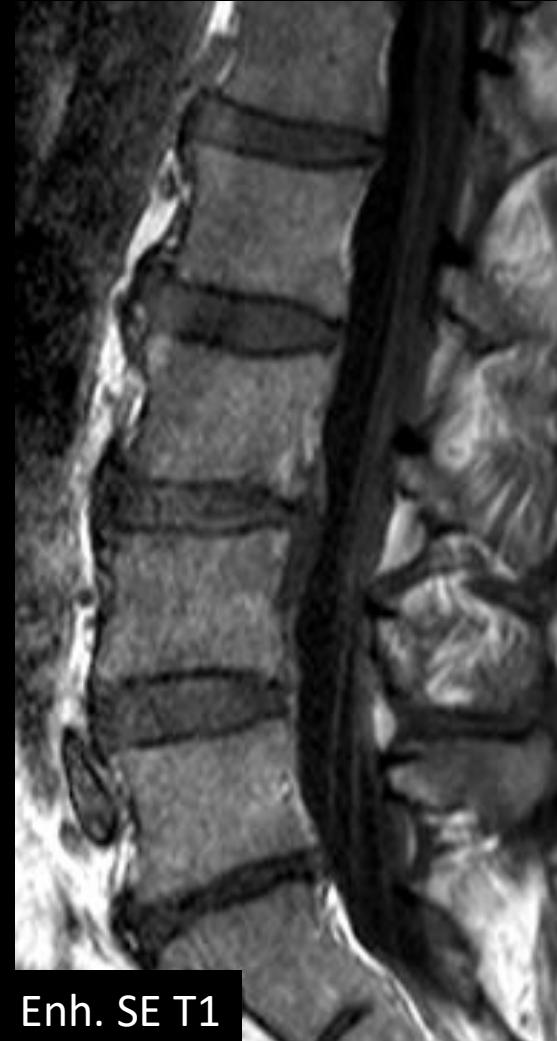
Septic discitis ?



SE T1



SE T2

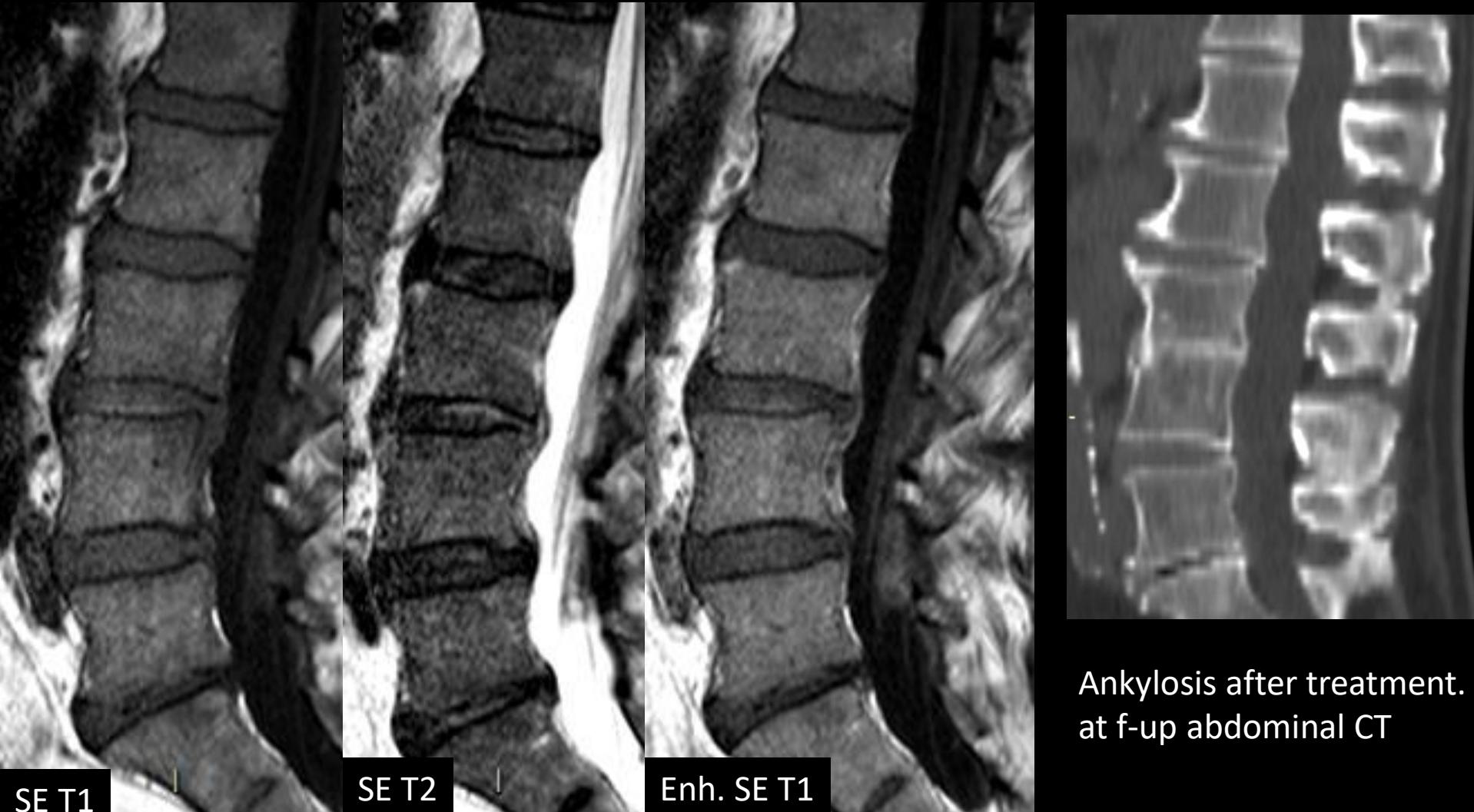


Enh. SE T1

Immuno-compromized patient (treated CLL)

Acute lumbar pain since 2 weeks

Septic discitis

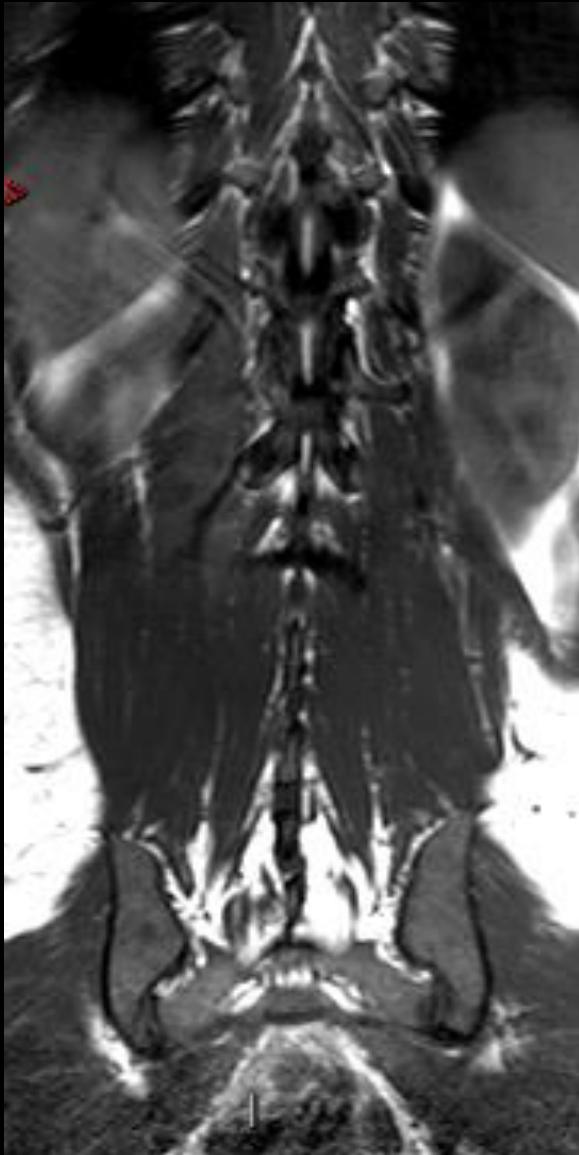


Ankylosis after treatment.
at f-up abdominal CT

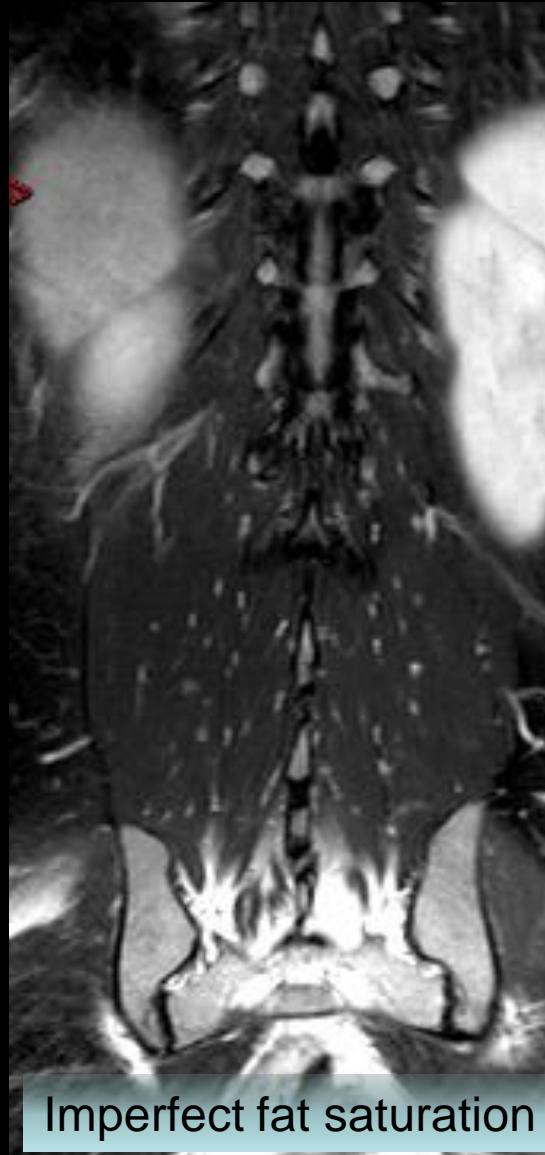
MRI protocols for inflammatory diseases of the spine detection/characterization

- Sagittal SE T1, Dixon T2
- Coronal Stir
- Enhanced fat-sat sag and coronal Dixon T1
-
- Transverse enh SE T1 , SE T2

Which fat-sat sequence to use in Spinal MRI ?



