



Non-traumatic Musculoskeletal Emergencies

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European Society of Emergency Radiology

Special thanks to Dr Marcela de la Hoz Polo



BSER

British Society of Emergency Radiology

Nordter, Aarhus, May 2023



ESER

European Society of
Emergency Radiology

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Objectives

- Learn how to classify MSK emergencies according to compartment and etiology (infection, inflammation, ischaemia and insufficiency)
- Know which imaging modality to use in which clinical scenario
- Understand what constitutes a surgical emergency and when to pick up the phone
- Understand the limitations of imaging in making the diagnosis

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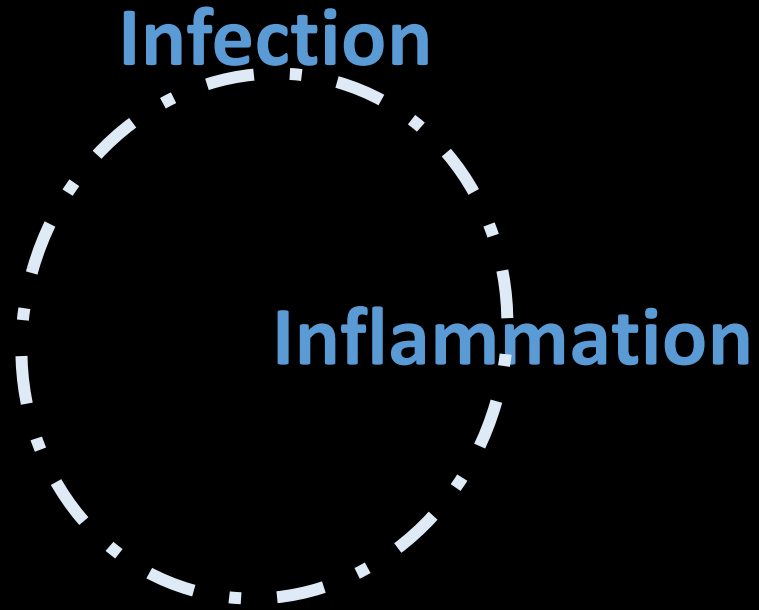
ALL IMAGING HAS BEEN ANONYMISED/PSEUDOANONYMISED

What is a MSK Emergency?

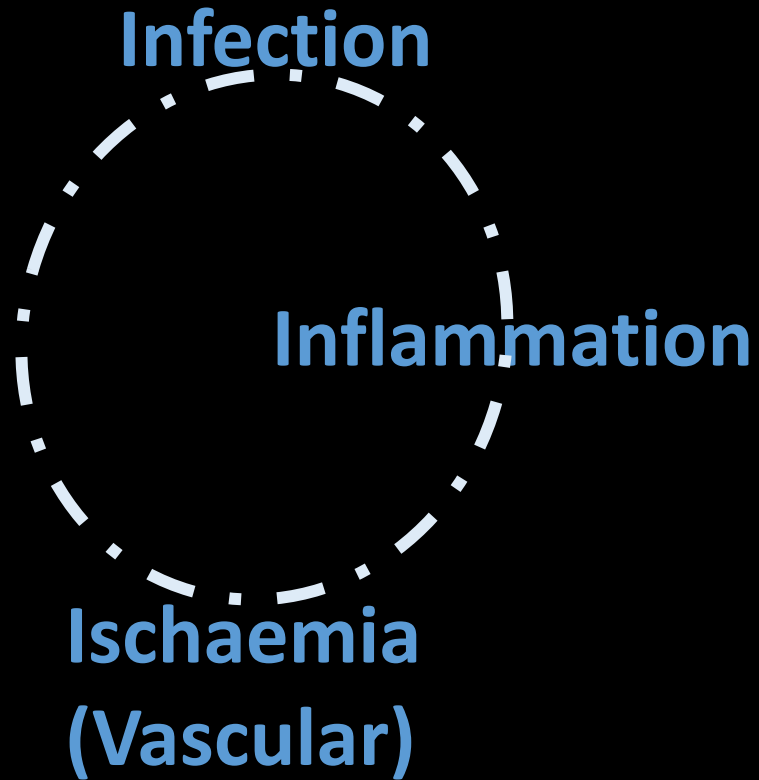
Infection



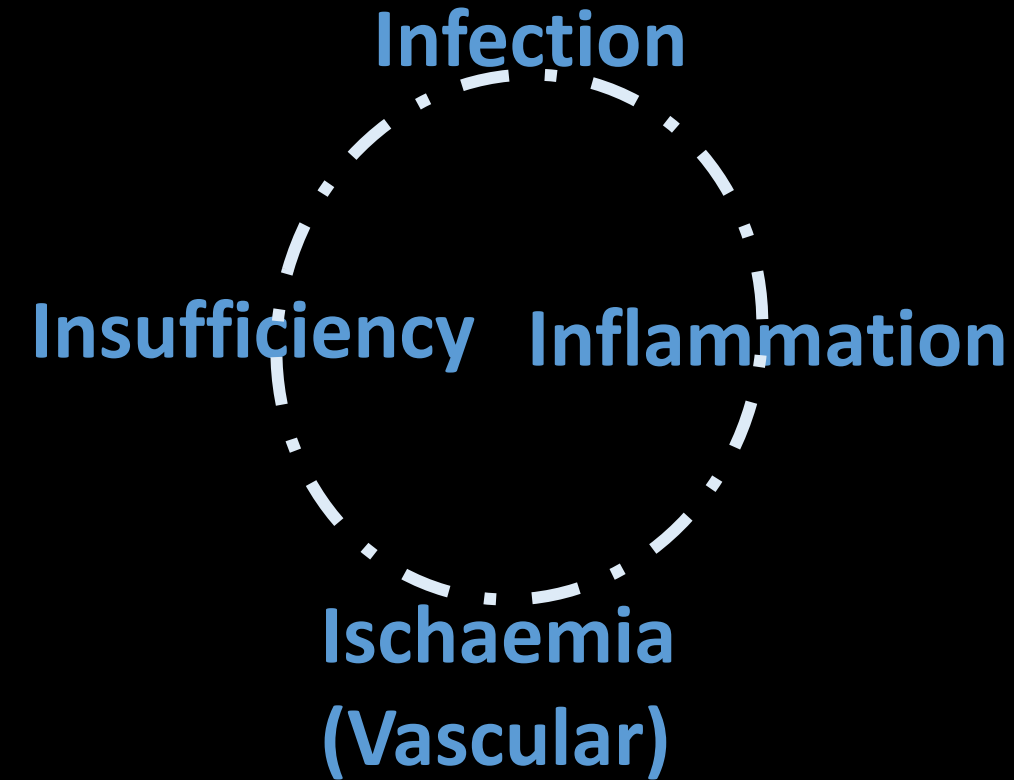
What is a MSK Emergency?



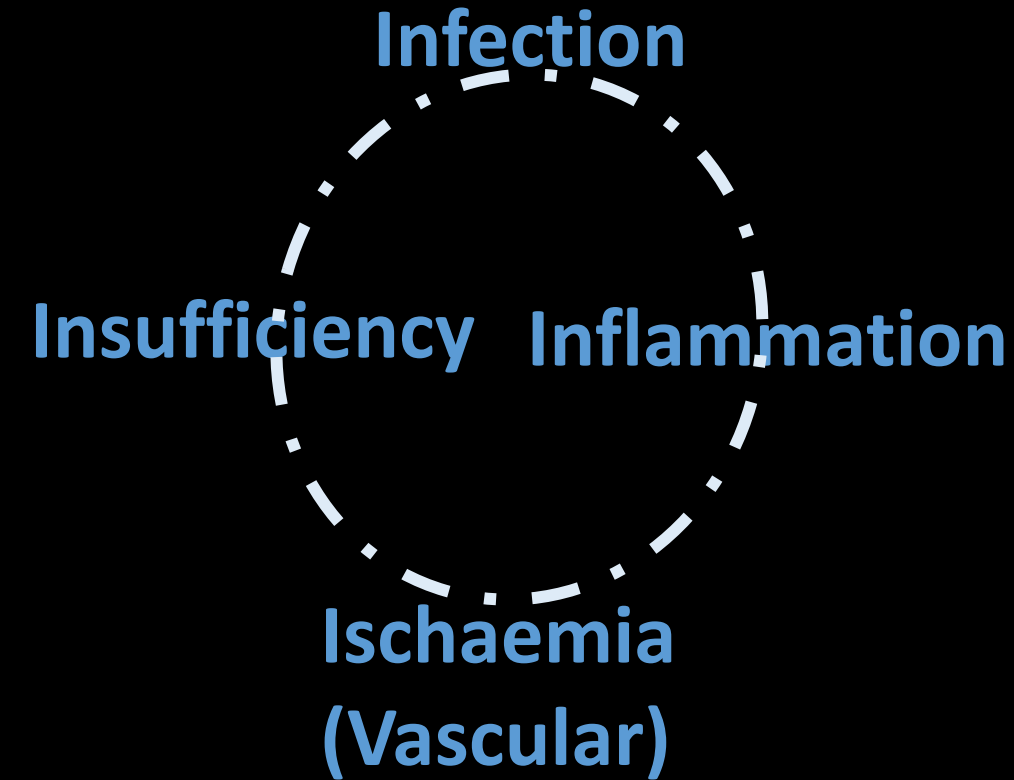
What is a MSK Emergency?



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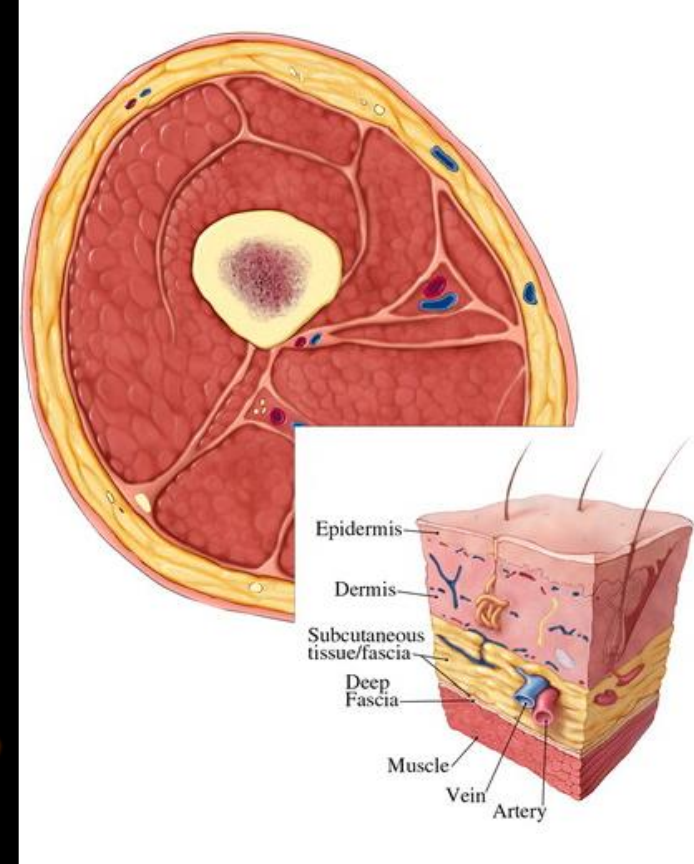


What is a MSK Emergency?

Infection

Insufficiency Inflammation

Ischaemia
(Vascular)



What is a MSK Emergency?

Infection

Insufficiency Inflammation

Ischaemia
(Vascular)

Non-Traumatic

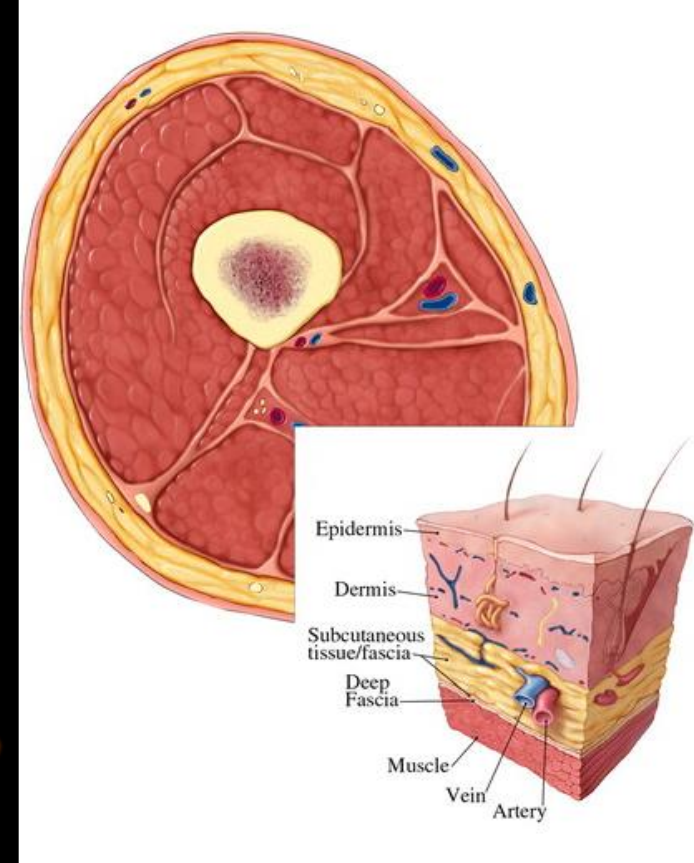
Subcutaneous

Fascia

Muscle

Bone

Joint



What is a MSK Emergency?

Non-Traumatic

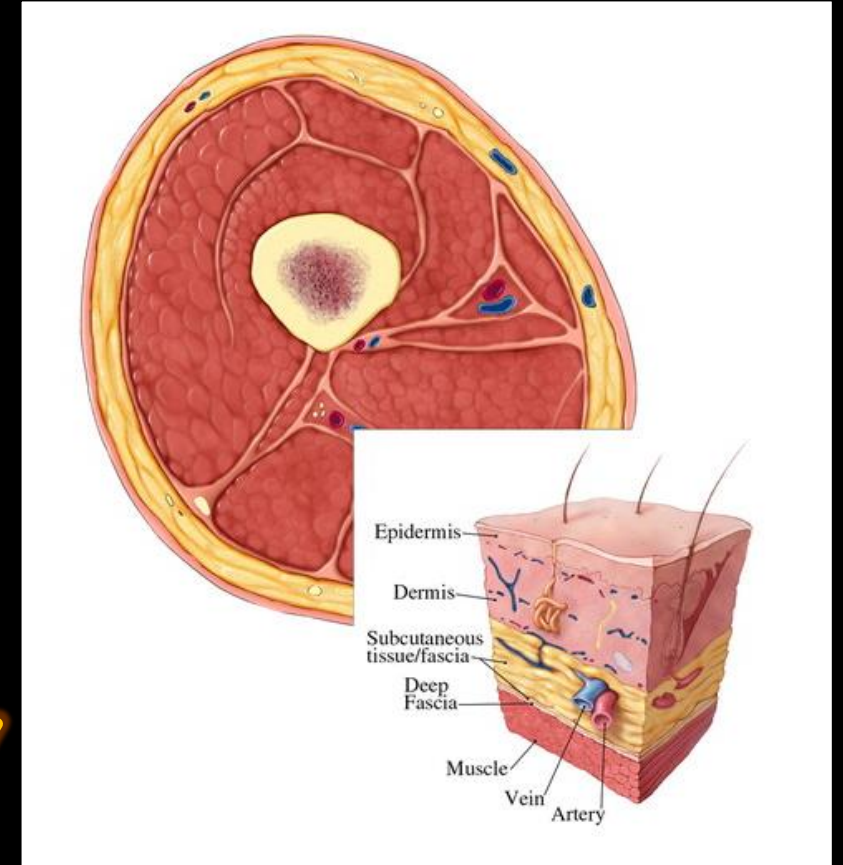
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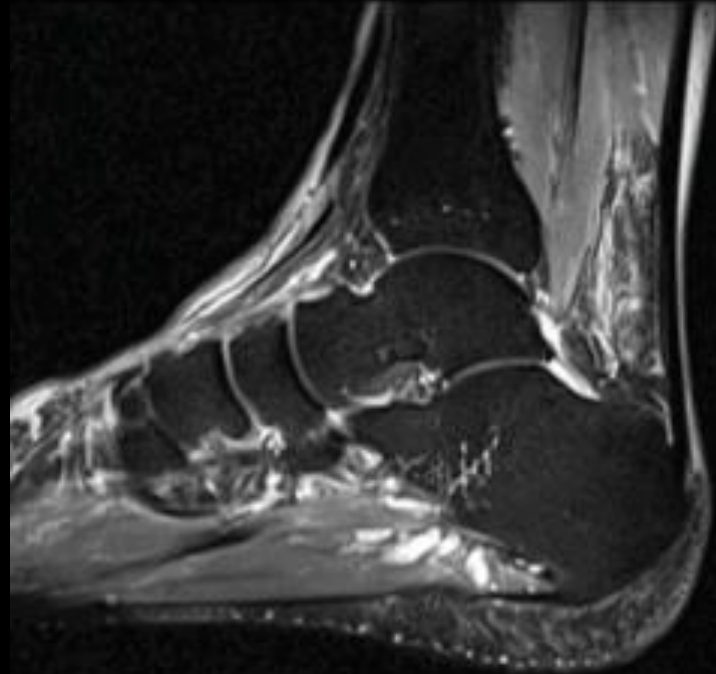
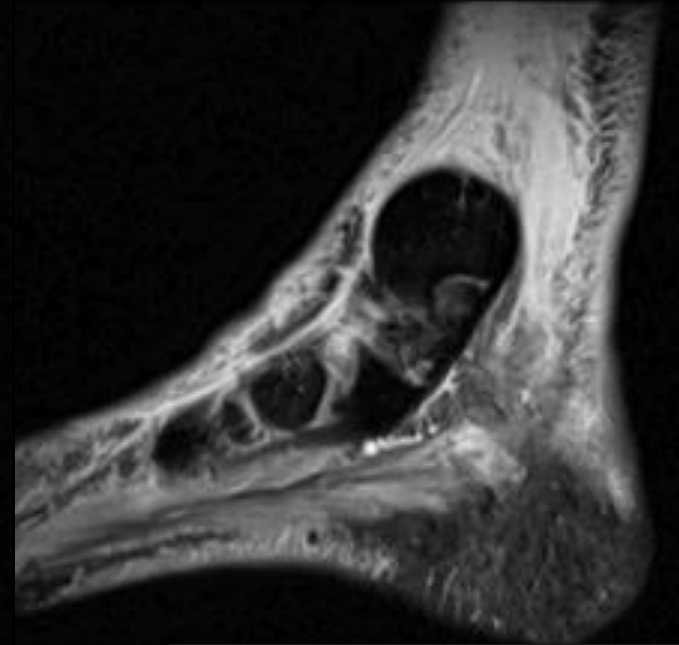
Bone