SE T1



Imperfect fat saturation

Fat-sat PD

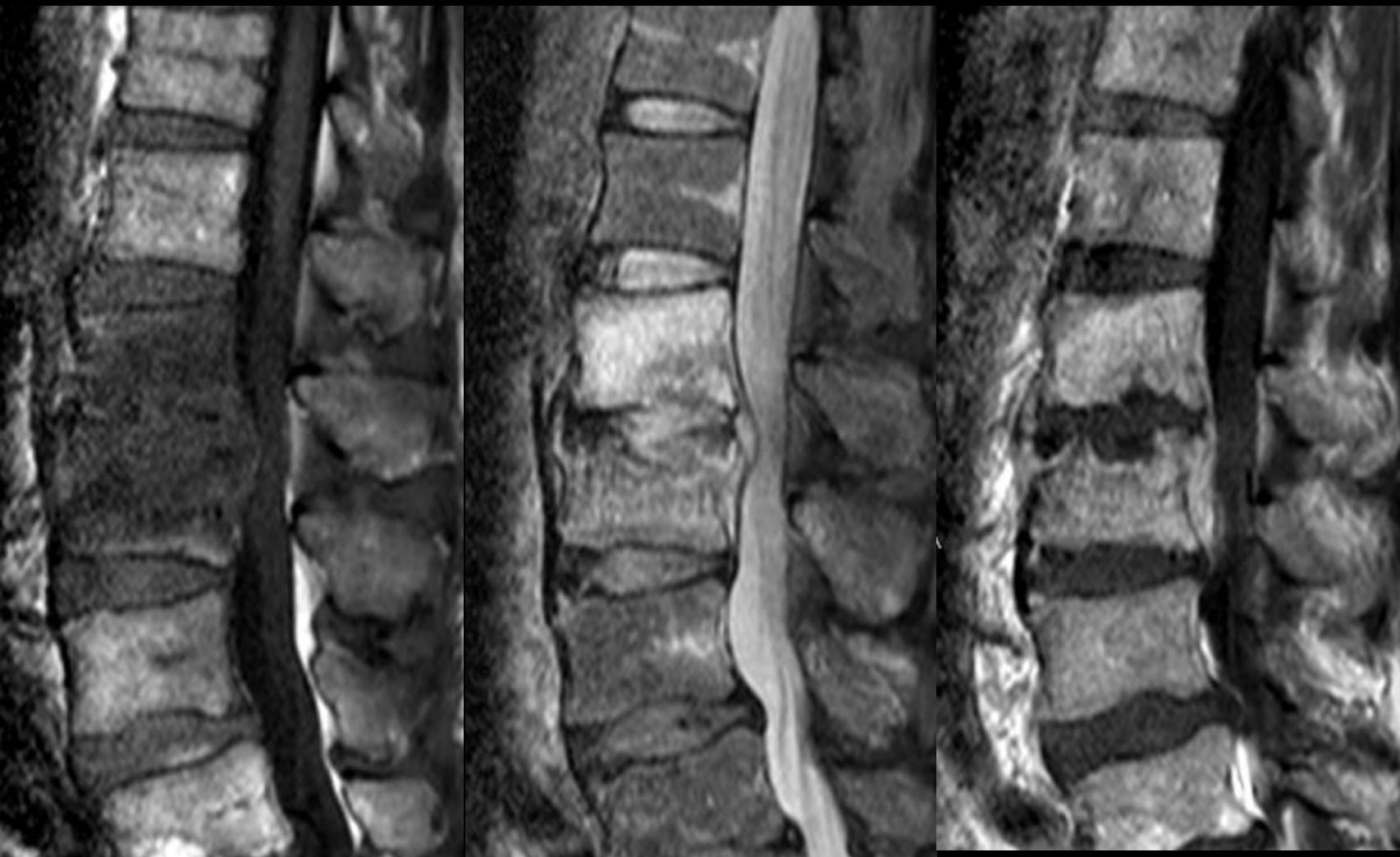


STIR

Objectives

- pyogenic discitis
- non-pyogenic discitis
- aseptic inflammatory discitis
- mimickers

66-year-old male
Chronic lumbar pain



SE T1

fs PD

enh. SE T1

CT

66-year-old male
Chronic lumbar pain
Tuberculous discitis



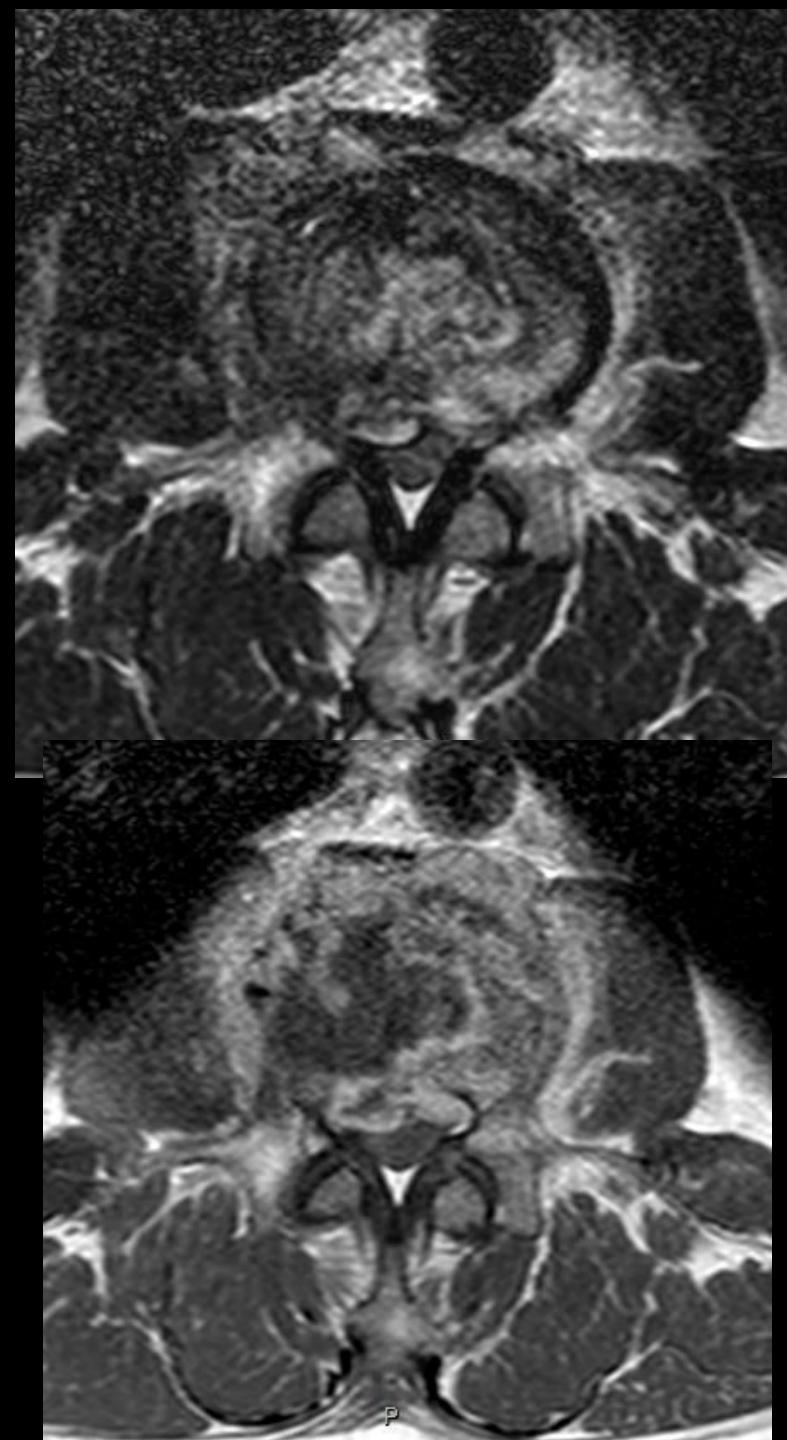
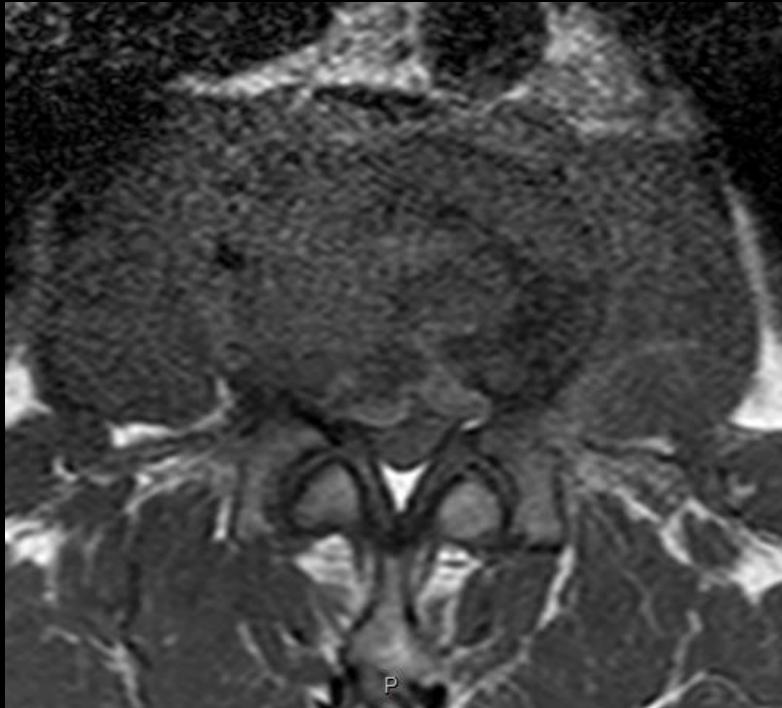
SE T1

fs PD

enh. SE T1

CT

66-year-old male
Chronic lumbar pain
Tuberculous discitis

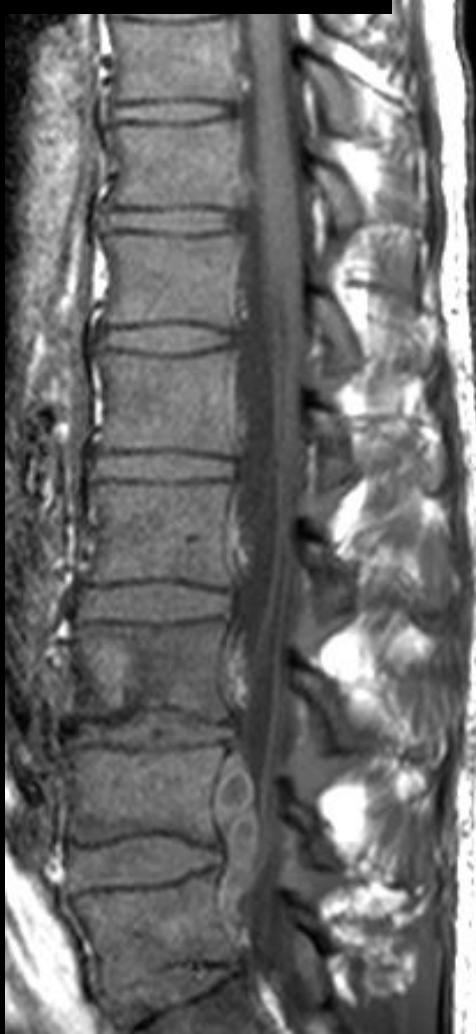


35-year-old male

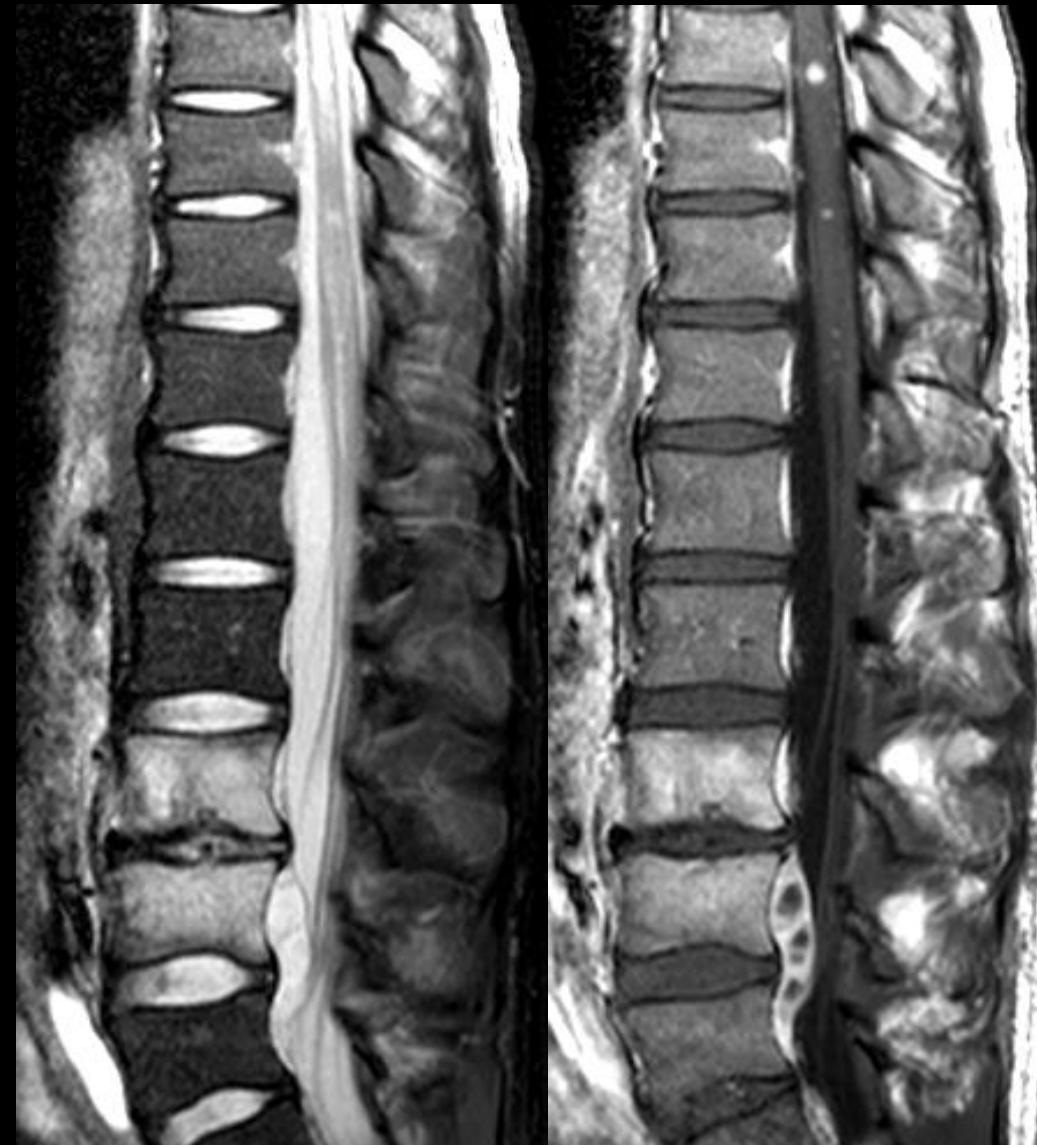
Tuberculous discitis

Moderate disc destruction

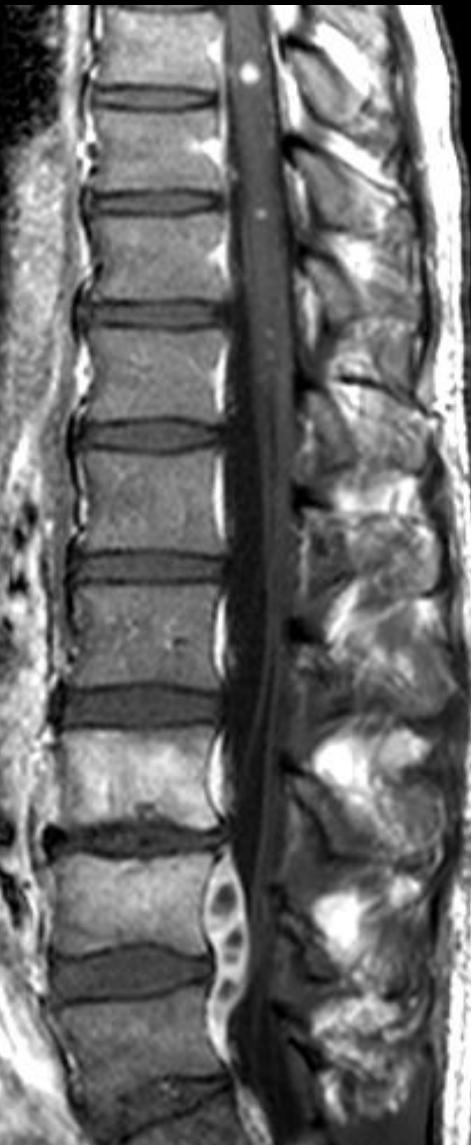
Subligamentous spread



SE T1

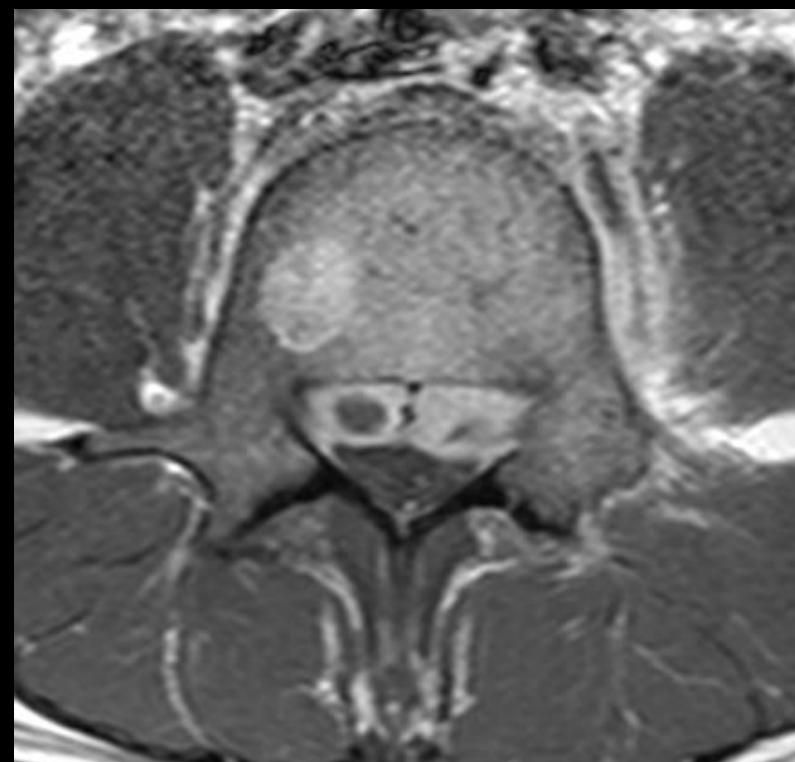
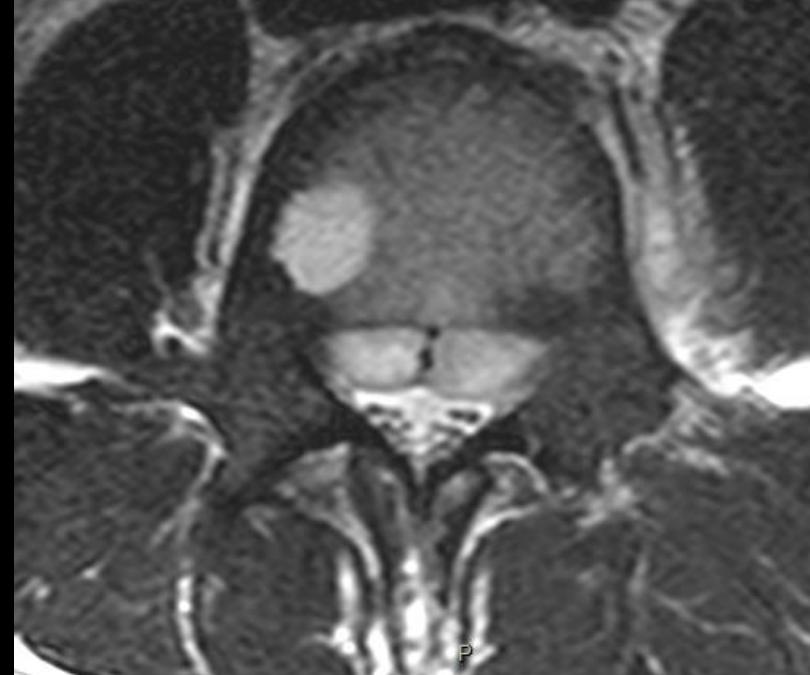
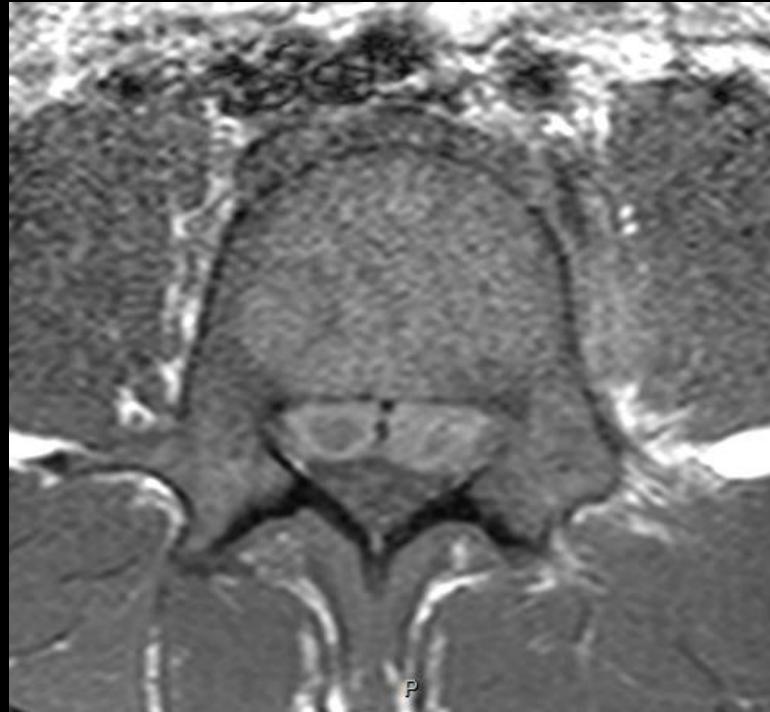


fs PD



enh. SE T1

35-year-old male
Chronic lumbar pain
Tuberculous discitis



Objectives

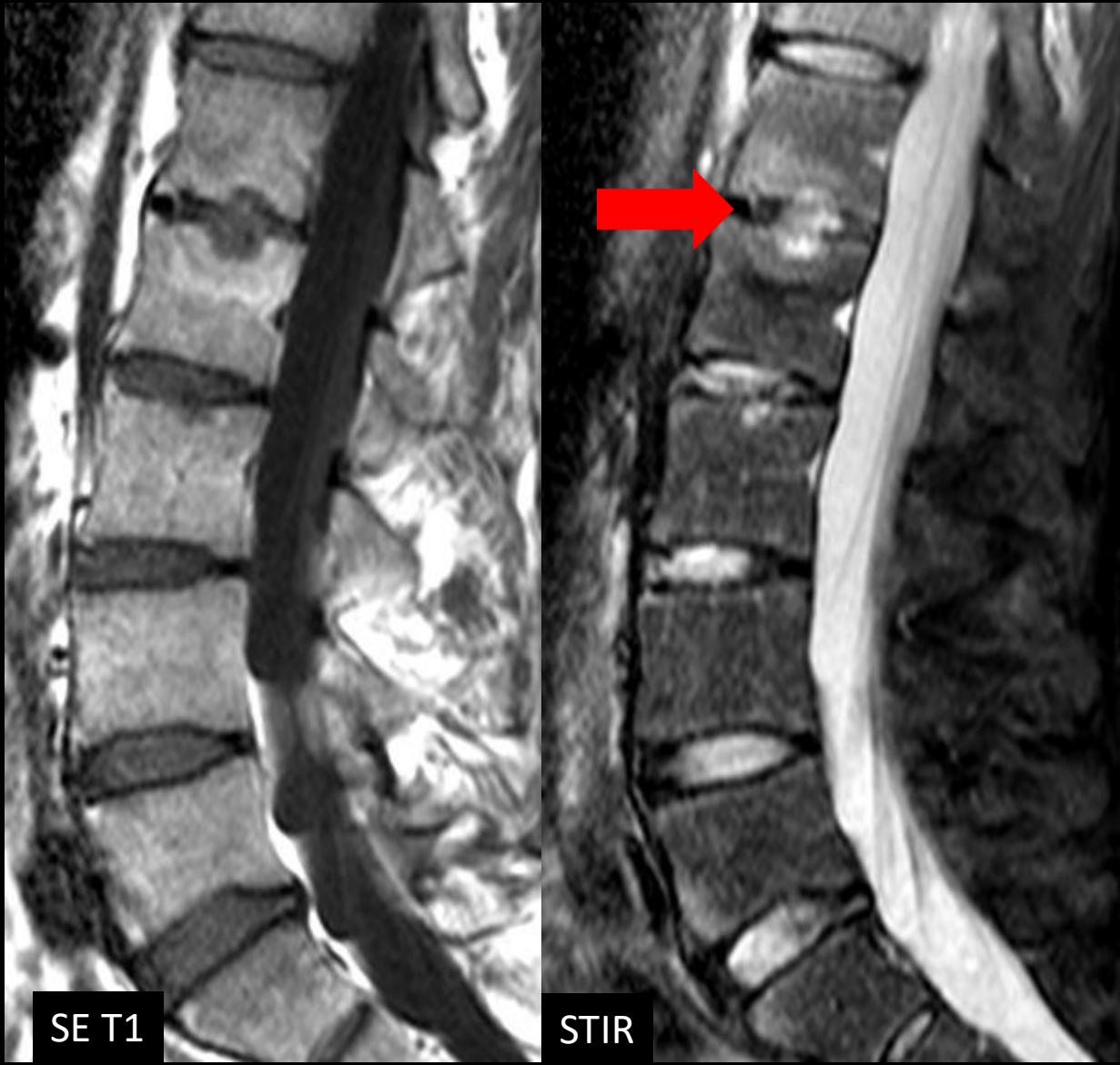
- pyogenic discitis
- non-pyogenic discitis
- aseptic inflammatory discitis
- mimickers

How to avoid false positive diagnoses of spinal infection ??