Joint

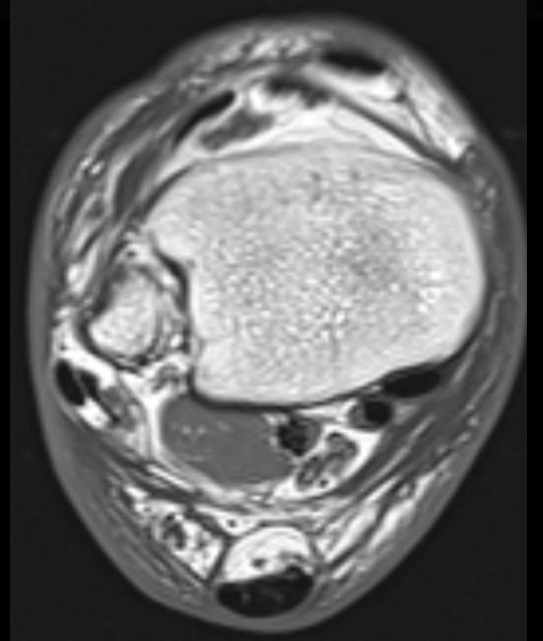


Clinical Question: Cellulitis or Necrotising Fasciitis ?

T2
fatsat



T1

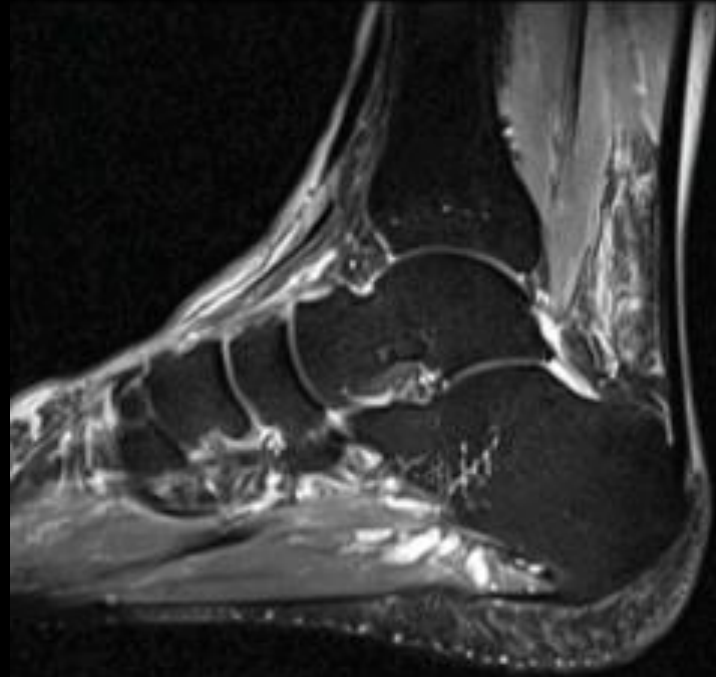
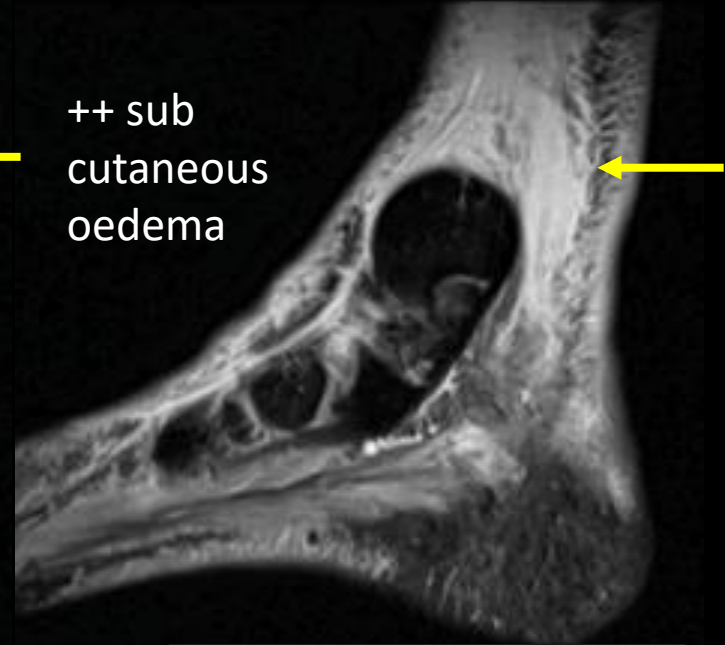


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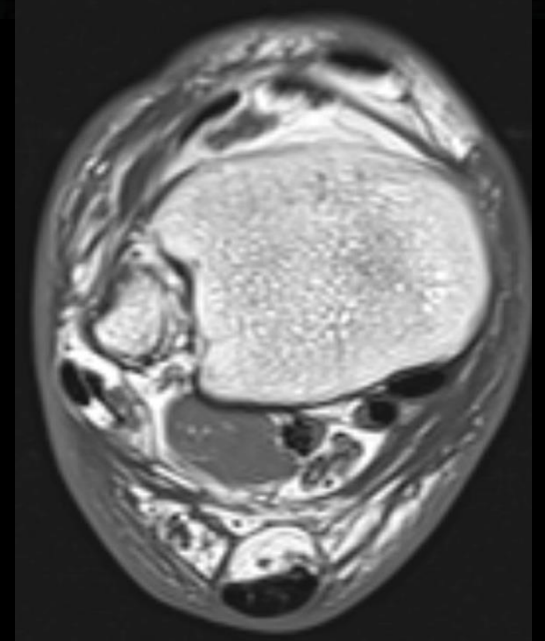
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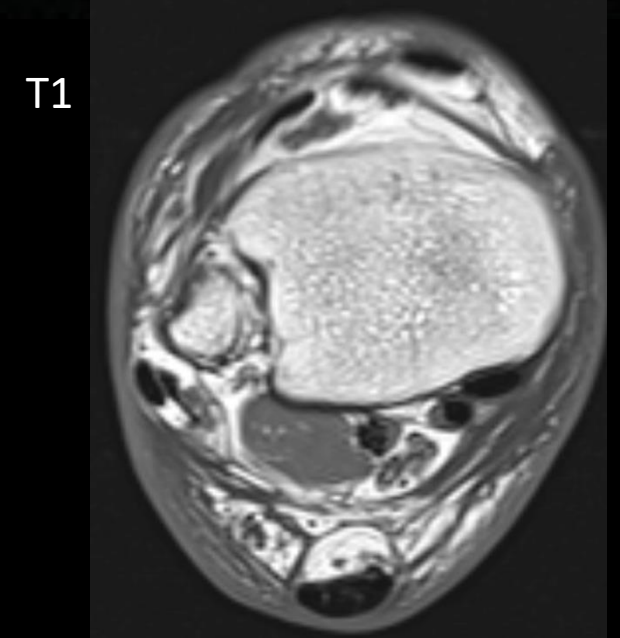
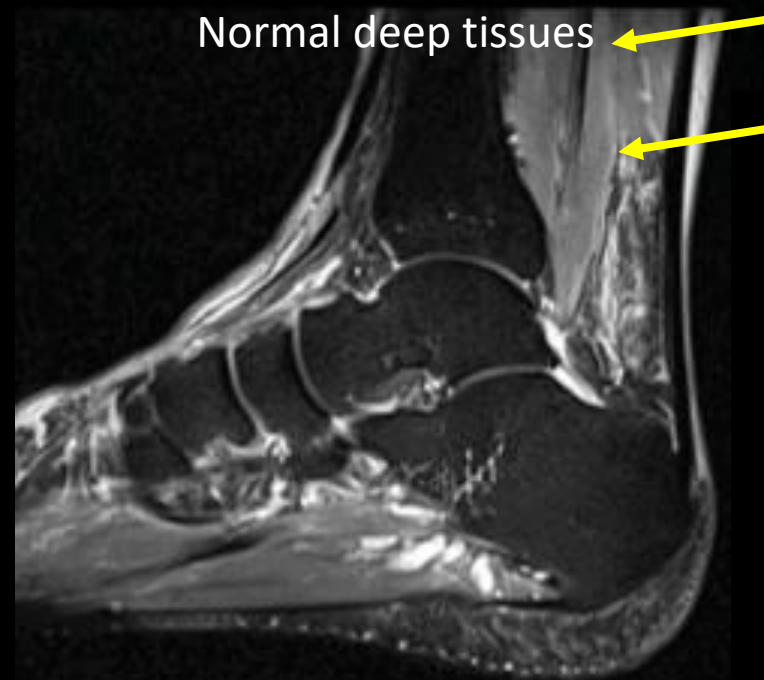
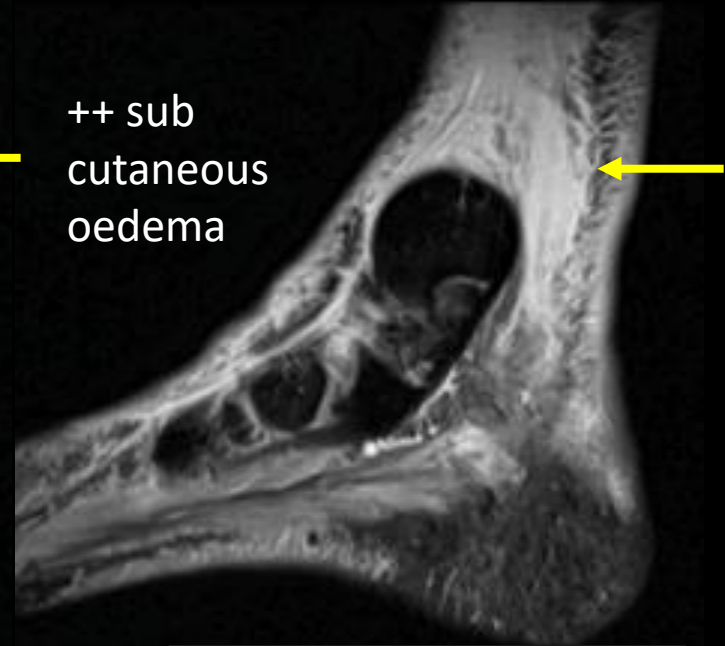
++ sub
cutaneous
oedema



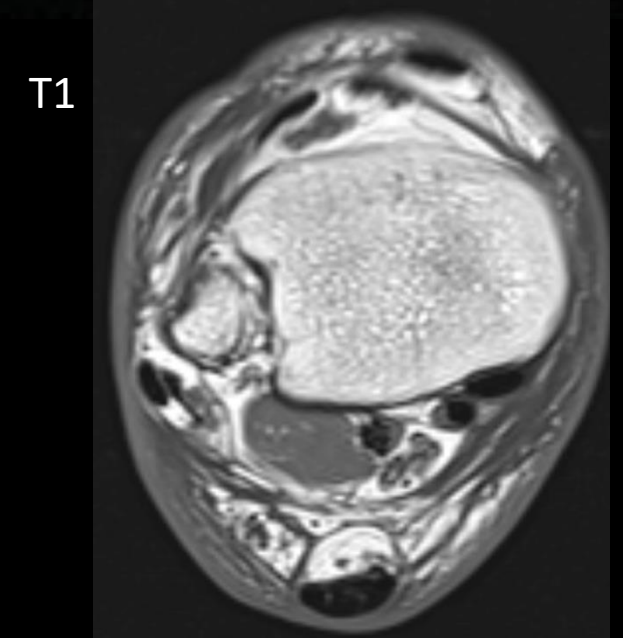
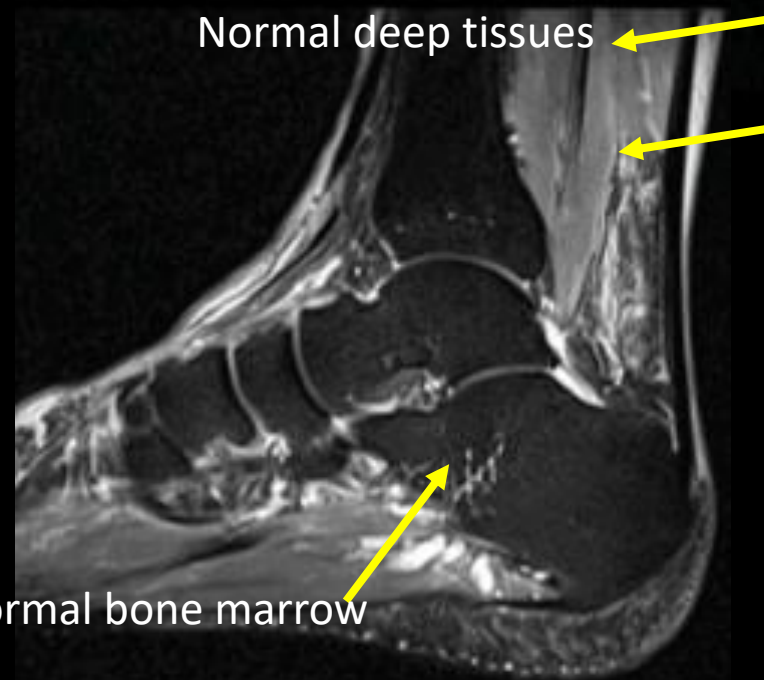
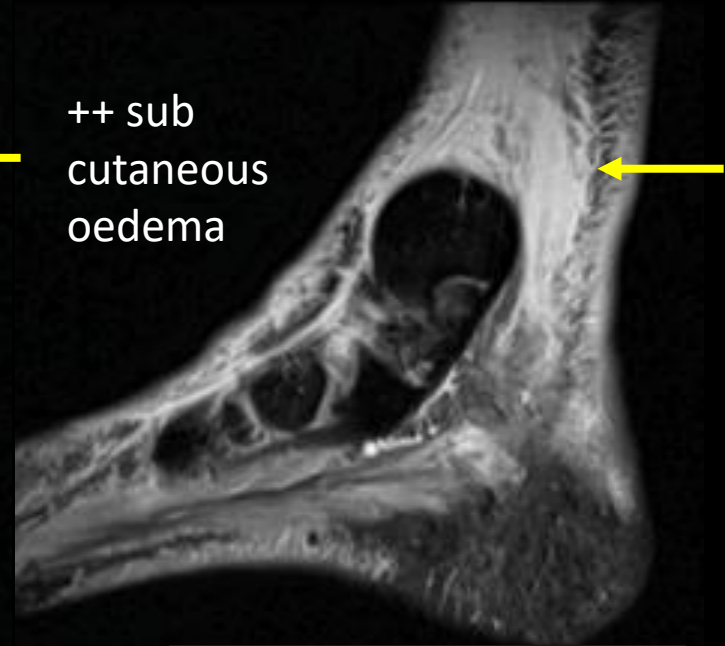
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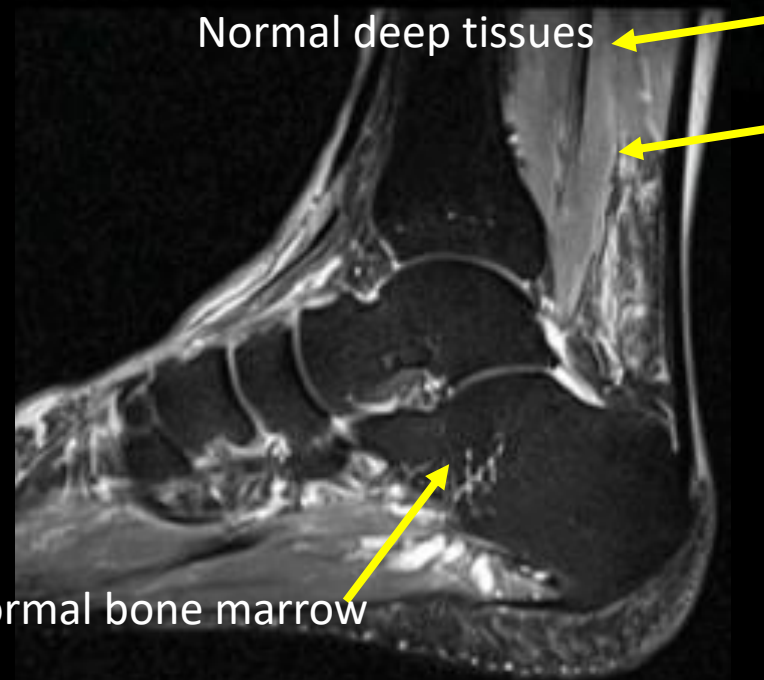
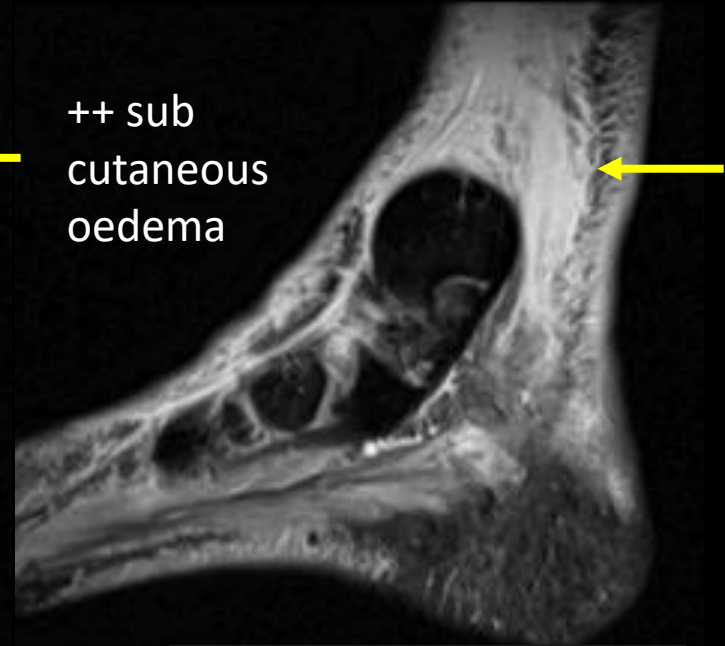
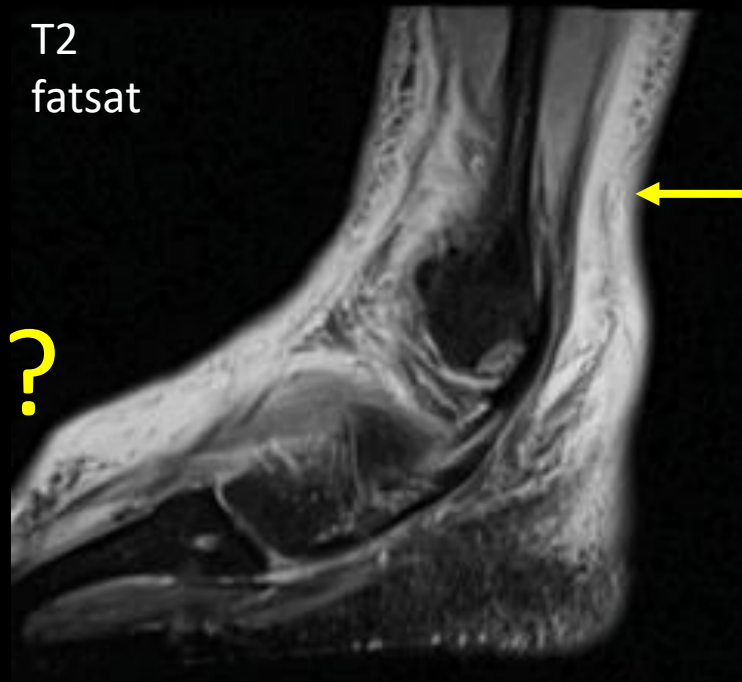
Clinical Question: Cellulitis or Necrotising Fasciitis?