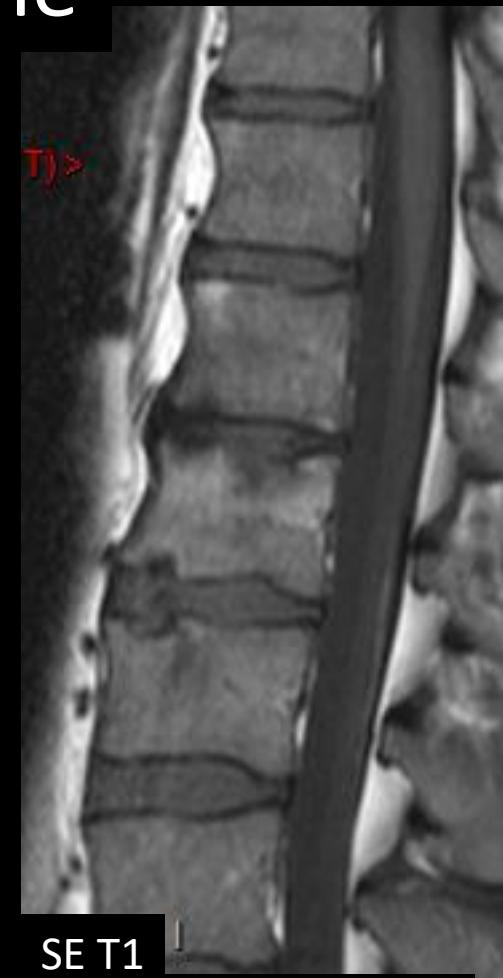
Many mimickers demonstrate

- * normal soft tissues
- * low signal intensity disk on T2
- * bone sclerosis on CT

Aseptic discitis in Ankylosing spondylitis (Romanus)

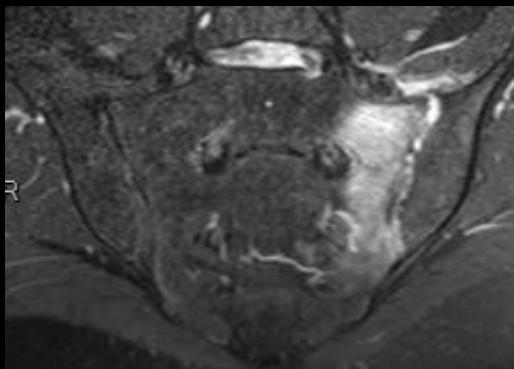


Aseptic discitis in SAPHO syndrome

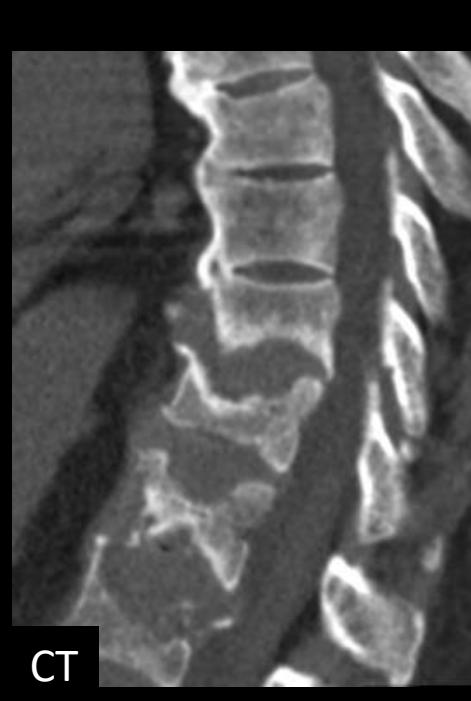
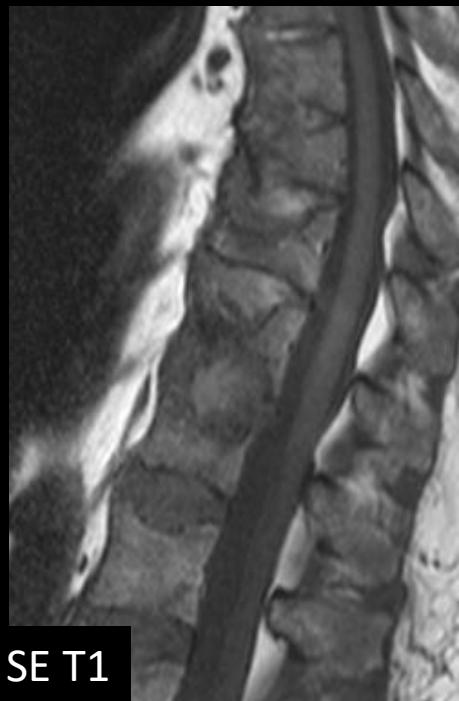


SE T1

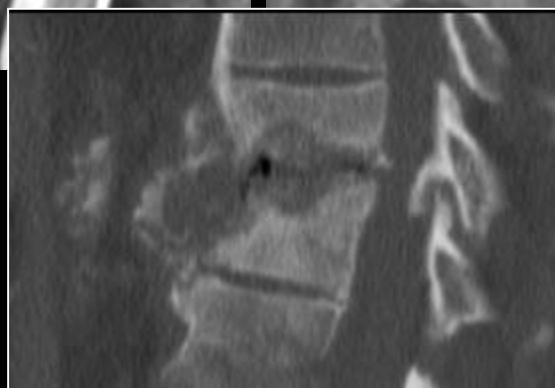
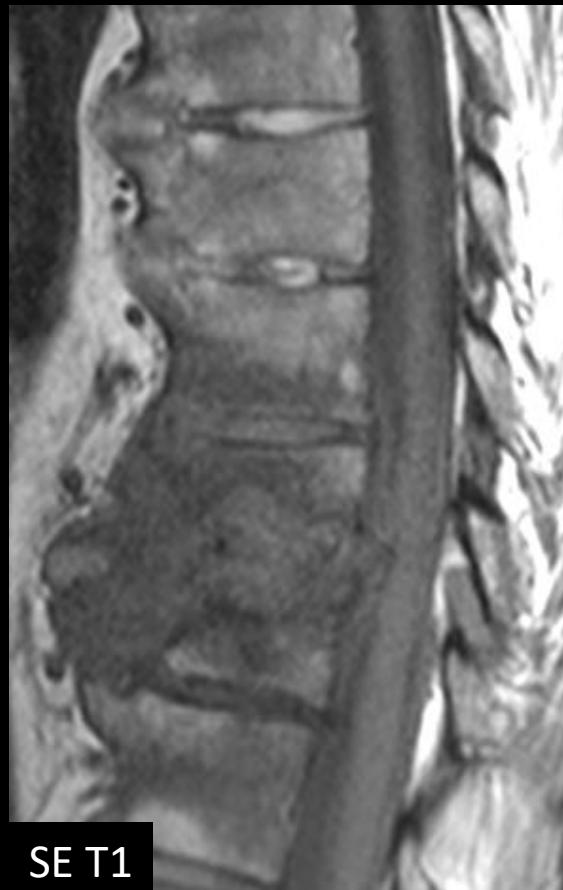
8 months later



Aseptic discitis in a dialysed patient with HPTH



Aseptic discitis in another dialysed patient



Aseptic calcifying discitis



Degenerative disk disease (Modic type 1 changes)

Preserved soft tissues

No high SI disk on T2

Well delimited marrow changes on T2



How to avoid false positive diagnoses ??

Many mimickers demonstrate

- * low signal intensity disk on T2
- * normal soft tissues
- * similar changes on CT

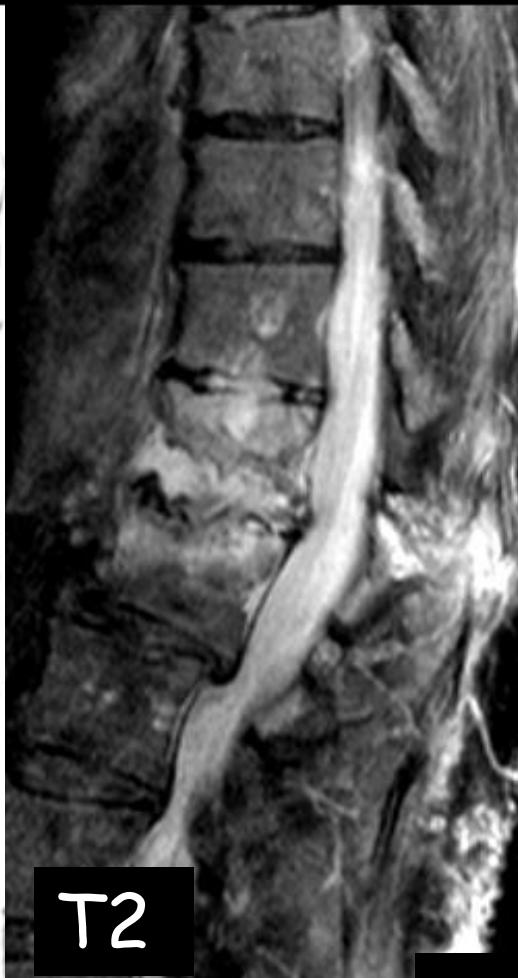
Except one condition that must be recognized !

Objectives

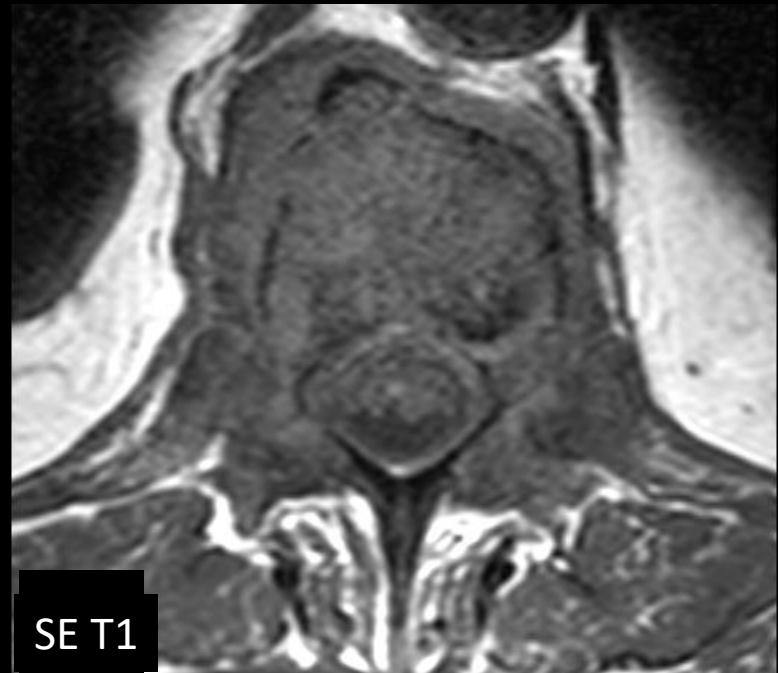
- pyogenic discitis
- non-pyogenic discitis
- aseptic inflammatory discitis
- mimicker



T1

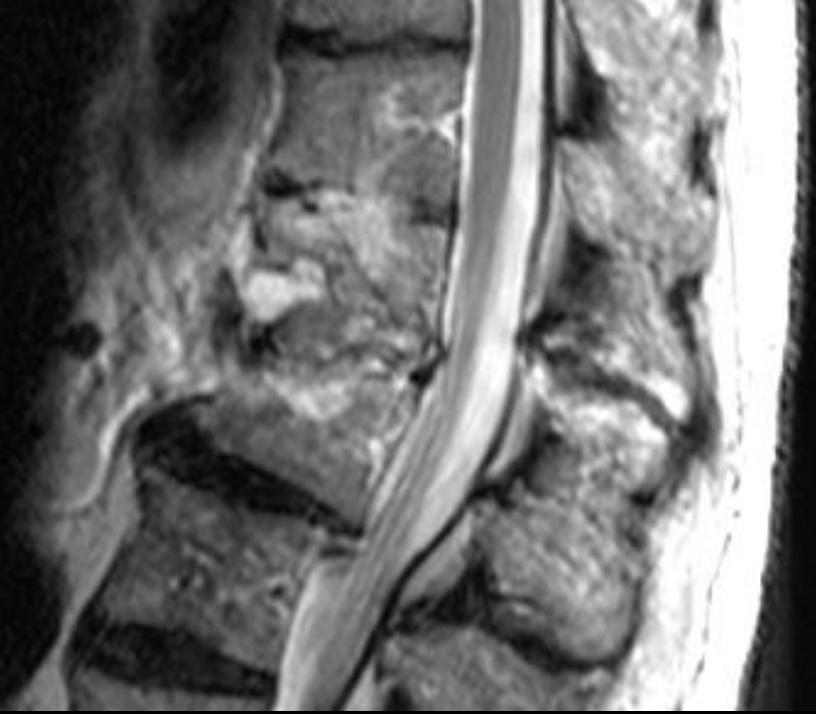


T2



SE T1

Soft tissue infiltration
High signal intensity disk on T2
Bone destruction



T2



Vertebral fracture in ankylosed spine



+ 1 month

Similar features in

Pyogenic discitis

- Elderly patients
- Acute onset
- Important pain
- Difficult to image
- Extensive soft tissue changes
- Disk destruction
- Avascular areas

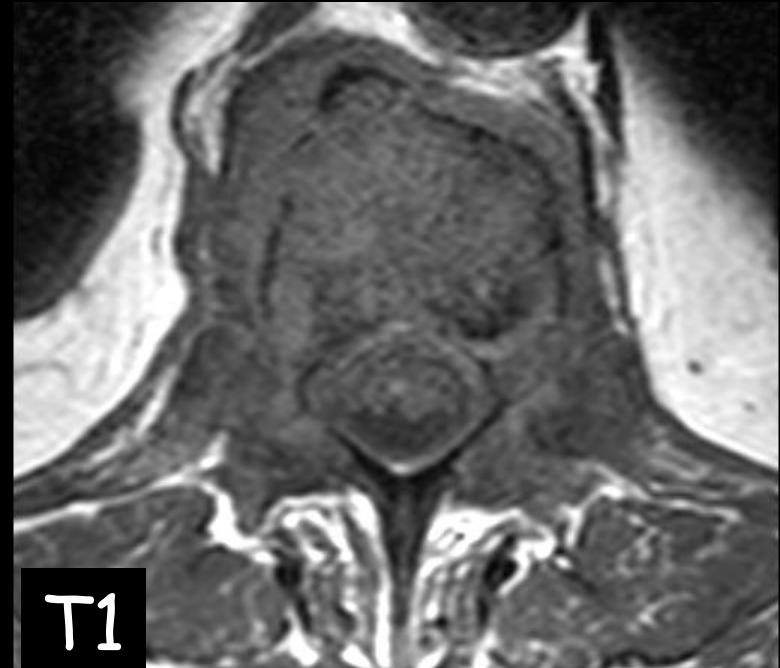
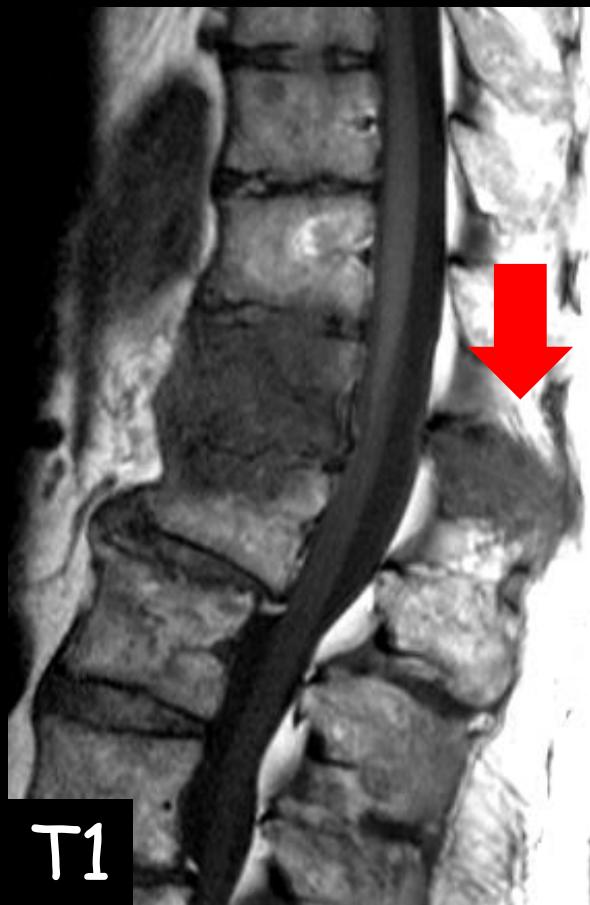
Fracture in ankylosed spine

- Elderly patients
- Acute onset
- Important pain
- Difficult to image
- Extensive soft tissue changes
- Disk/plateau destruction
- Avascular areas
- Ankylosis is easily overlooked

Key-features in ankylosed spine fractures

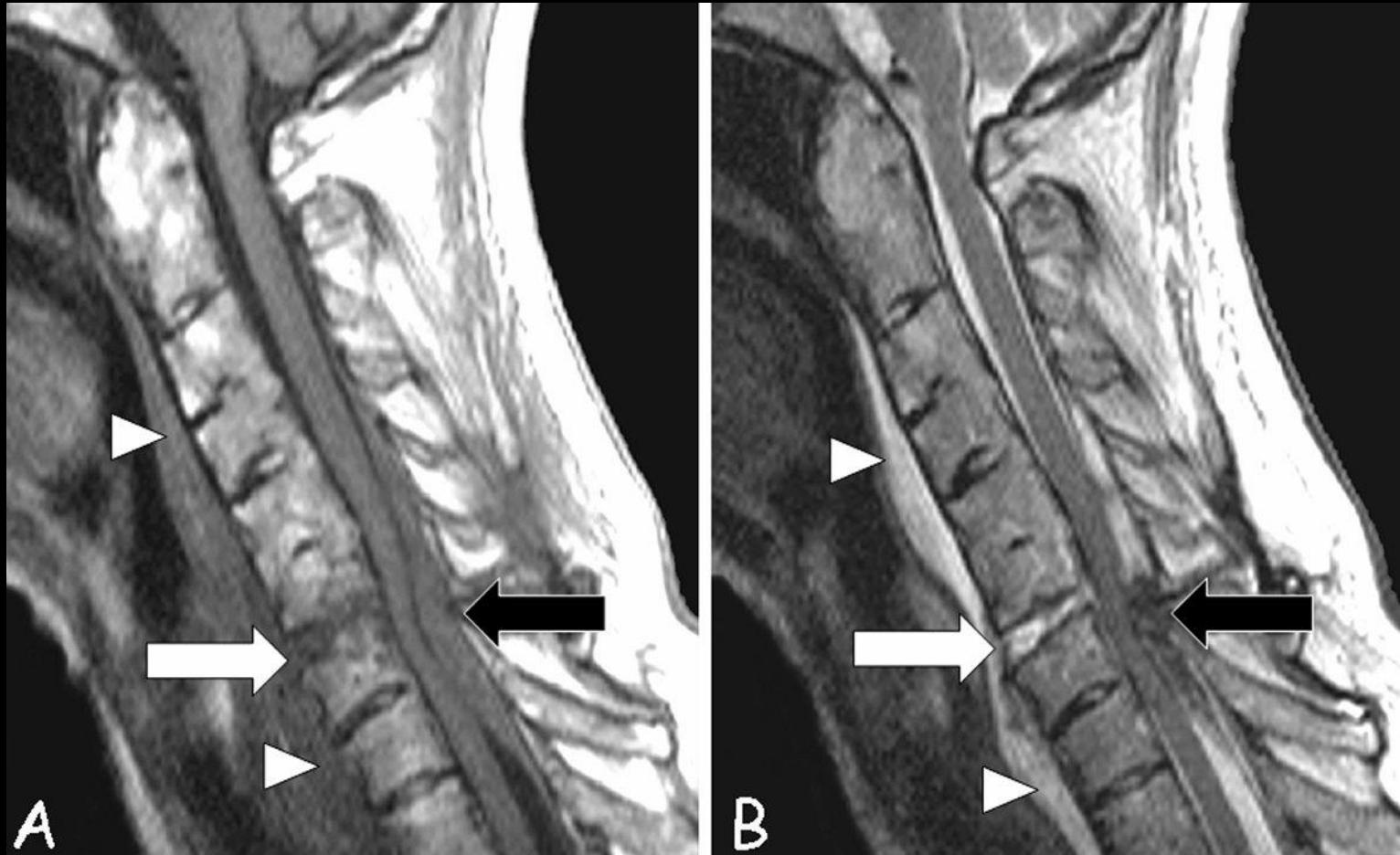
- Fracture in disk and in vertebral body
- Associated posterior fractures (facet/lamina/spinous process)
- Look for ankylosis
- CT can help to demonstrate fracture and ankylosis

Key-features in ankylosed spine fractures



Soft tissue infiltration
High signal intensity disk on T2
Bone destruction

Key-features in ankylosed spine fractures



By the end of this presentation, you should

- Recognize specific signs of discitis
- Be familiar with hints and tricks
 - to detect early discitis (False -)
 - to recognize mimickers (False +)

Hints and tricks

- Look at soft tissues (anterior, posterior)
- Look at most lateral sections
- Coronal images provide better view of lateral soft tissues
- Enhanced fat-sat T1 to detect soft tissue changes and abcesses
- Short time follow-up MRI can help (even if treatment already started)

Hints and tricks

- Many mimickers of pyogenic diskitis
 - Low signal in disk on T2
 - Moderate soft tissue changes at distance
- Watch out for fractures in ankylosed spine !

The spine:

Inflammatory disc disorders and mimickers

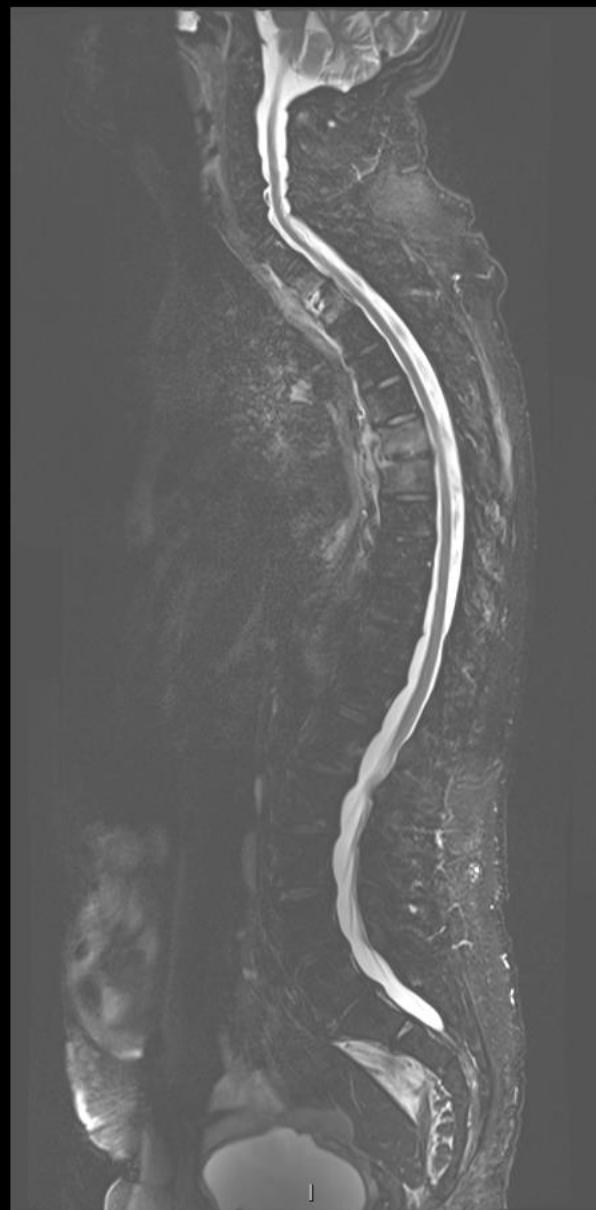


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Spinal infections: Hints and tricks

Bruno Vande Berg, Patrick Omoumi, Ahmed Larbi, Frédéric Lecouvet
St Luc University Hospital
Brussels Belgium