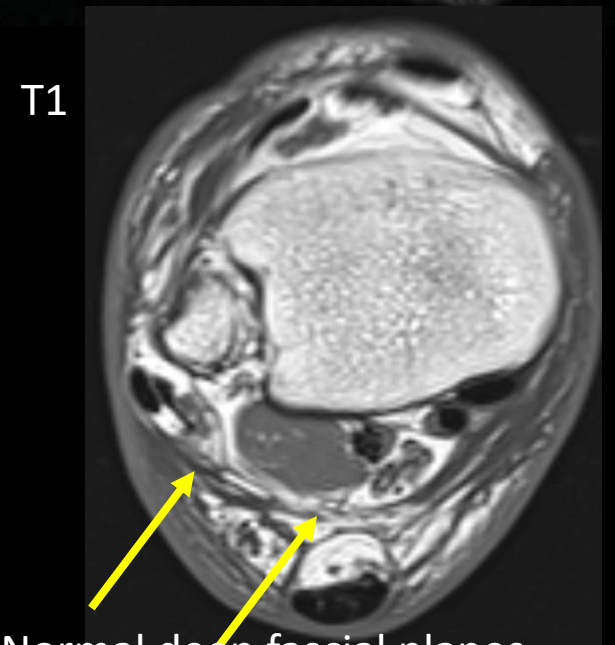
Clinical Question: Cellulitis or Necrotising Fasciitis?



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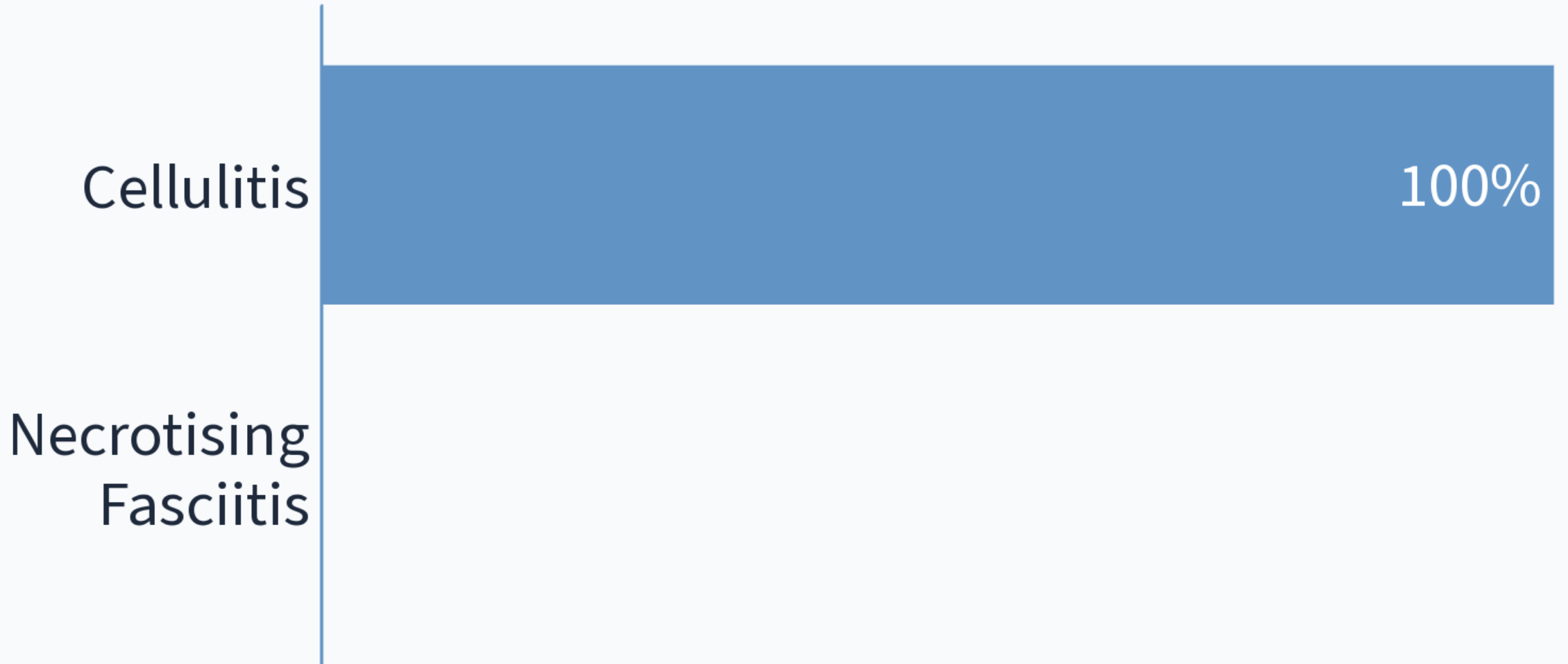
Normal bone marrow



Normal deep fascial planes

QUESTION 1

Cellulitis or Necrotising Fasciitis

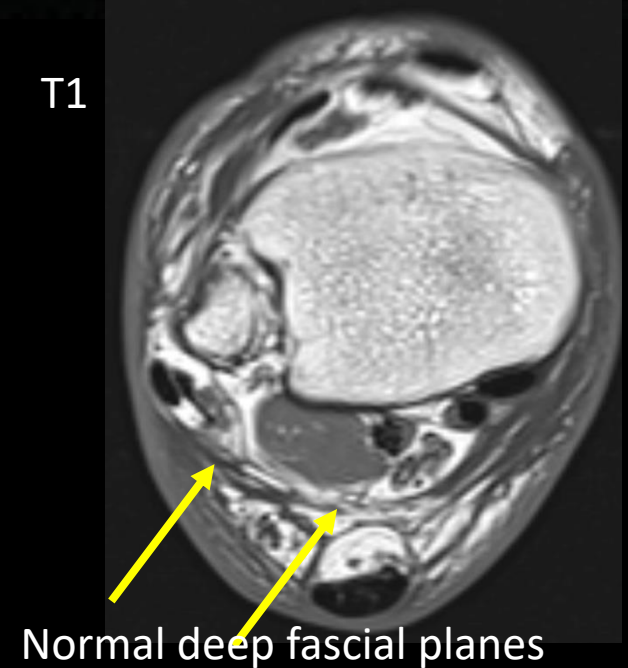
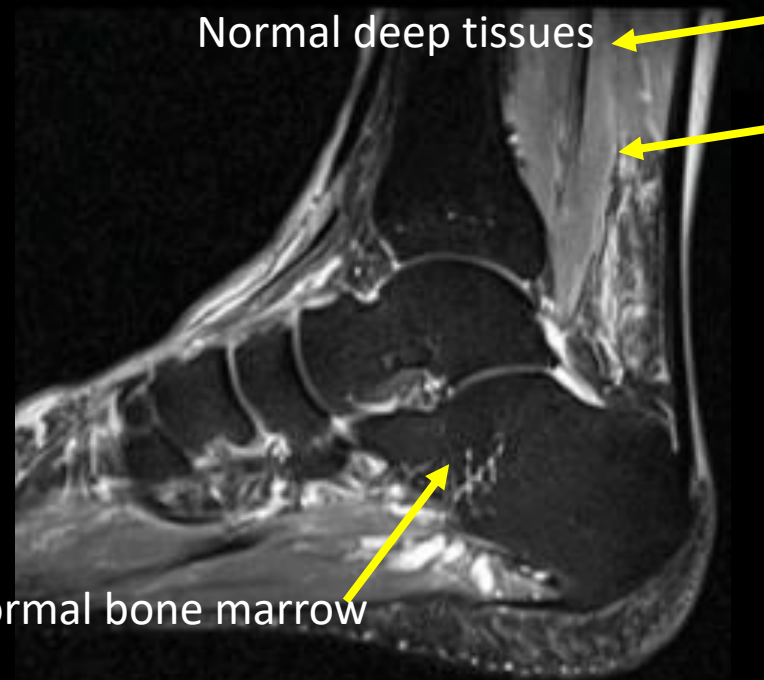
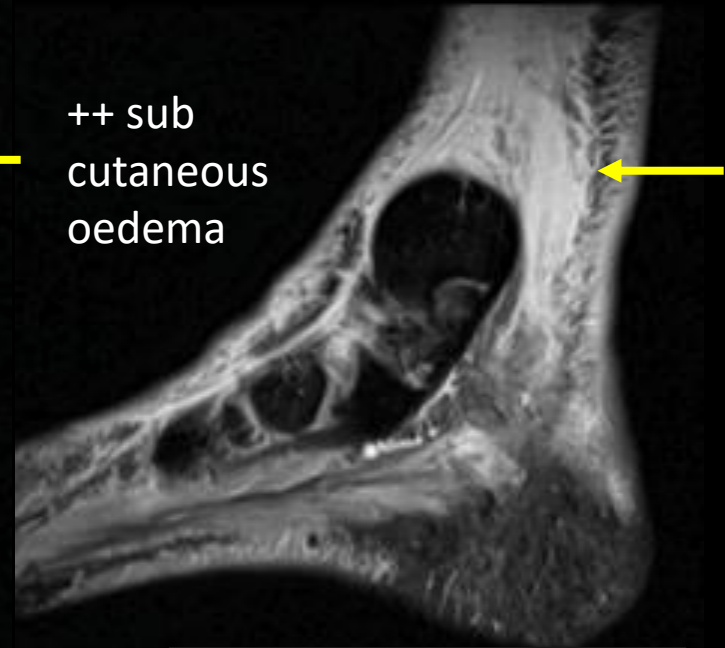
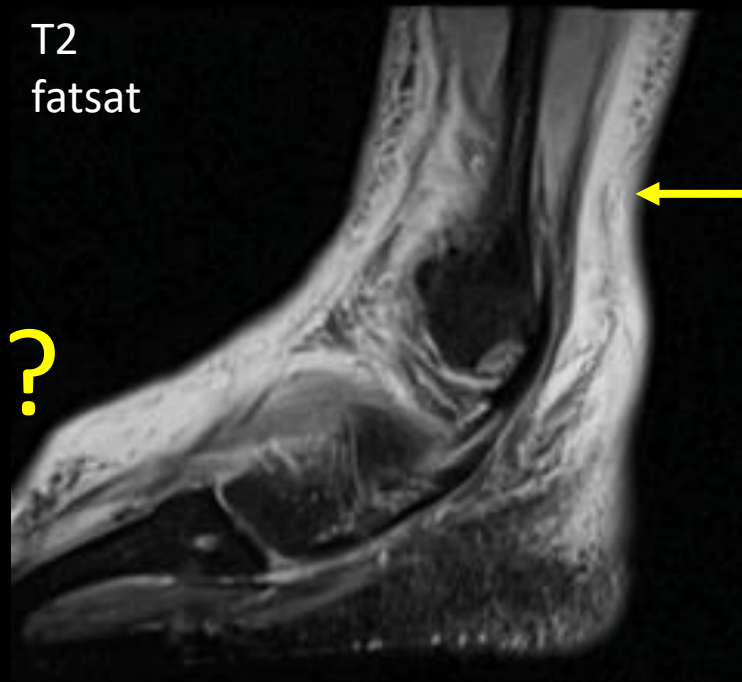


Clinical Question: Cellulitis or Necrotising Fasciitis?