47-year-old male

Veterinarian

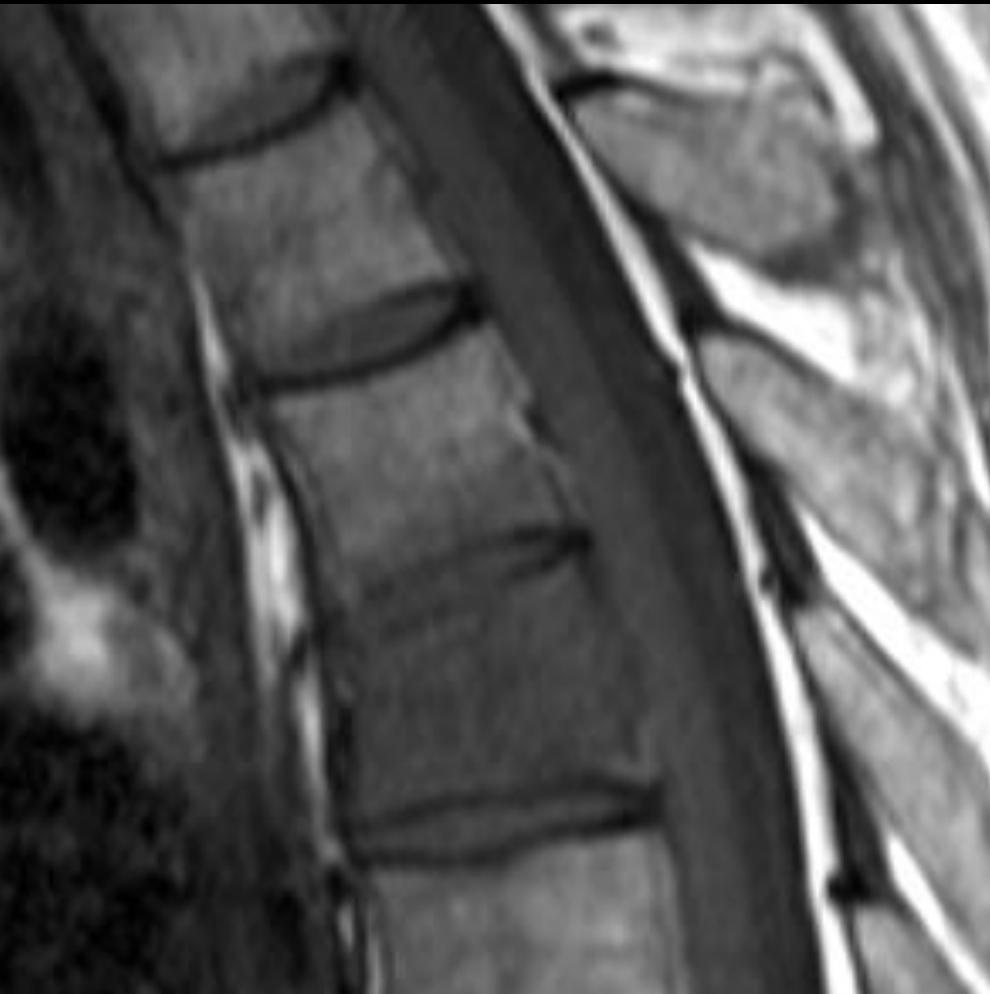
Pain since 10 days



T1

T2

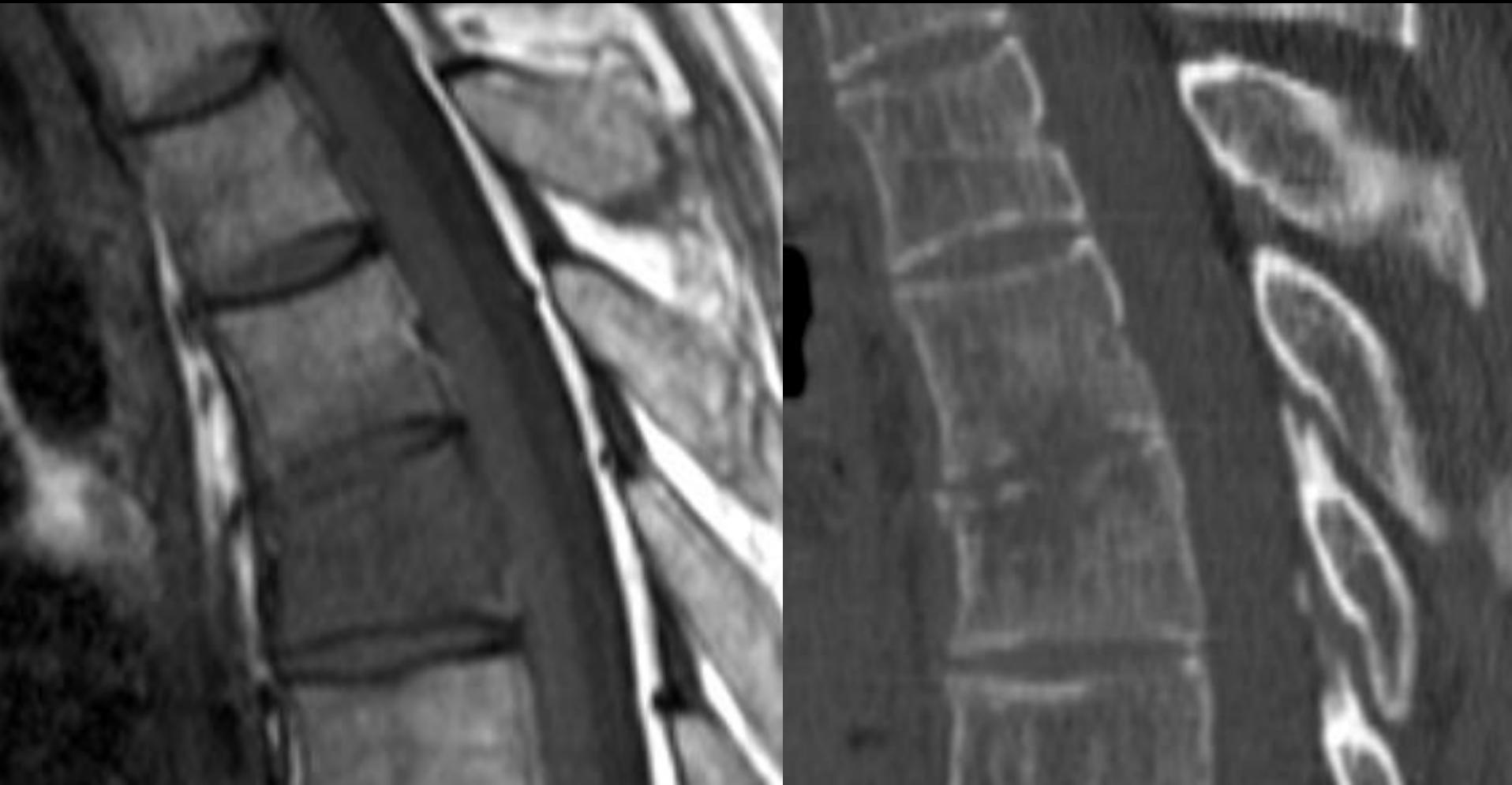
T1 + Gd



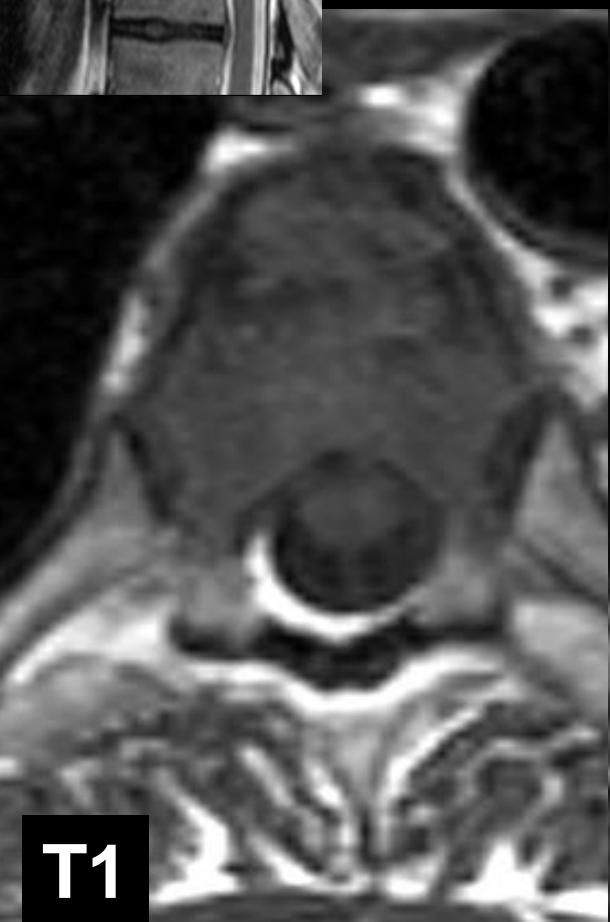
On Friday 7 pm



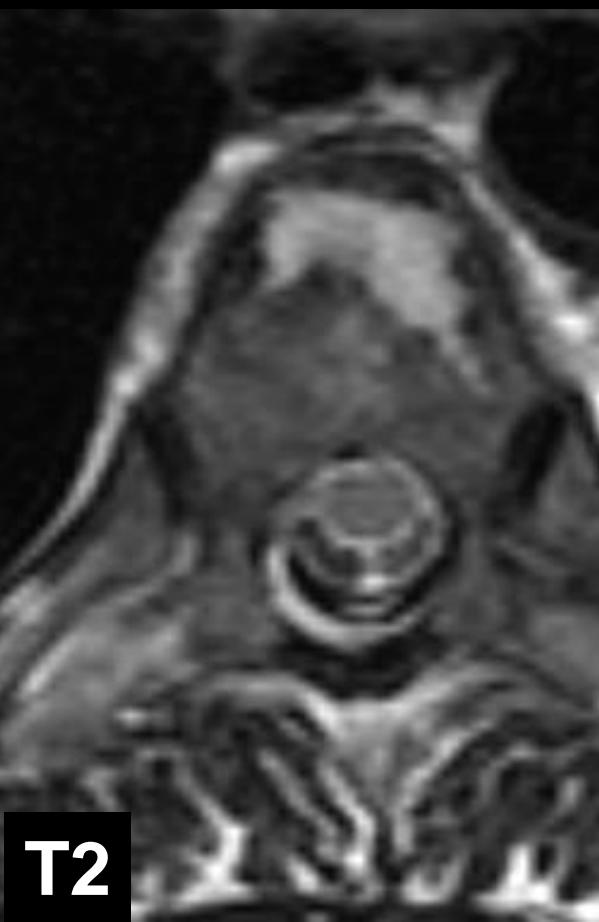
Next Monday 10 am



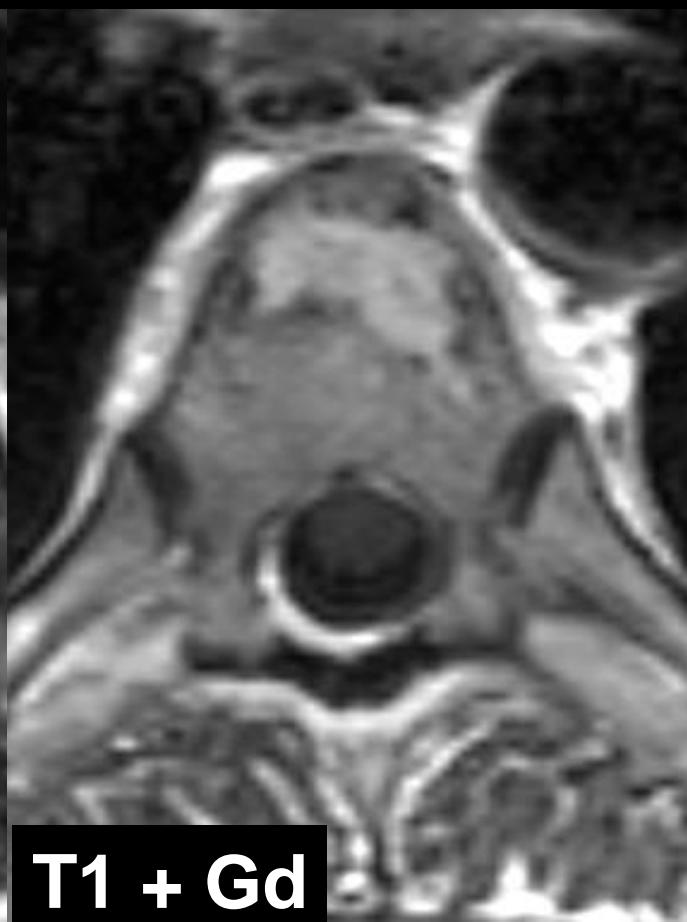
Early pyogenic discitis !!



T1



T2



T1 + Gd

Hints and tricks

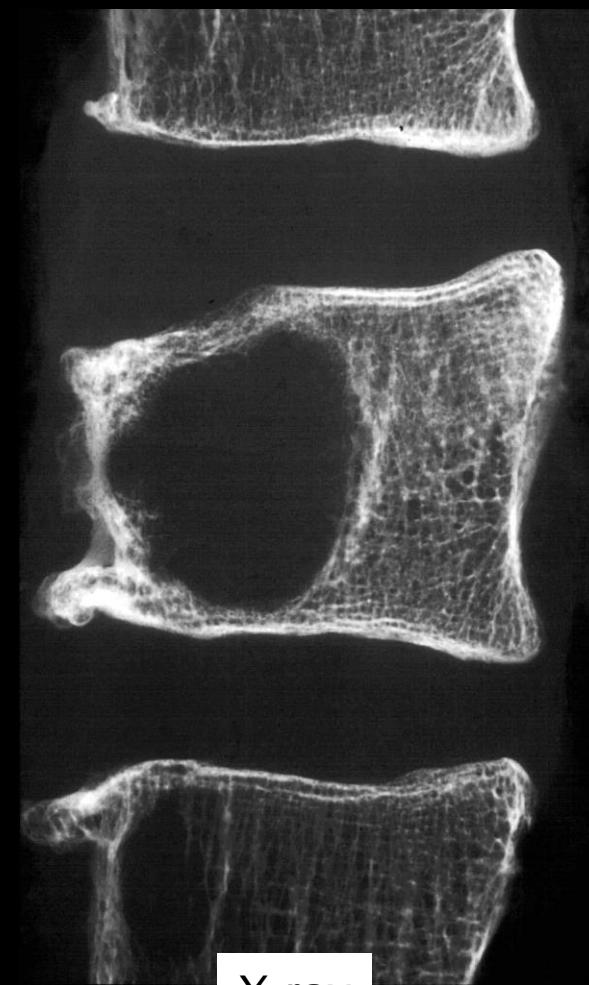
- Look at soft tissues (anterior posterior)
- Look at most lateral sections
- Coronal images provide better view of lateral soft tissues
- Enhanced Fat sat T1

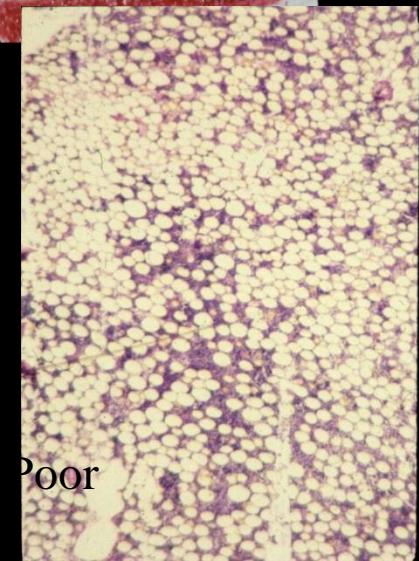
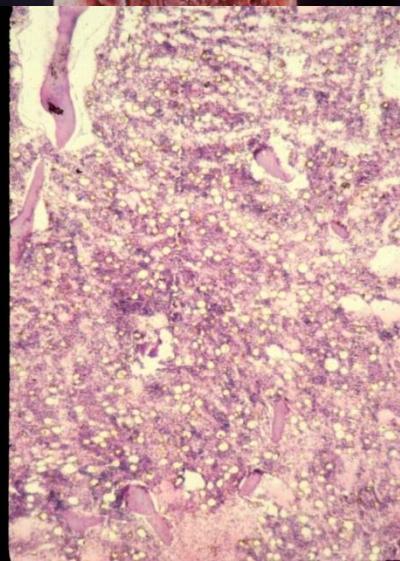
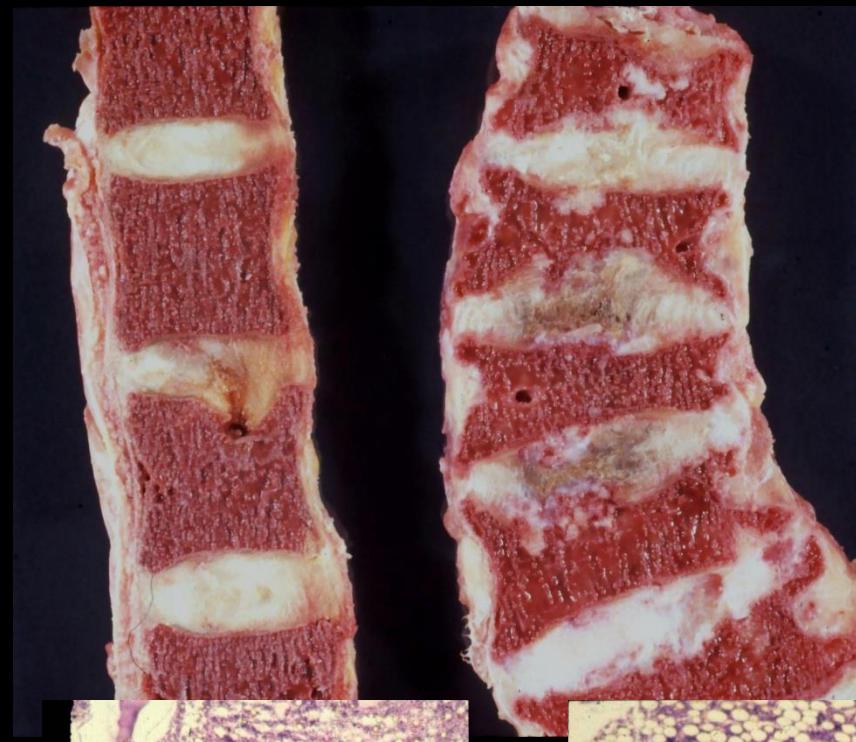
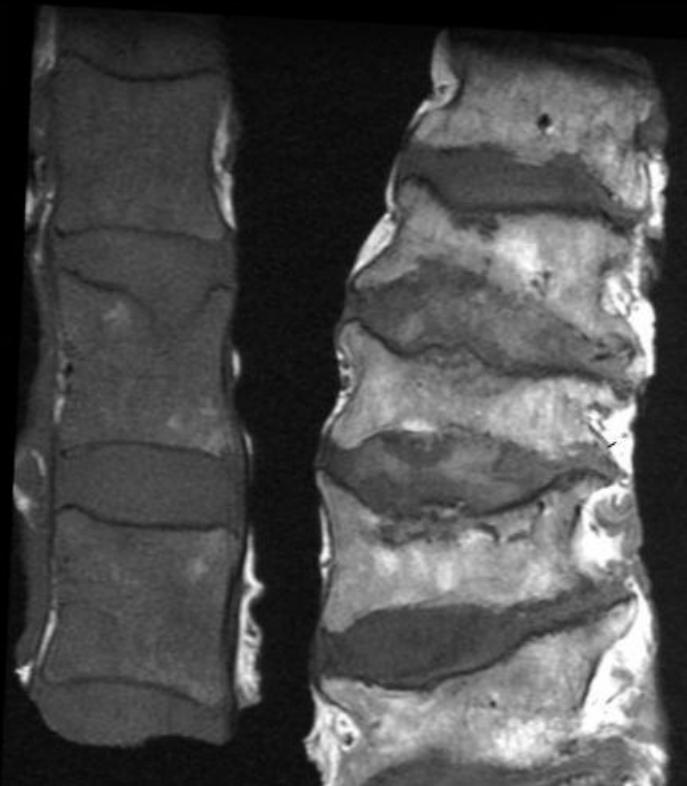
Watch out !

Soft tissues changes can be limited in selected situations
early discitis

discitis in immuno-compromized patients

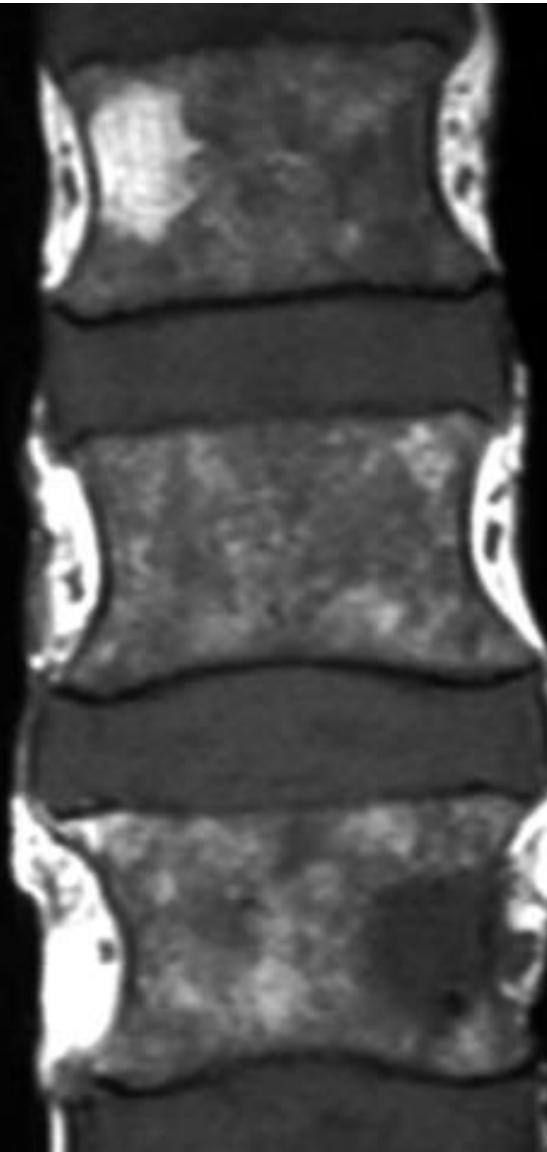
treated discitis



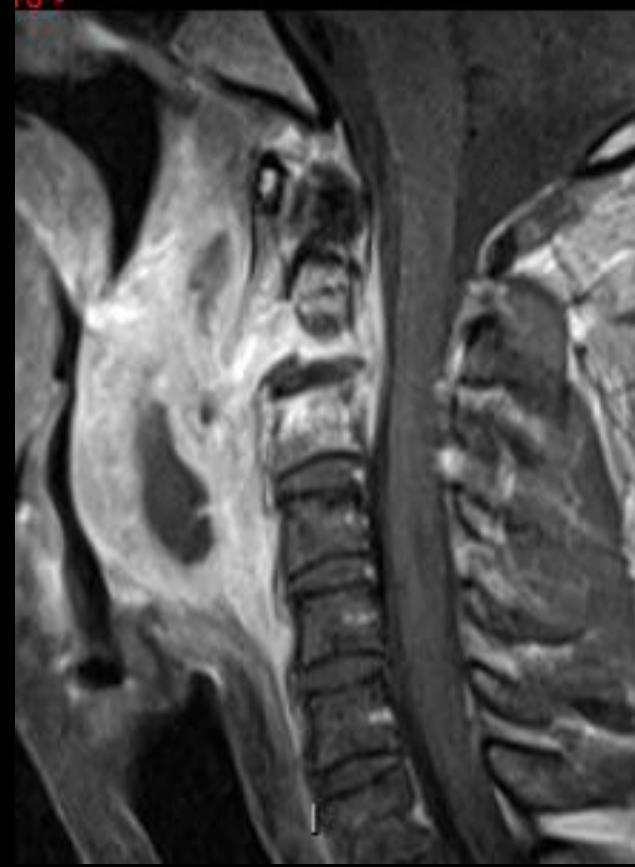
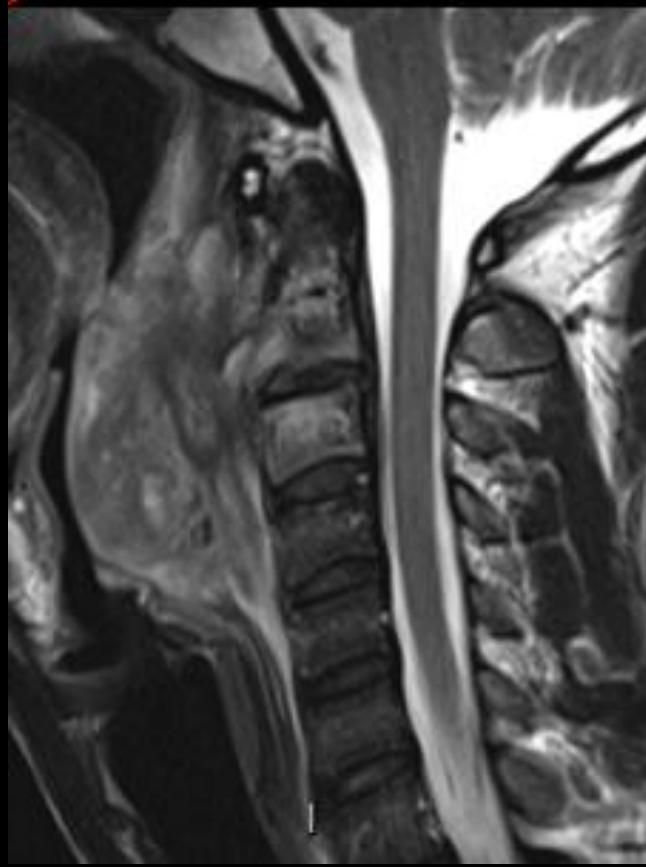