Vote NOW:

A. Cellulitis

B. Necrotising Fasciitis

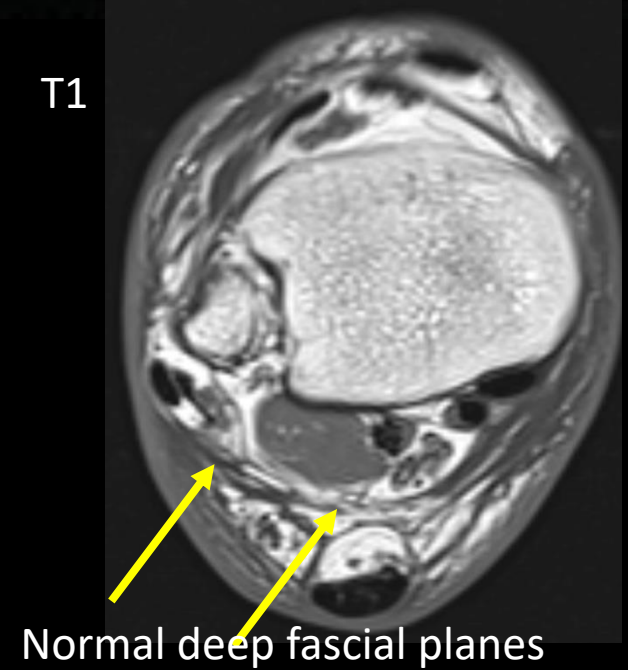
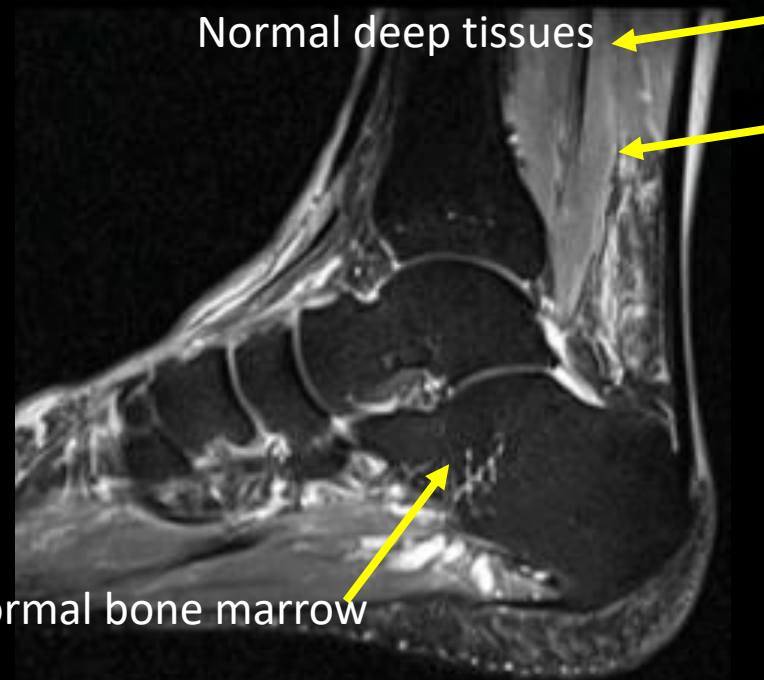
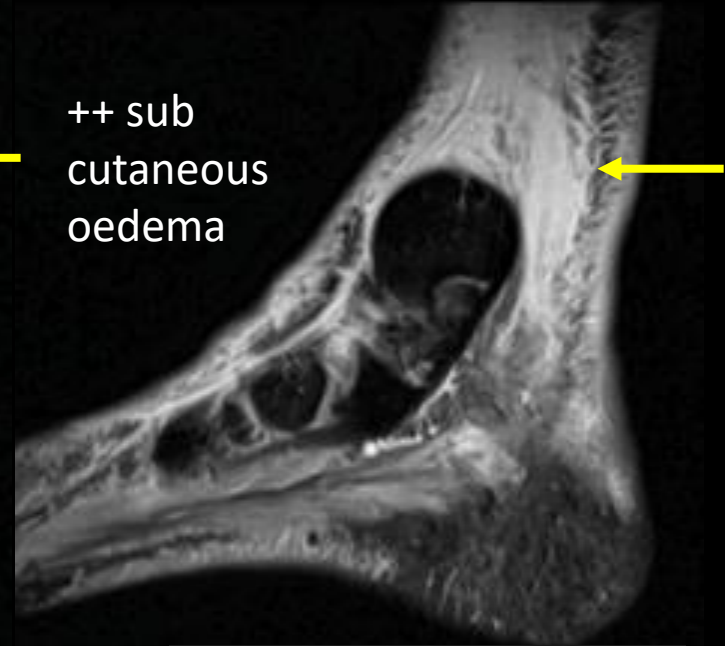


Clinical Question: Cellulitis or Necrotising Fasciitis?

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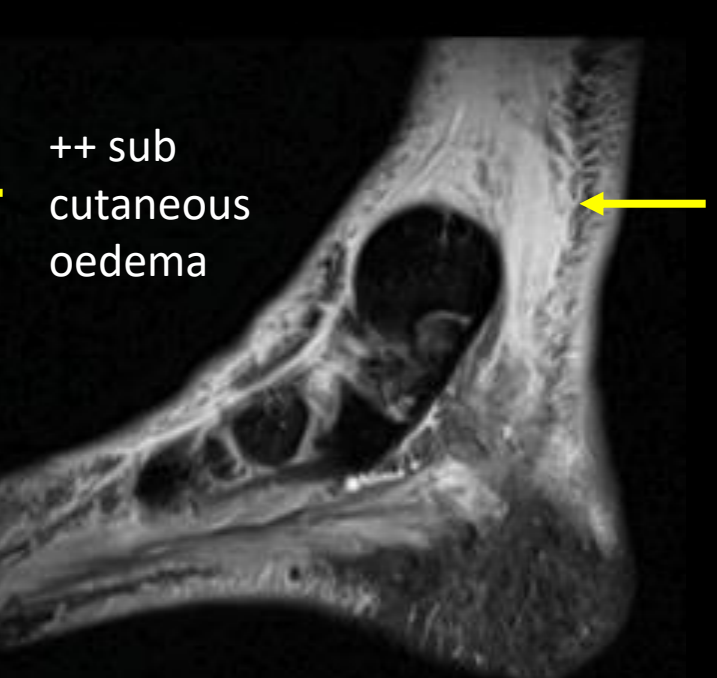
A. Cellulitis TRUE

B. Necrotising Fasciitis
FALSE



Diagnosis: Cellulitis

T2
fatsat

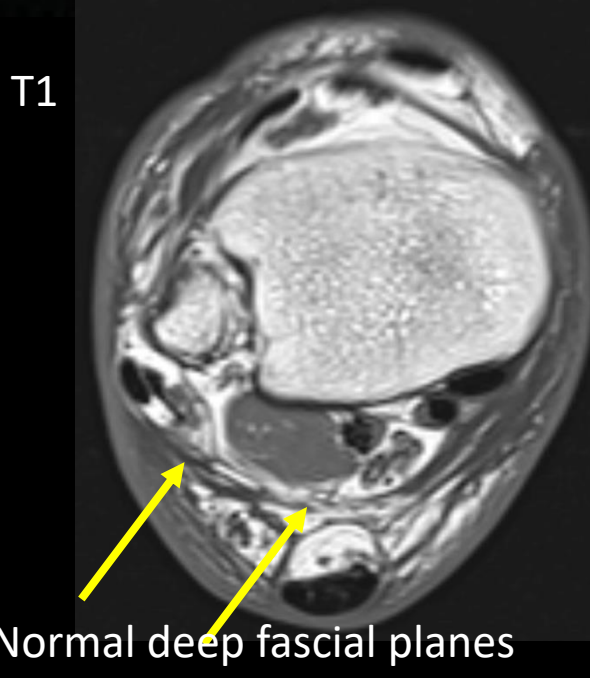
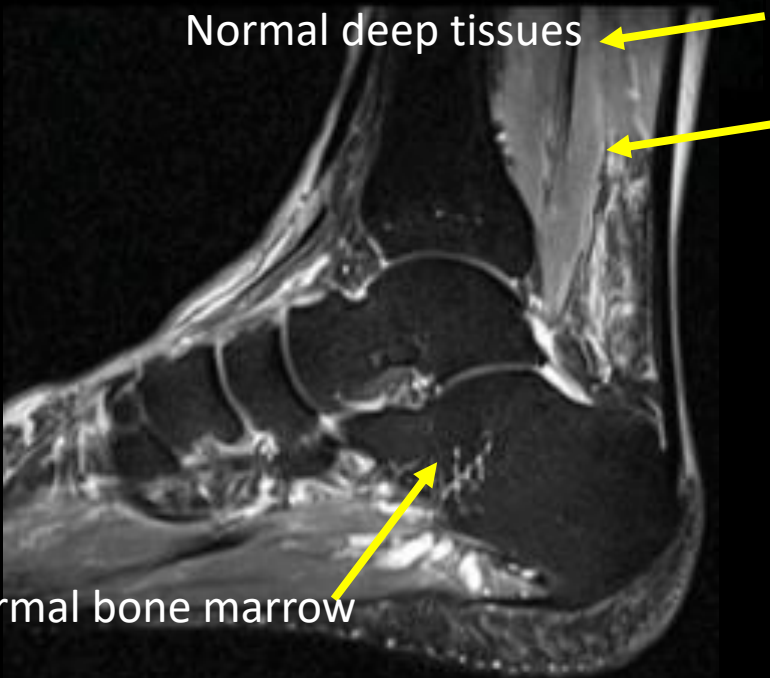


EXTENSIVE SUBCUTANEOUS
OEDEMA

DEEP FAT PLANES PRESERVED

OEDEMA CONFINED TO THE
SUPERFICIAL TISSUE.

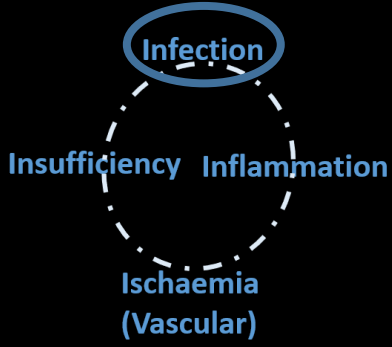
NO BONE INVOLVEMENT



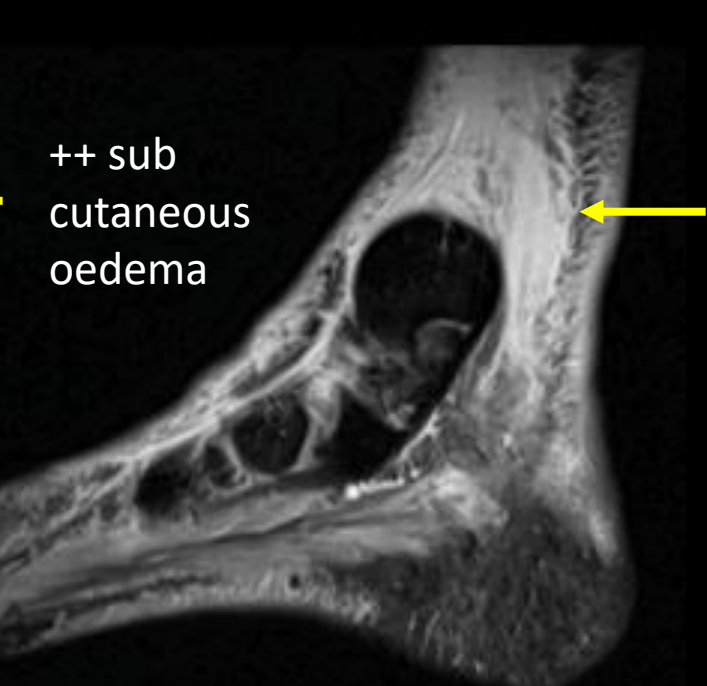
T1

Normal deep fascial planes

Diagnosis: Cellulitis



T2
fatsat

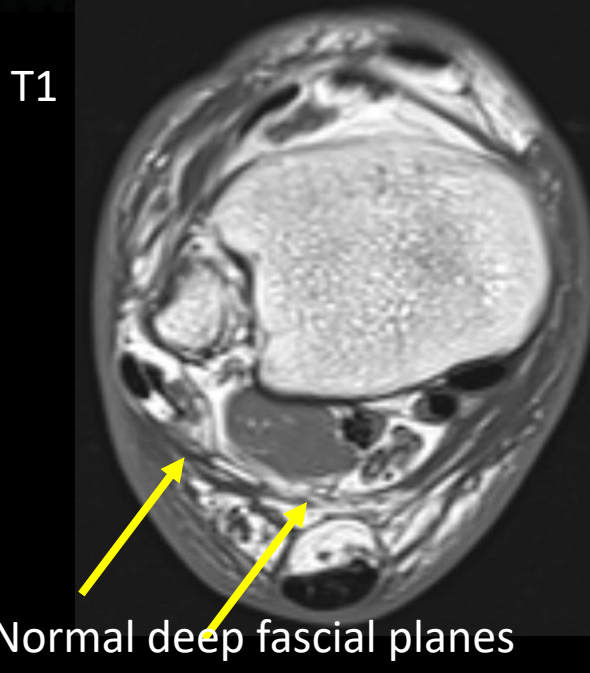
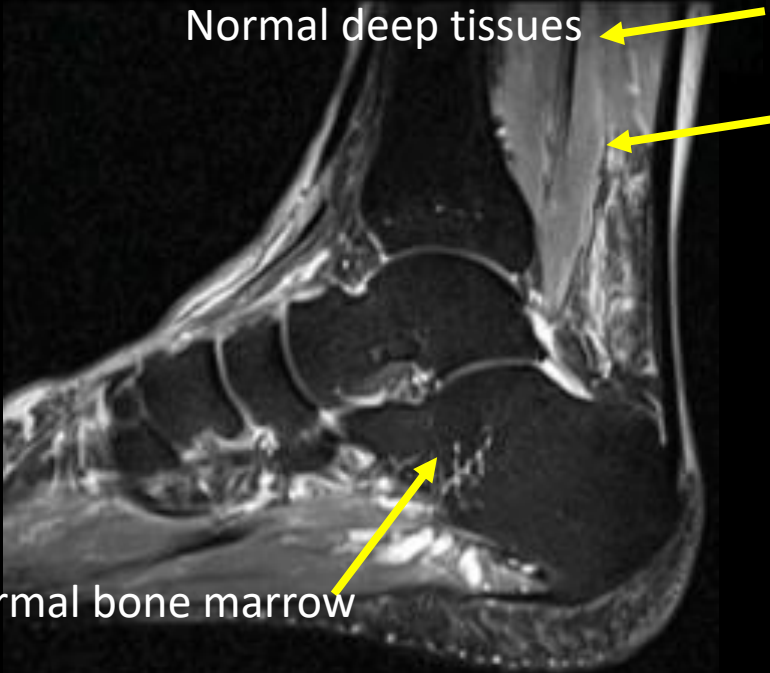


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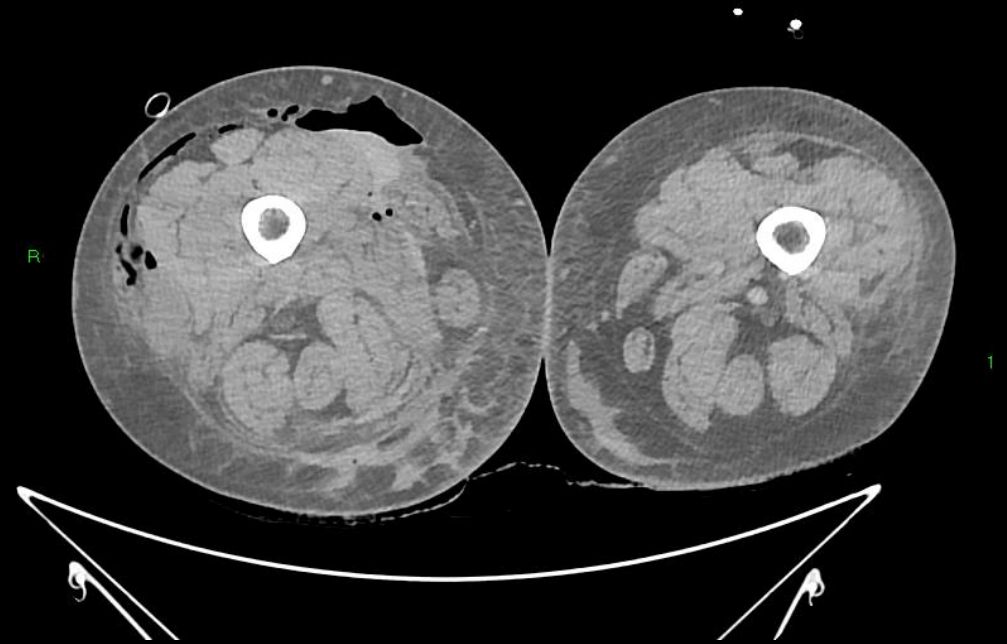
What happens if the cellulitis spreads?

Soft tissue infections

- Cellulitis
- Necrotising Fasciitis
- Pyomyositis

QUESTION 2

- Different patient
- Dx: Necrotising Fasciitis



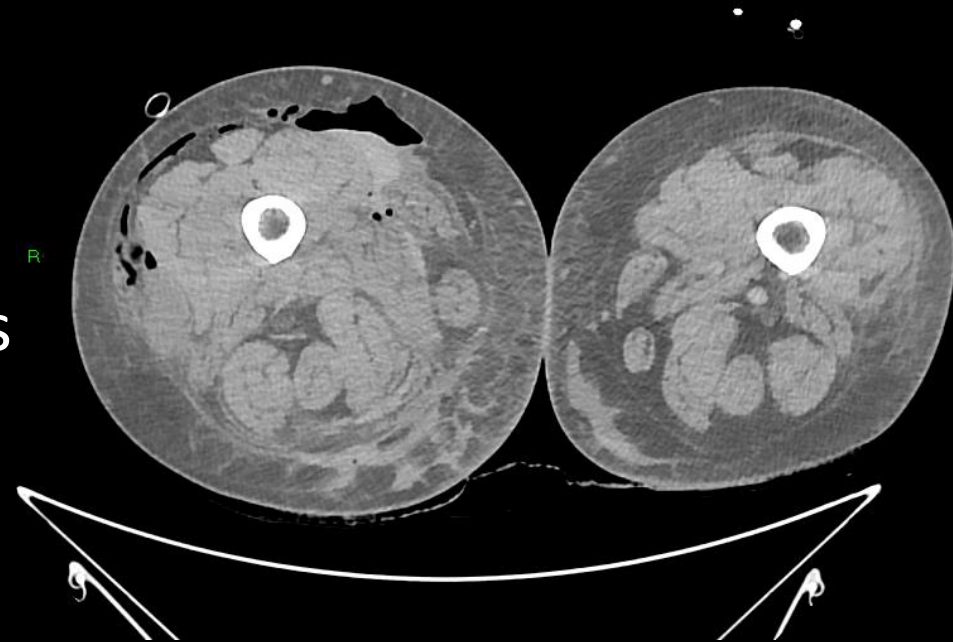
Q2: Concerning necrotising fasciitis. Choose one correct answer

A: Absence of gas excludes necrotising fasciitis

B: Soft tissue gas and deep fascial fluid suggest necrotising fasciitis

C: Necrotising fasciitis usually responds to conservative management

D: necrotising fasciitis is common



Concerning necrotising fasciitis. Choose one correct answer

Absence of gas excludes necrotising fasciitis

Soft tissue gas and deep fascial fluid suggest necrotising fasciitis

Necrotising fasciitis usually responds to conservative management

necrotising fasciitis is common

100%

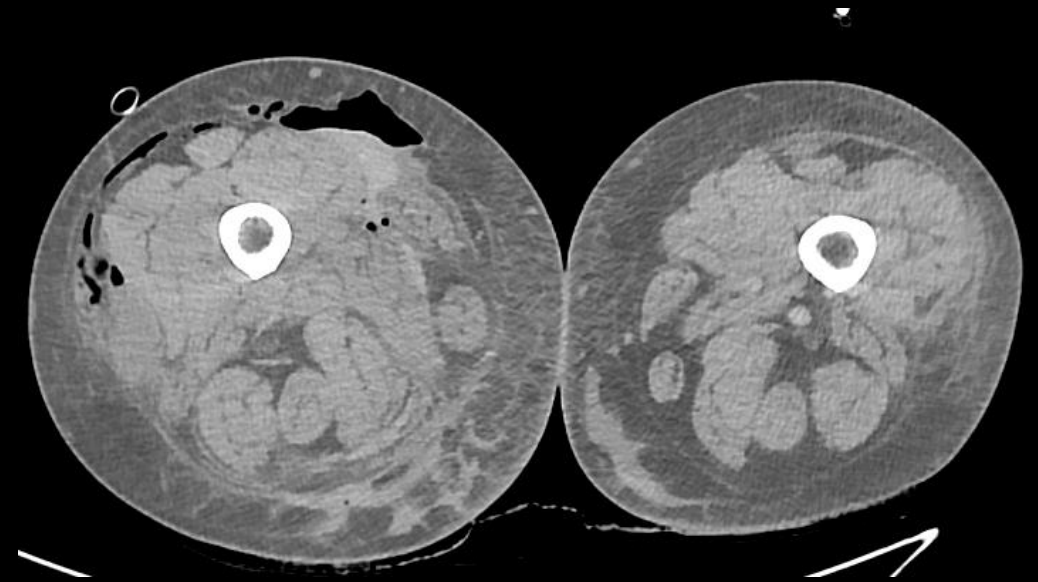
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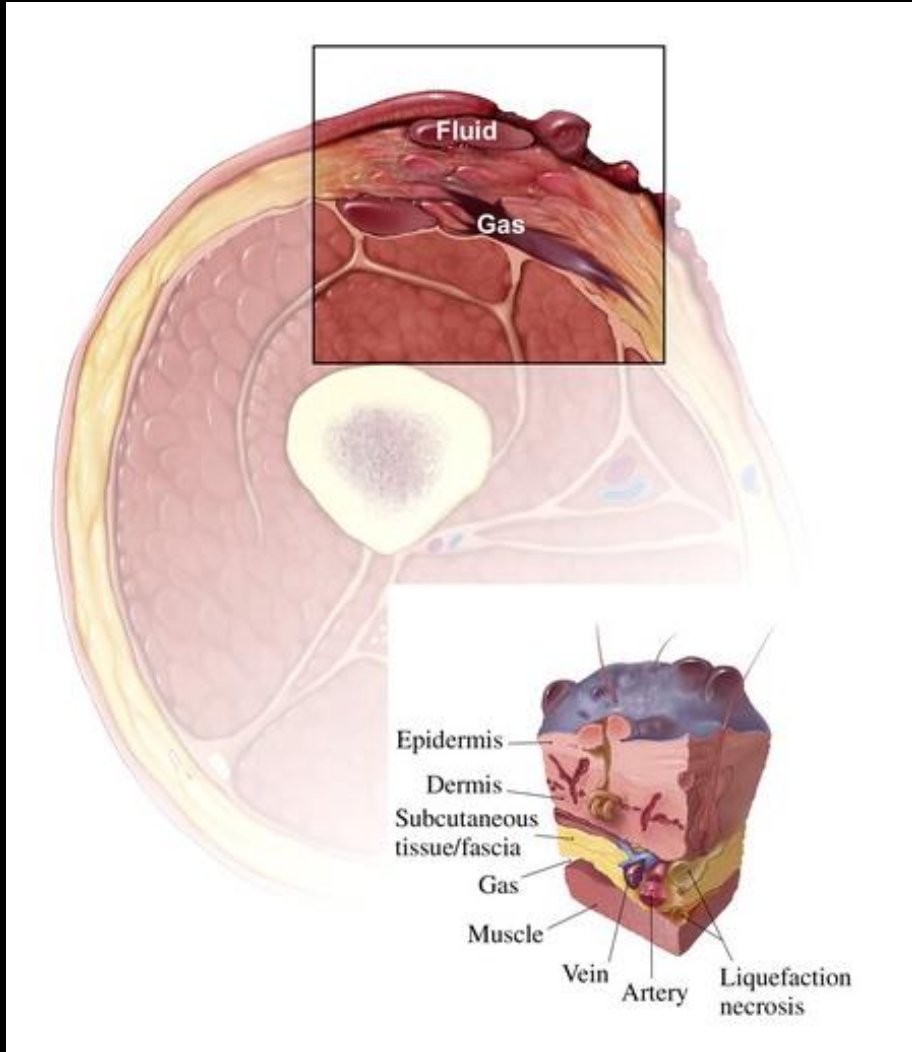
C: Necrotising fasciitis usually responds to conservative management False

D: Necrotising fasciitis is common False



Necrotising fasciitis

Necrotizing Fasciitis



- Rapidly progressive infection of deep tissue
- Various organisms
- Severe pain out of proportion to the degree of skin manifestations
- Difficult to recognize clinically
- High Morbidity & Mortality 70-80%



URGENT DIAGNOSIS!!! MAKE THAT CALL!

What the Clinicians Want to Know?

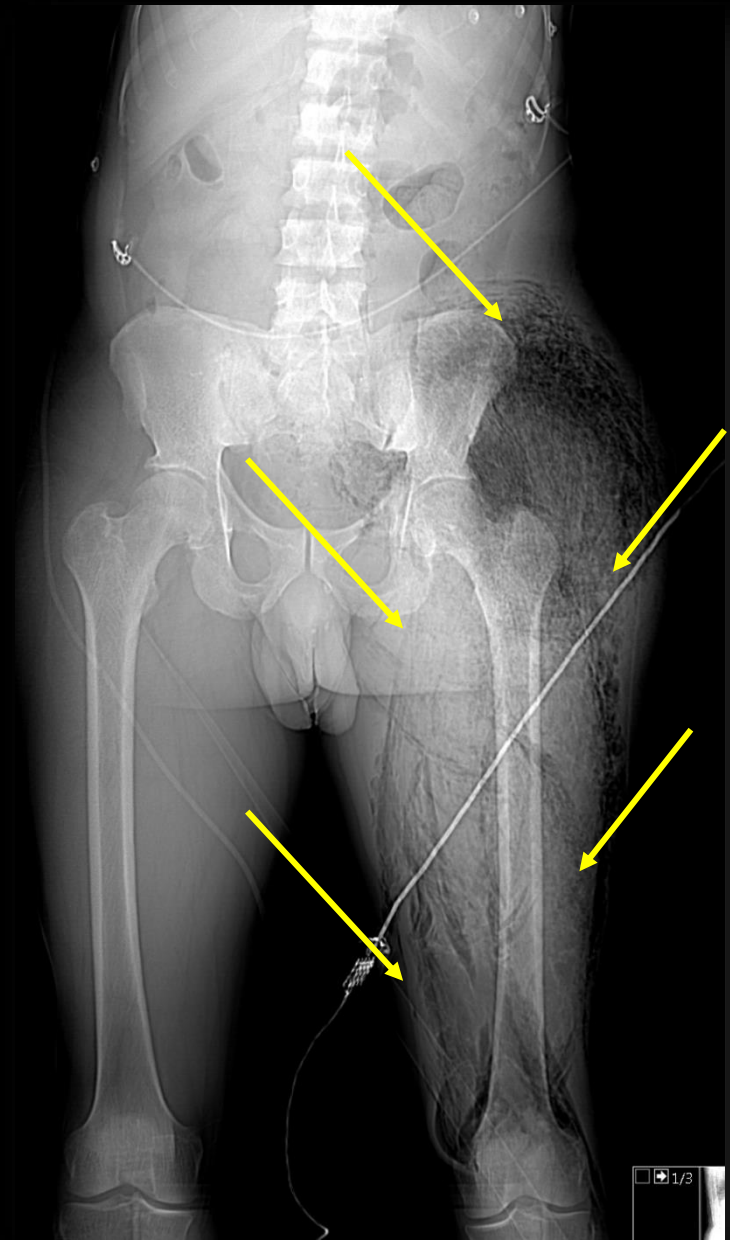
- Extent
 - DISTAL TO PROXIMAL
 - DEEP TO SUPERFICIAL (myonecrosis, osteomyelitis)

Necrotizing Fasciitis - Imaging

- Plain film: Gas
 - only in 24% cases
 - ominous sign

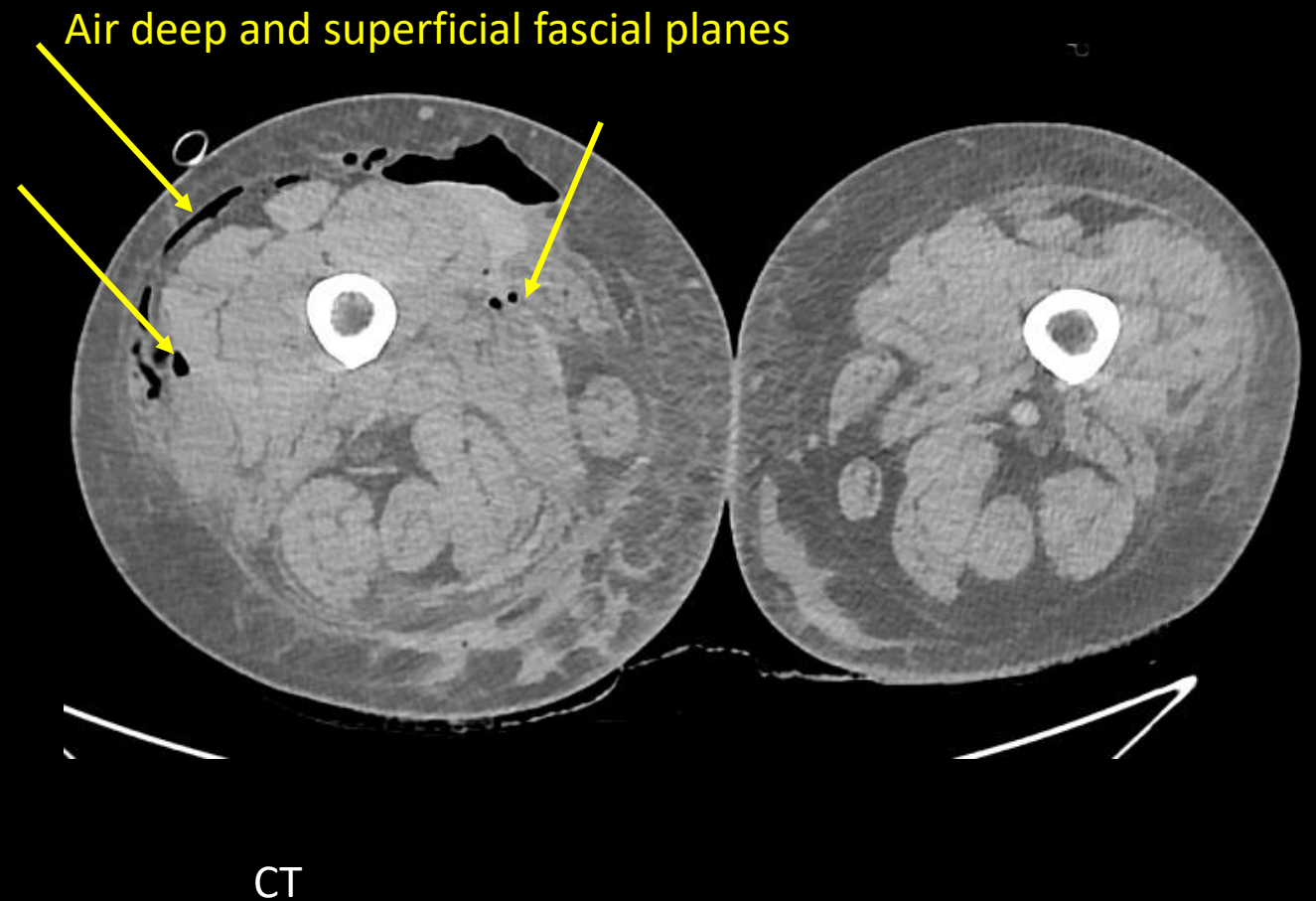
- CT

- MRI



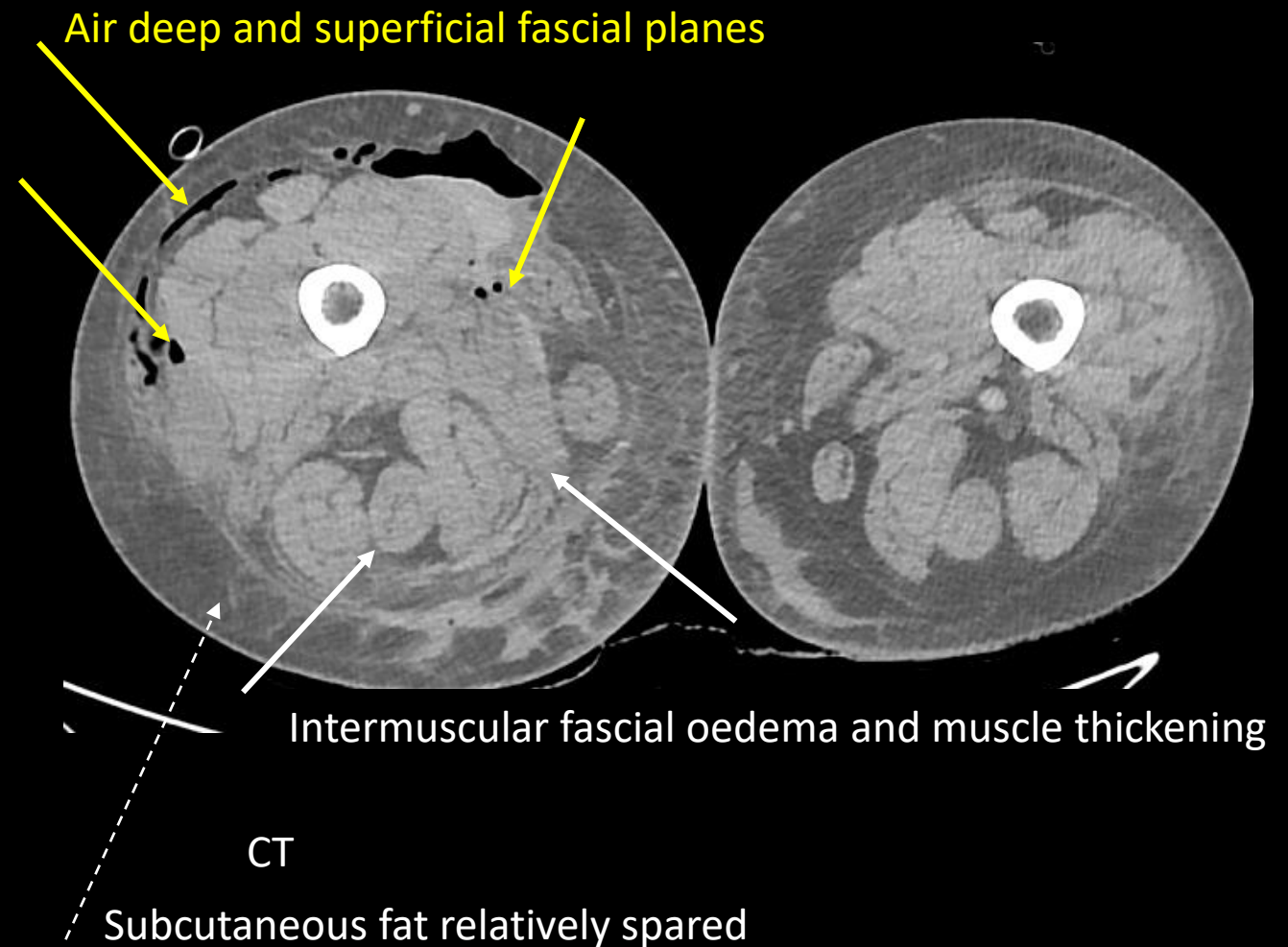
Necrotizing Fasciitis - Imaging

- Plain film
- CT : initial modality of choice. Subcutaneous oedema and fat stranding *with/without gas*, intermuscular fascial oedema and thickening
- MRI:

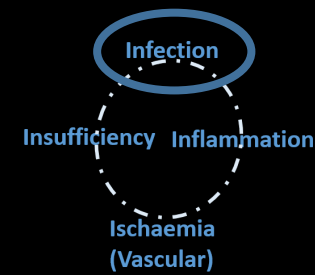


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Necrotizing Fasciitis - Imaging



MRI different patient

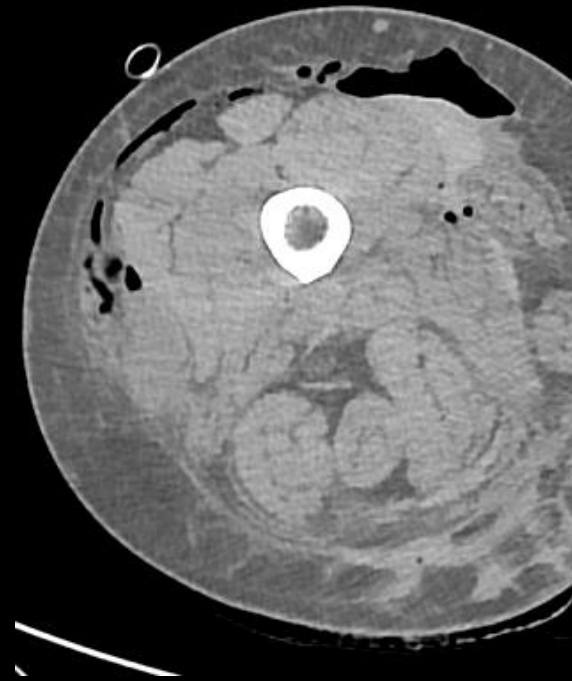
- Plain film

- CT

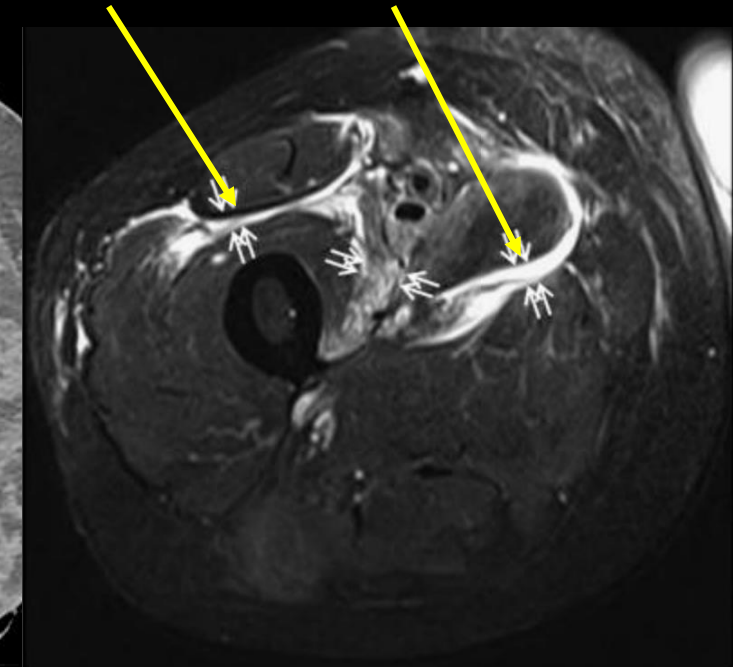
- MRI:

- Relatively less subcutaneous oedema in comparison with cellulitis
- Thickening fascia, fascial fluid

Intermuscular fascial oedema and muscle thickening

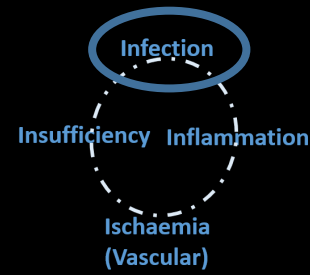


CT



MRI – Ali et al BJR 2014

Necrotizing Fasciitis - Imaging



- Plain film

- CT

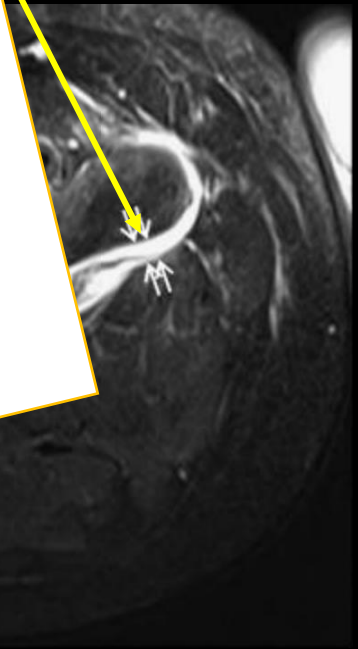
- MRI:

- Relatively
- in compari
- Thickening

No imaging modality can reliably exclude underlying necrotizing fasciitis in the absence of soft tissue gas
Imaging plays a very limited role in diagnosis and should not delay surgical intervention

MRI different patient

muscle thickening



CT

What is a MSK Emergency?

Infection

Insufficiency Inflammation

Ischaemia
(Vascular)

Non-Traumatic

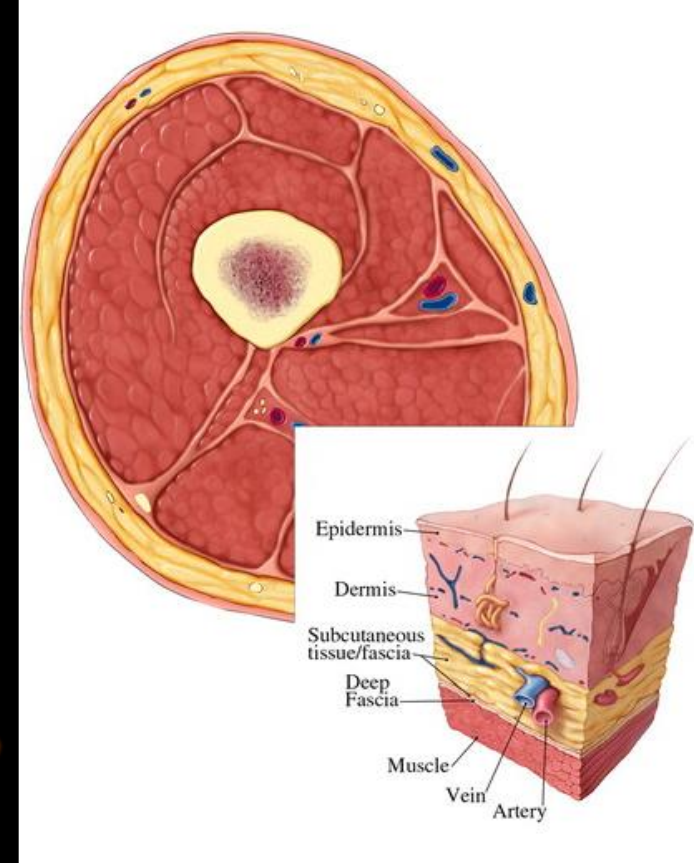
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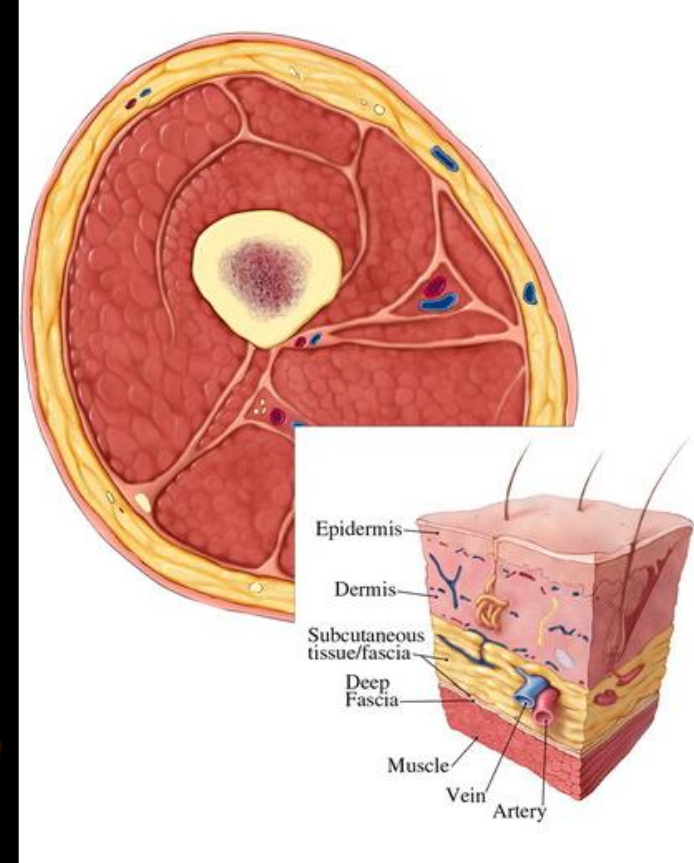
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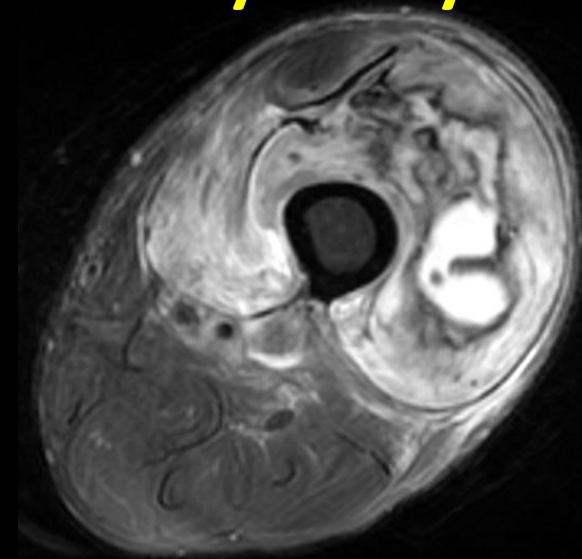
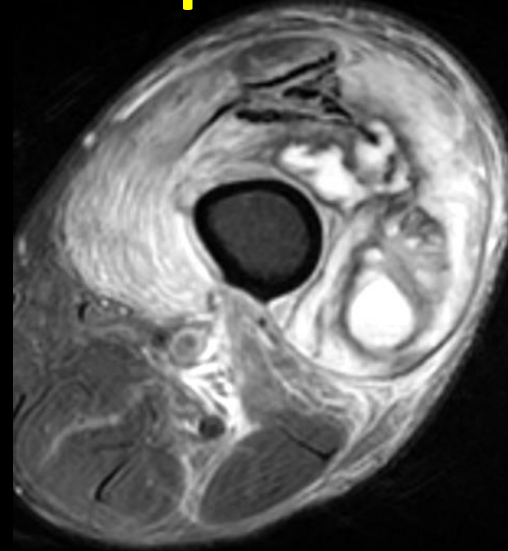
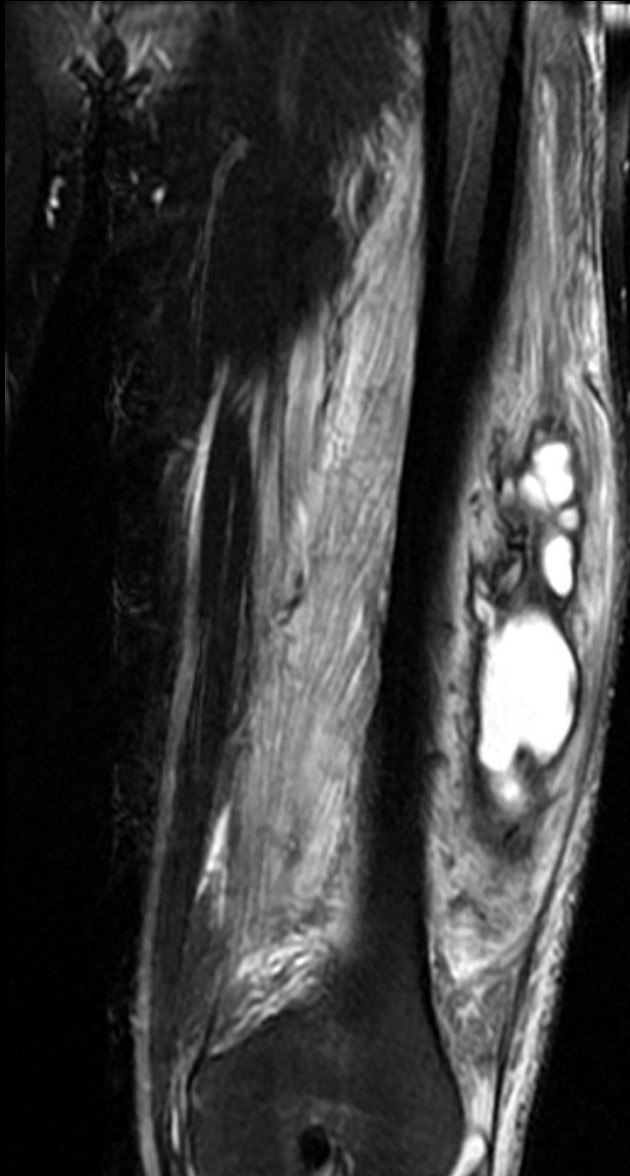
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Joint



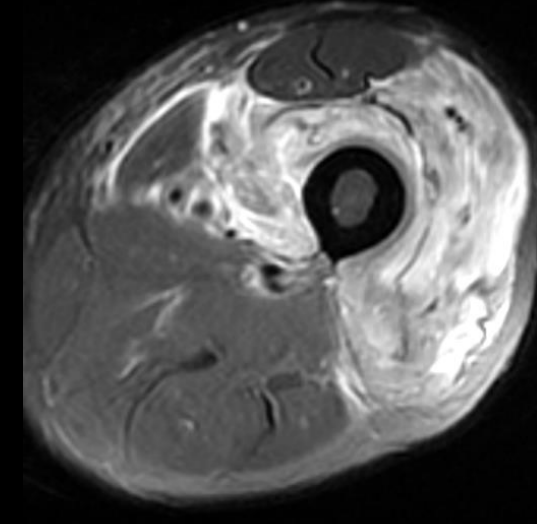
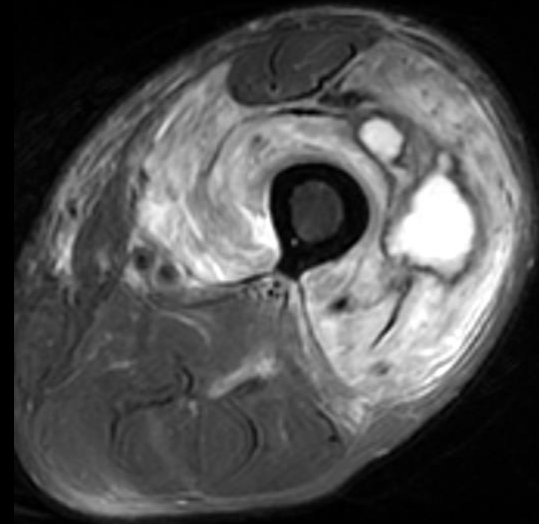
Moving deeper...