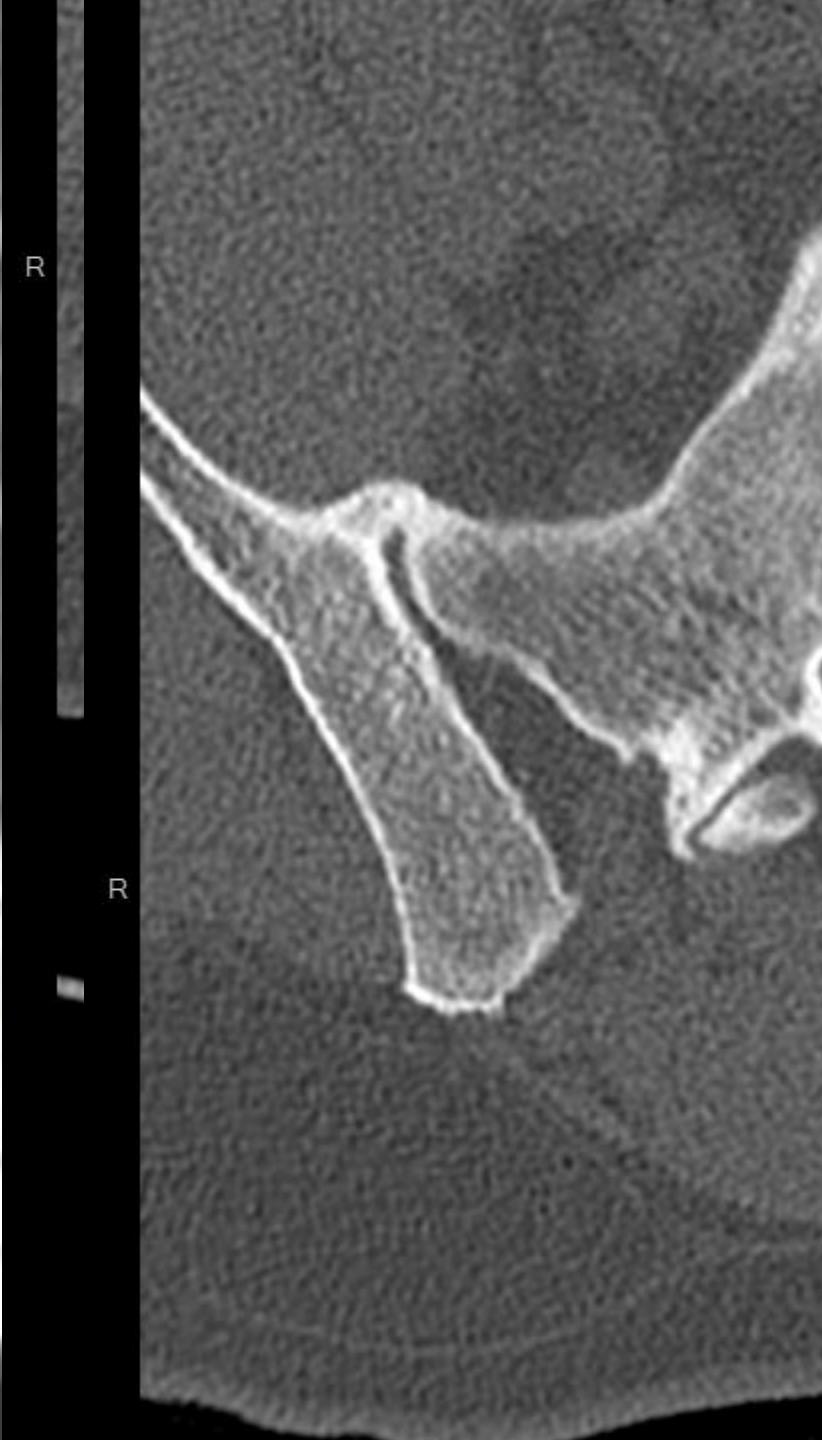
Poor

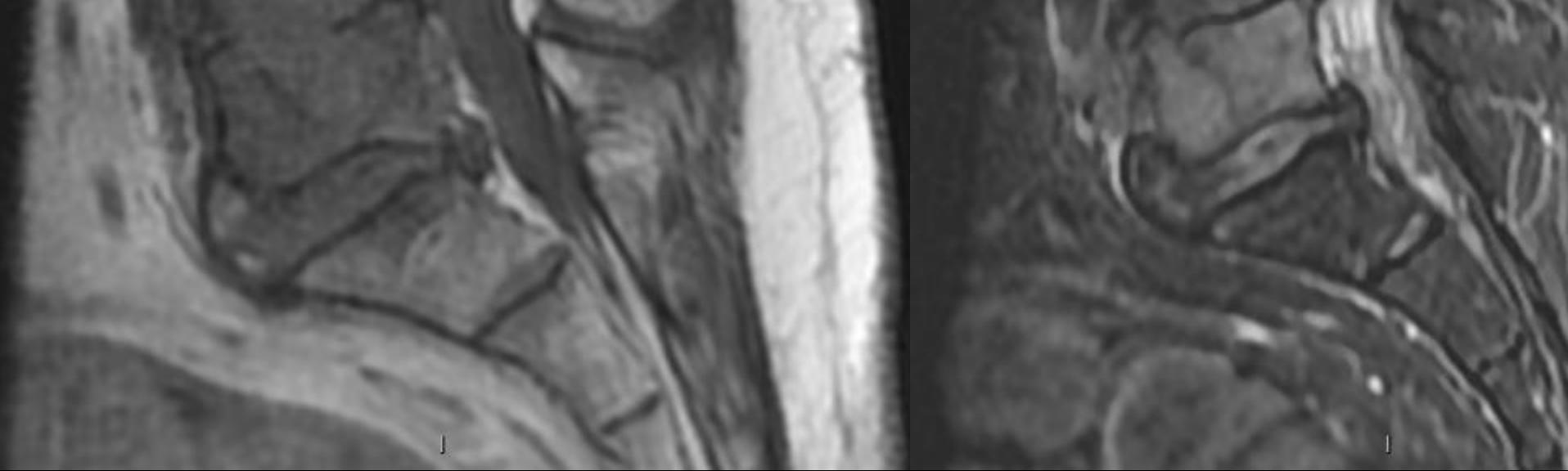
!! Fat-saturated intermediate-W FSE !!
increased sensitivity
Decreased specificity











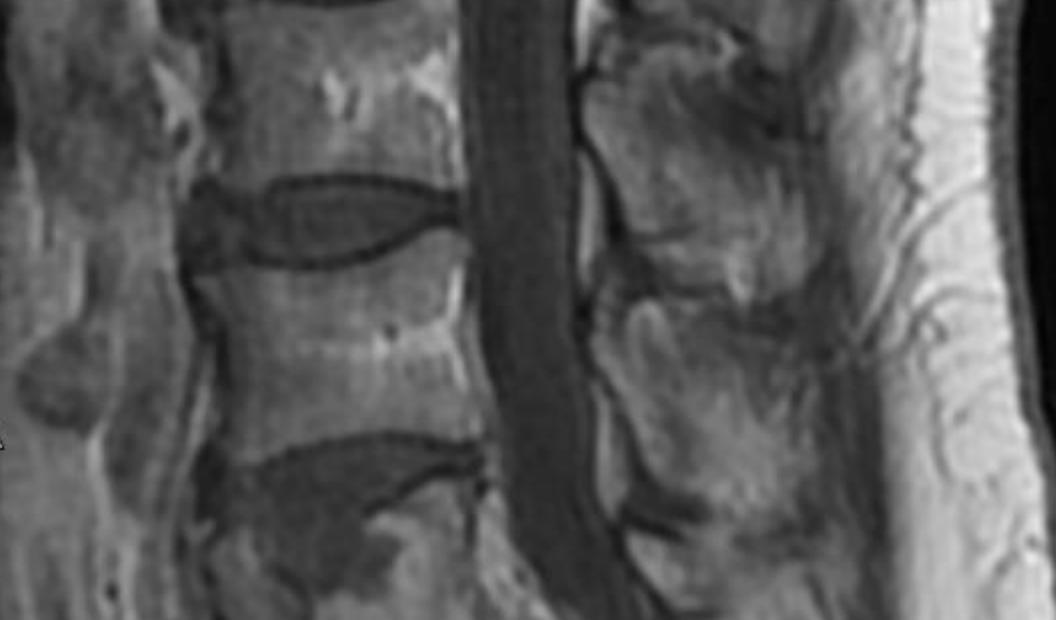
Actuel

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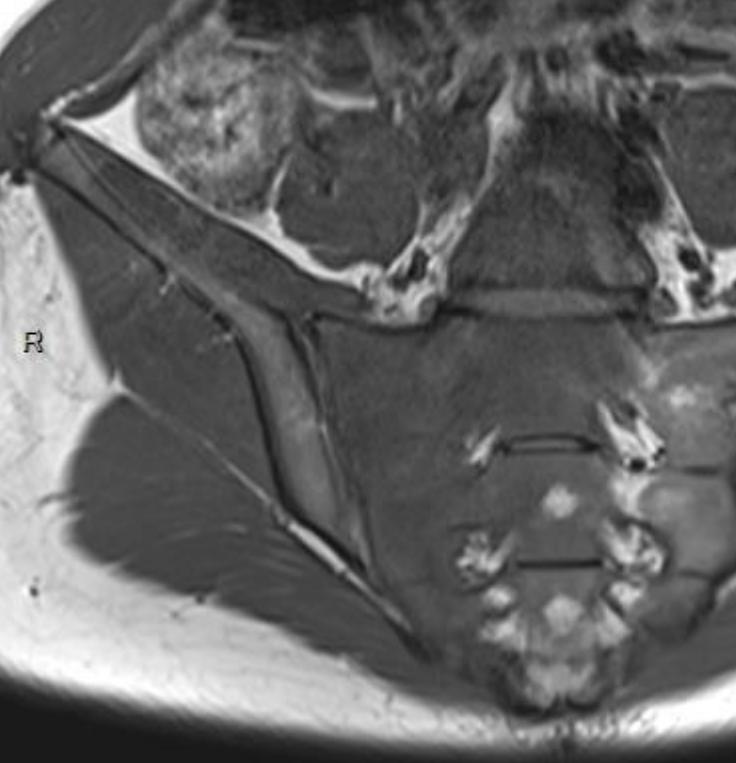
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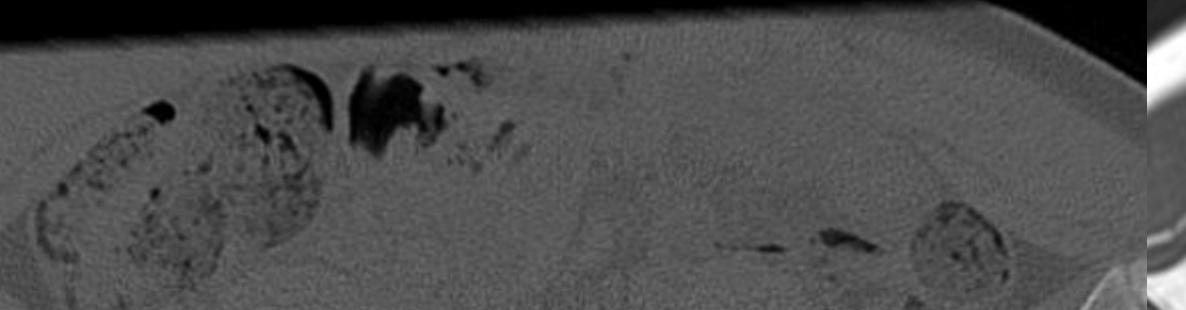
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