Clinical Q: Immunocompromised? Pyomyositis



Femur Lt
4x T2 FatSat

AX T2 FatSat



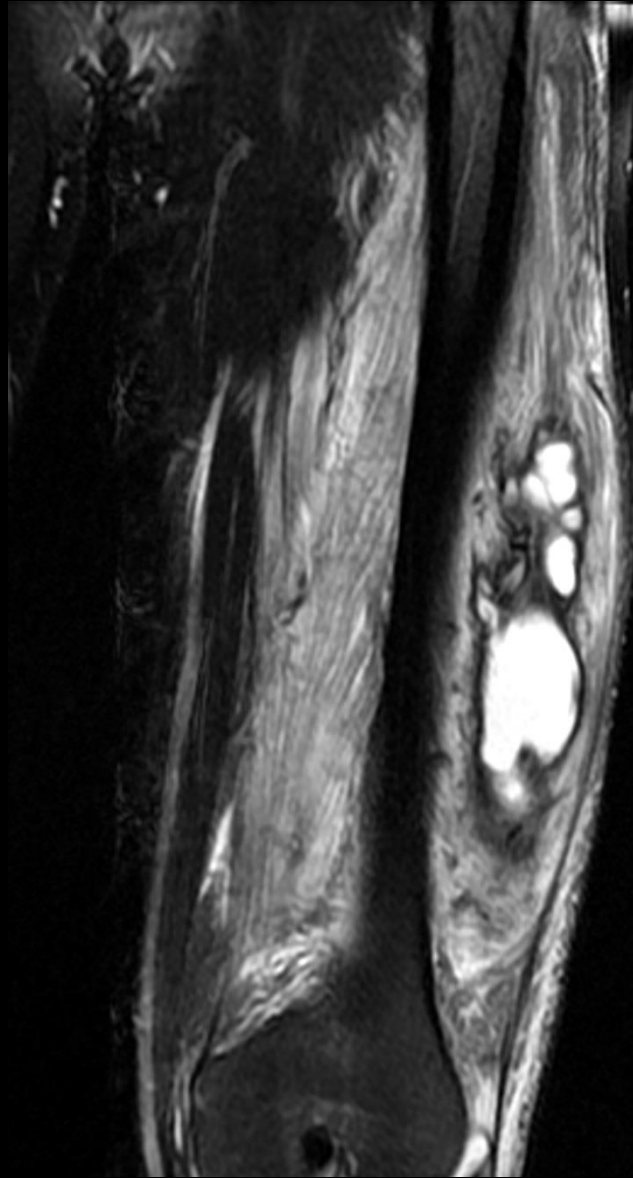
Describe the findings

205

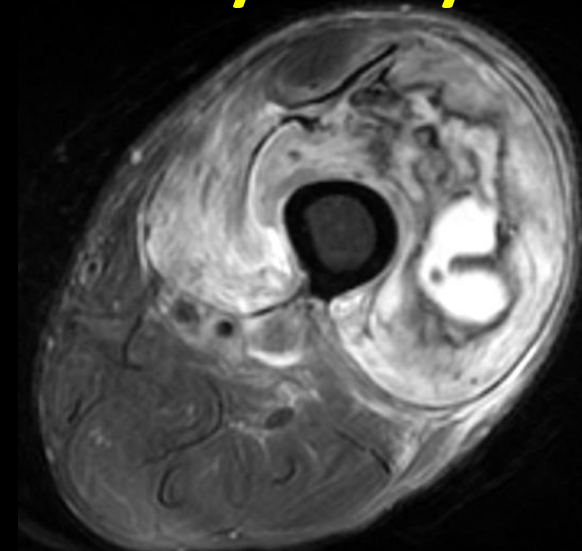
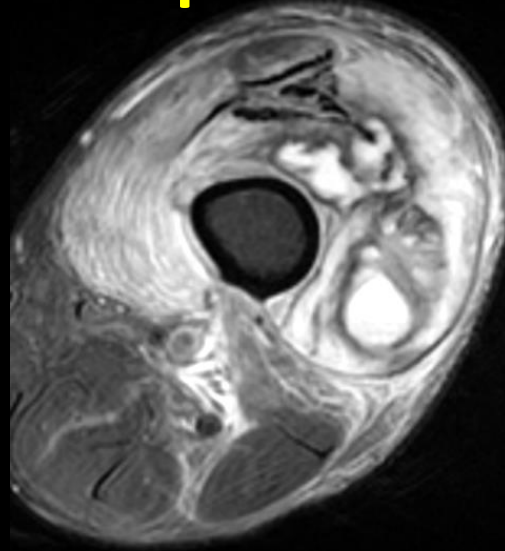
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Describe the findings

Clinical Q: Immunocompromised? Pyomyositis

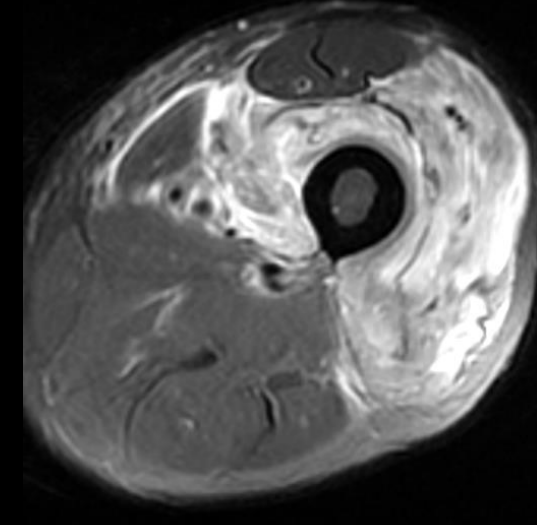
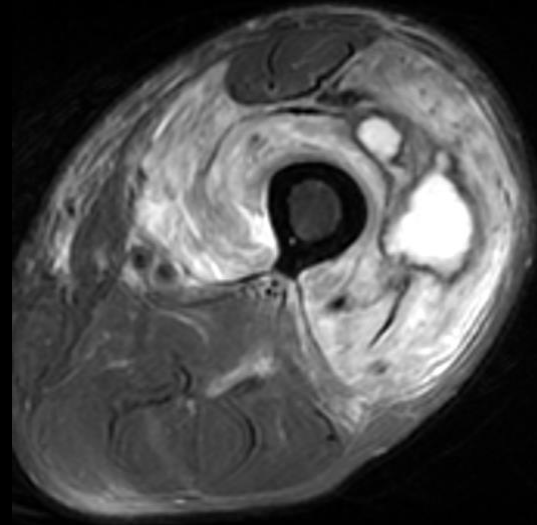


Oedema +++

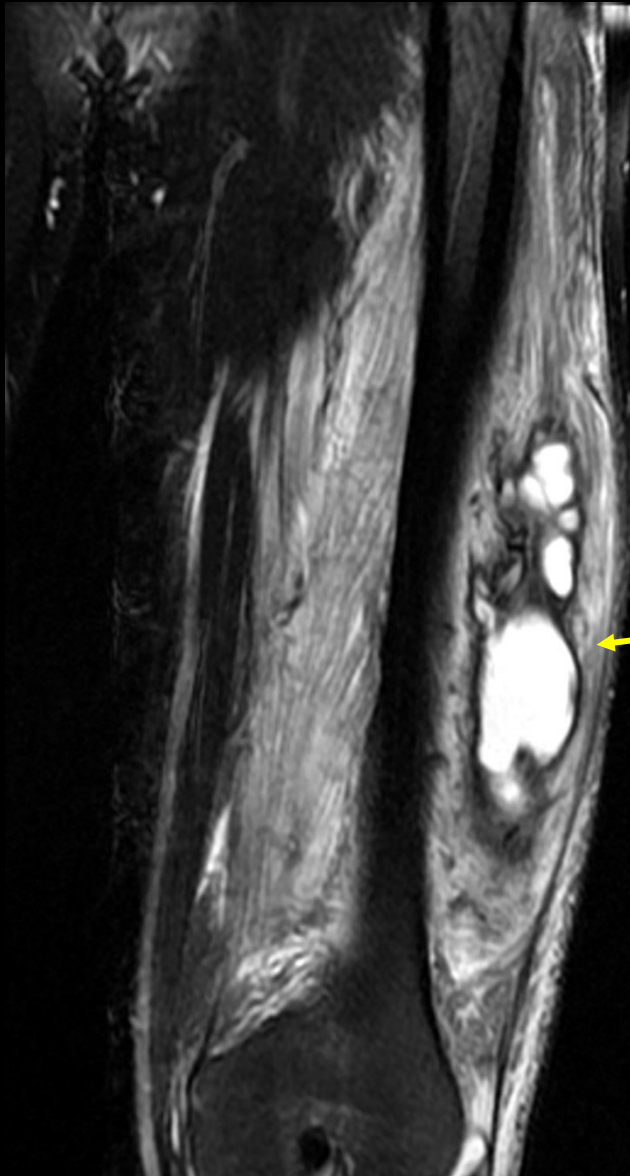


Femur Lt
4x T2 FatSat

AX T2 FatSat

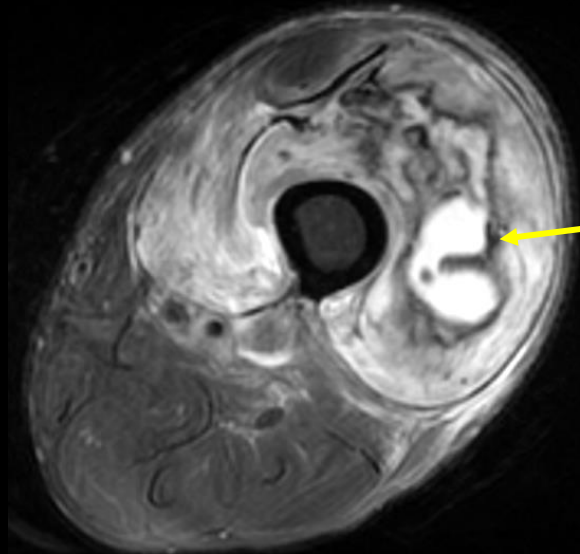
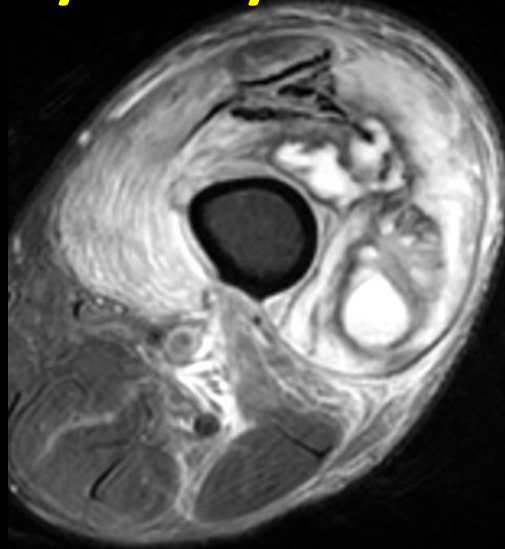


Clinical Question: Pyomyositis Quads muscles

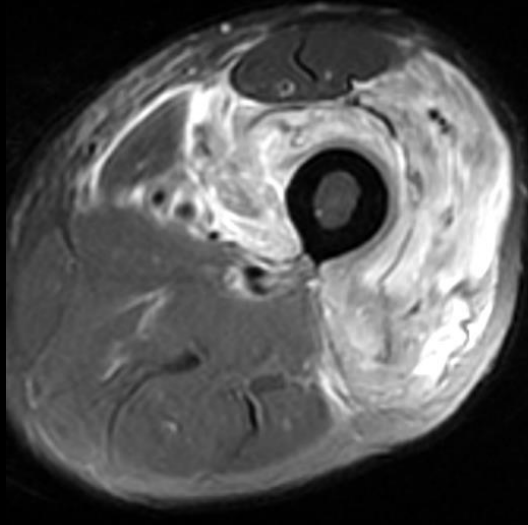
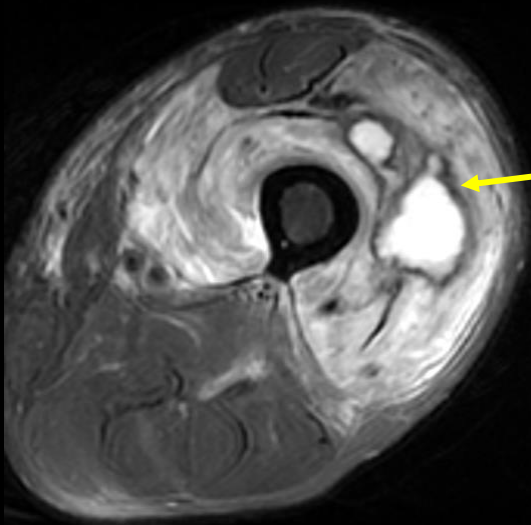


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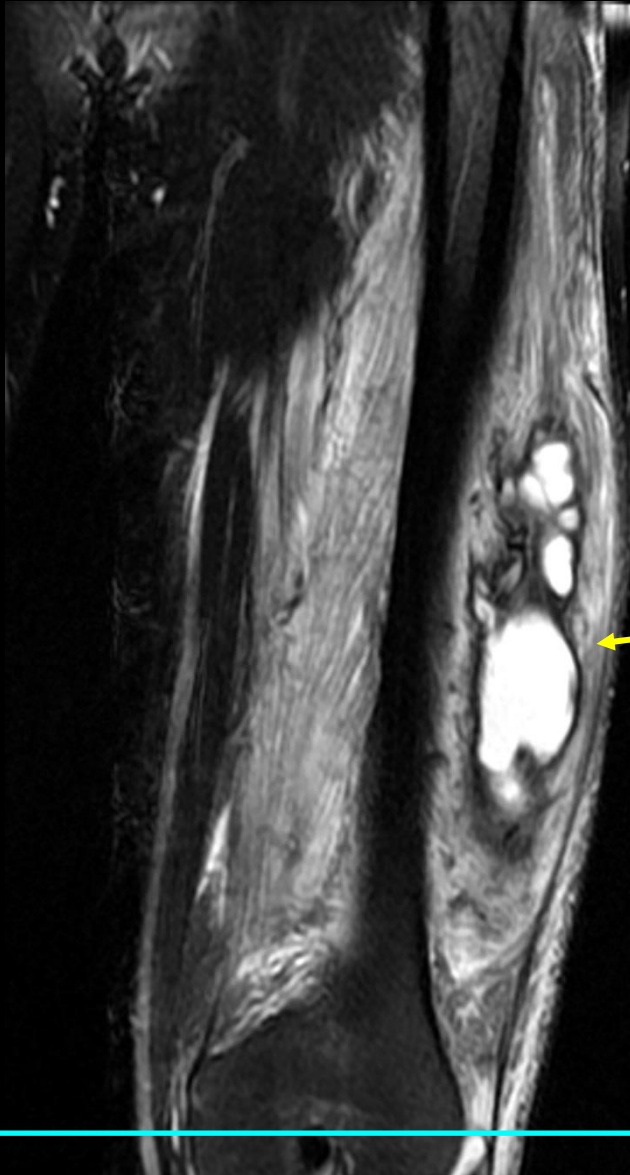
abscesses



Femur Lt
4x T2 FatSat

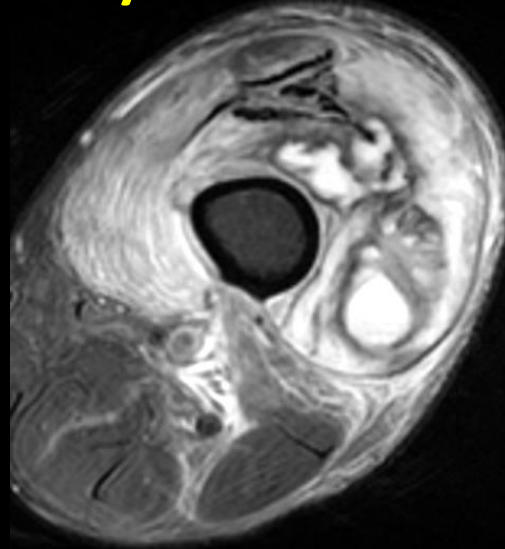


Dx: Pyomyositis

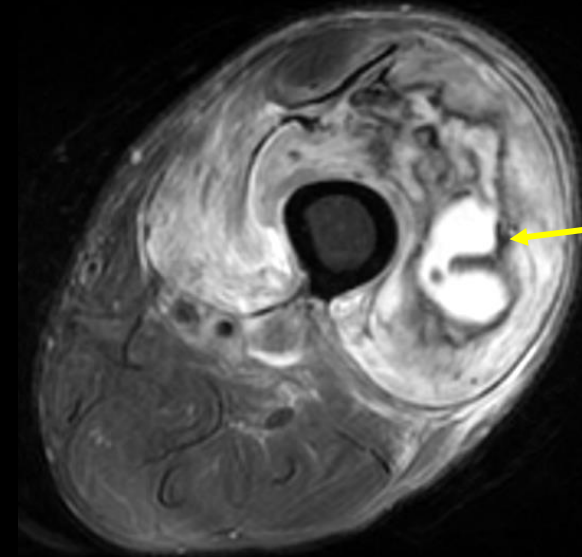


Oedema +++

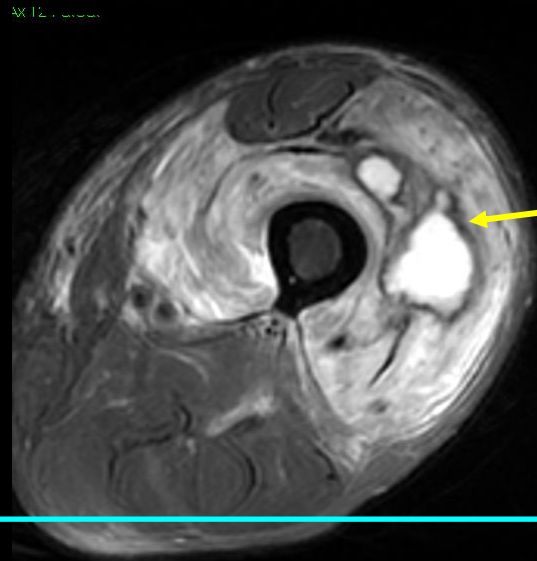
abscesses



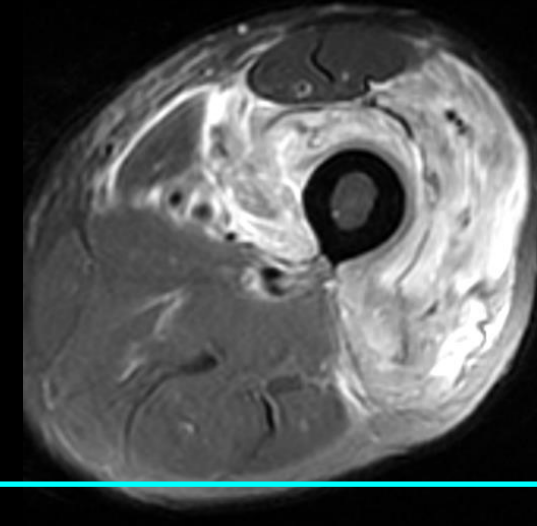
R1 Femur Lt
U Ax T2 FatSat



Femur Lt
4x T2 FatSat

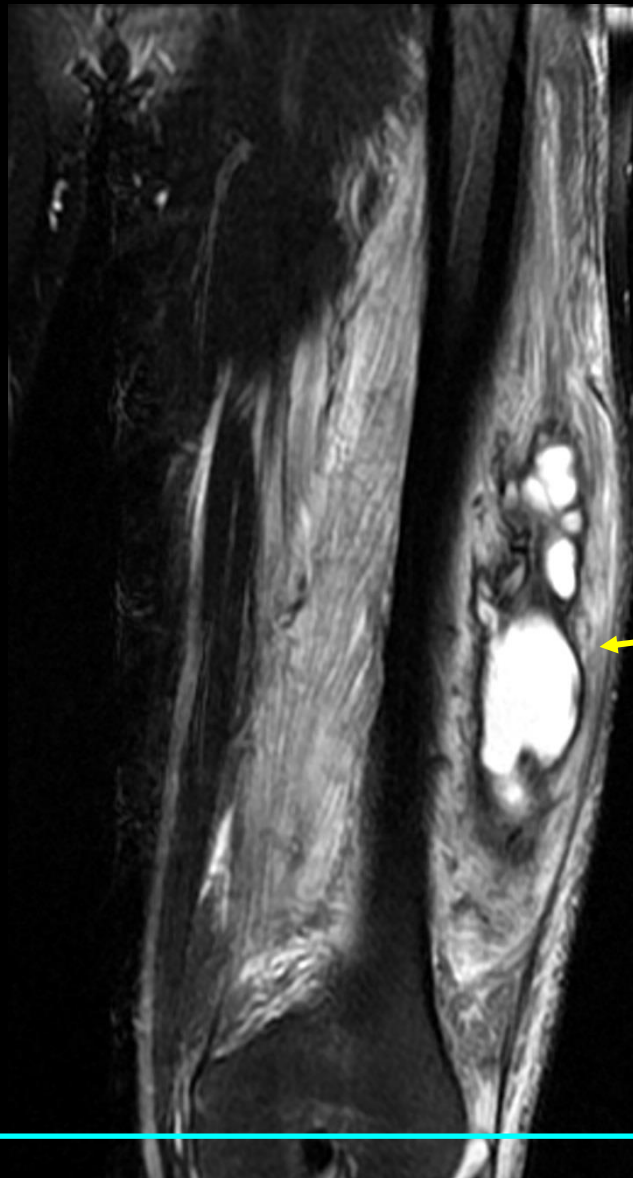


AX T2 FatSat



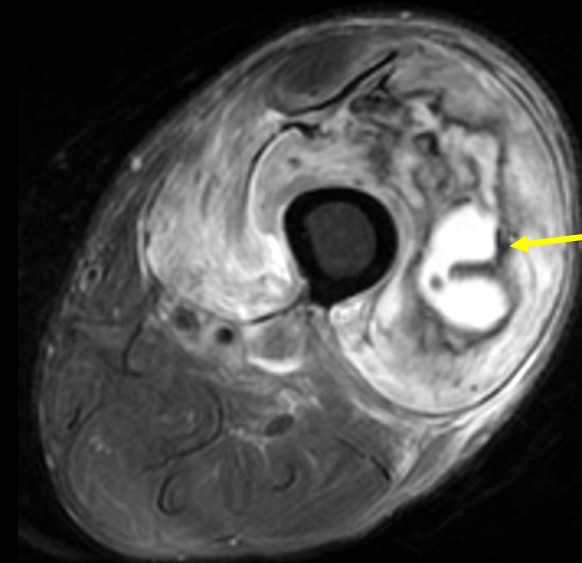
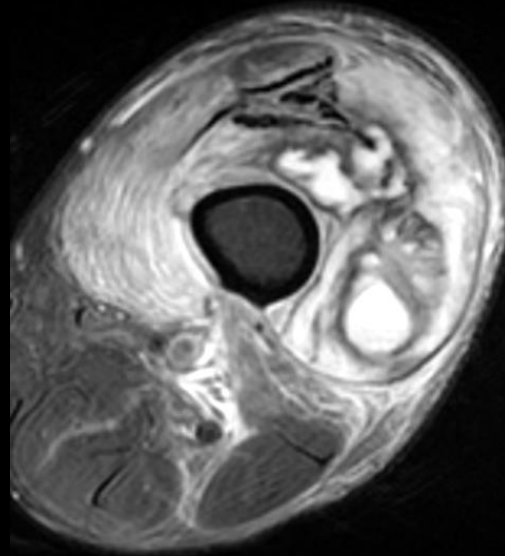
- **Pyomyositis** is a primary infection of the skeletal muscle

Dx: Pyomyositis - Resolved w Antibiotics



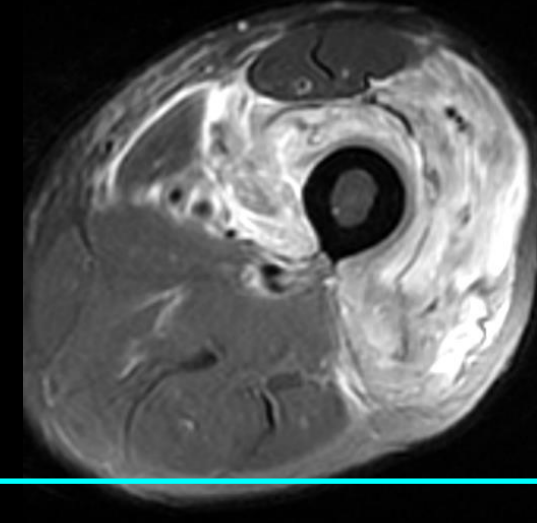
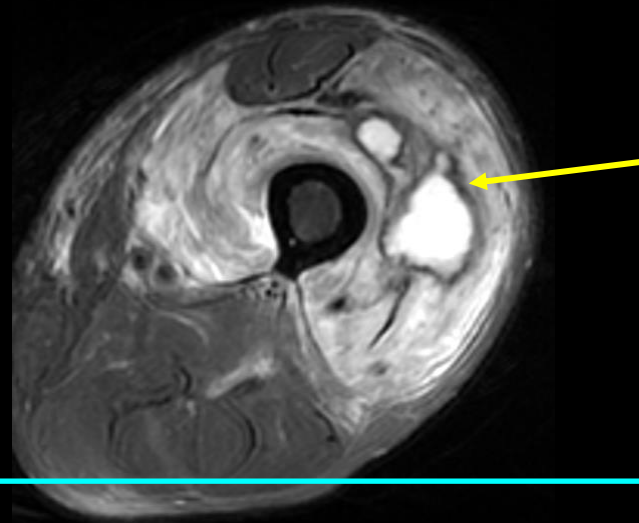
Oedema +++

abscesses



Femur Lt
4x T2 FatSat

AX T2 FatSat



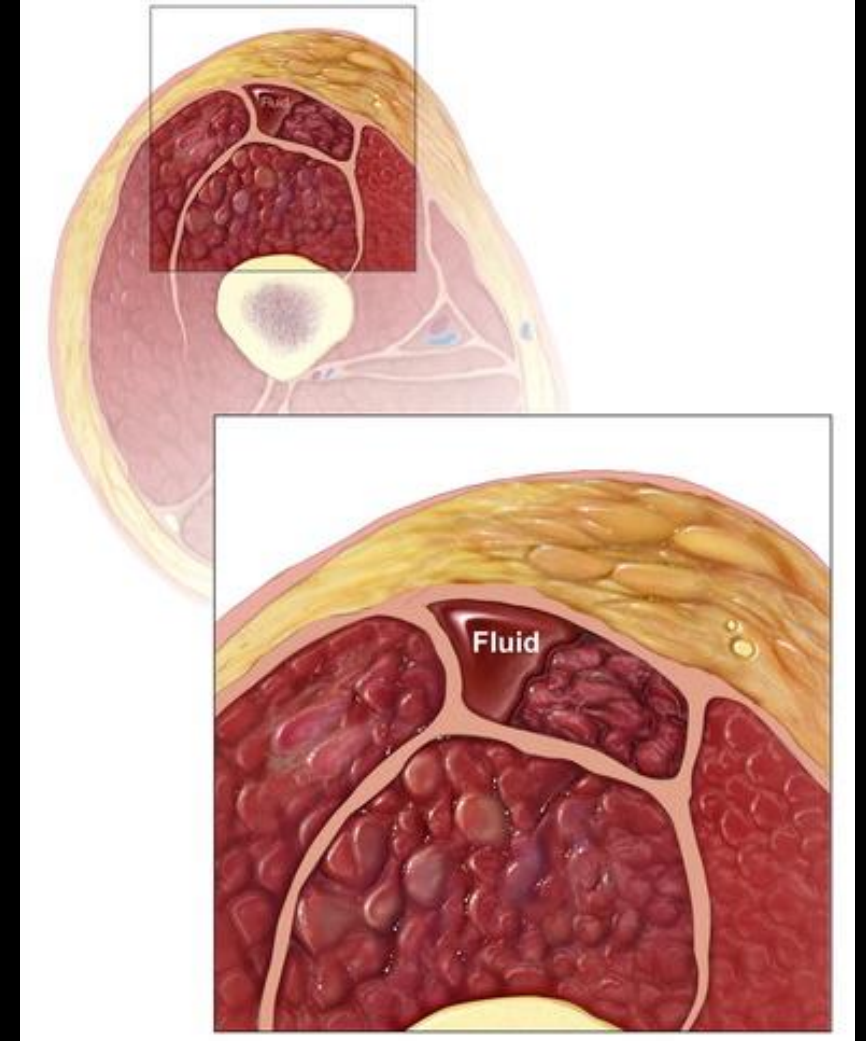
- **Pyomyositis** is a primary infection of the skeletal muscle

Pyomyositis

At risk: Immunocompromised

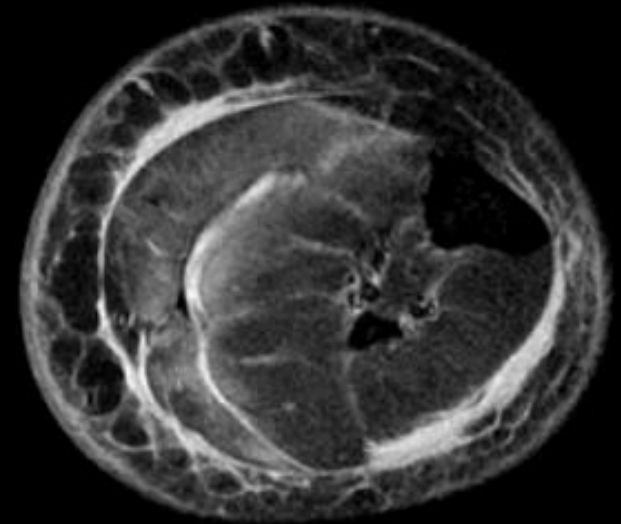
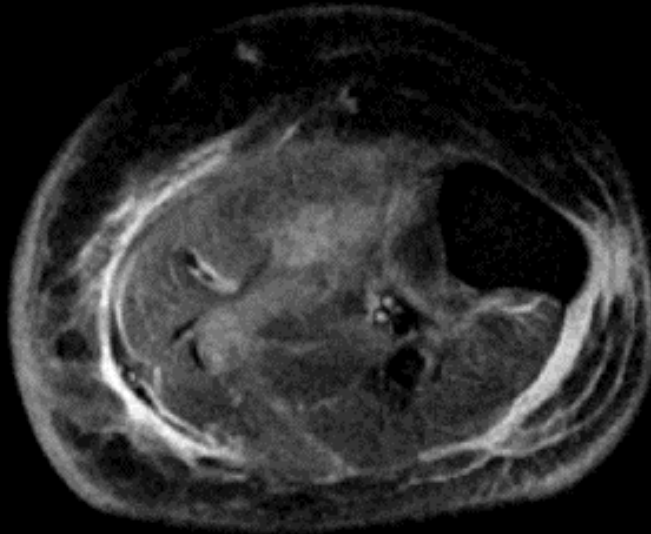
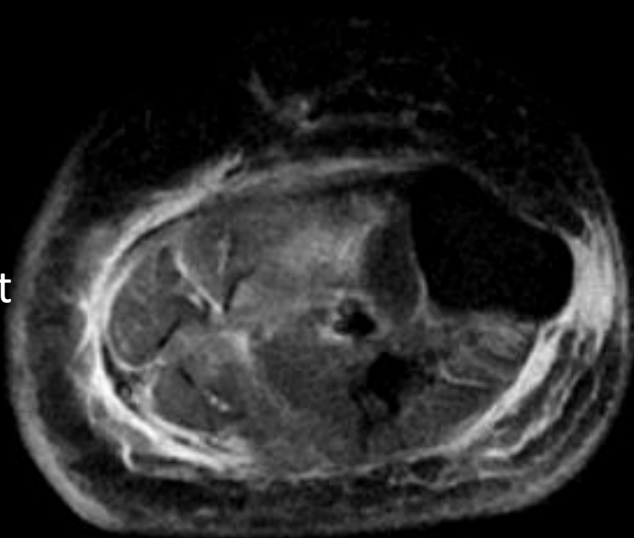
Haematogenous or direct spread

Staph Aureus

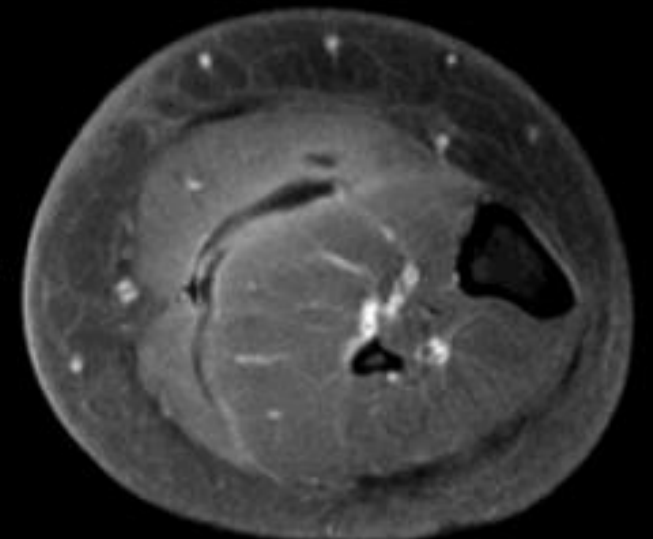
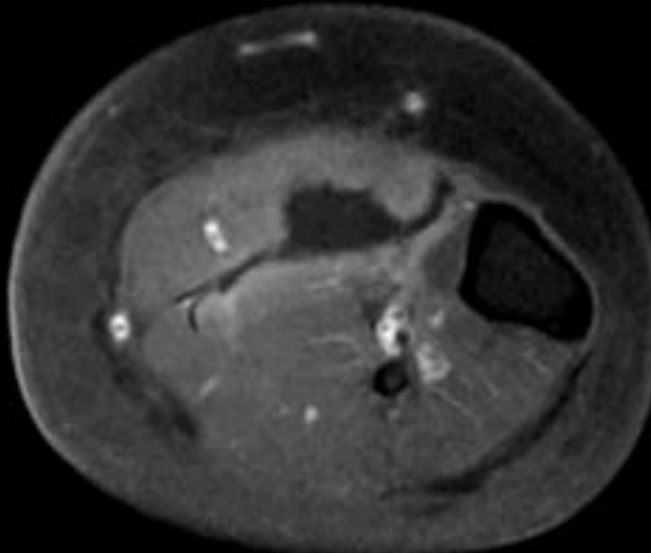
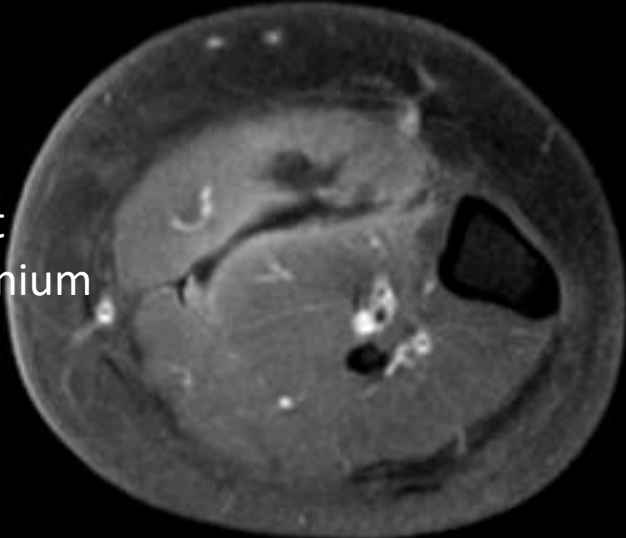


Clinical Question: ? Pyomyositis Calf muscles

Ax T2Fatsat

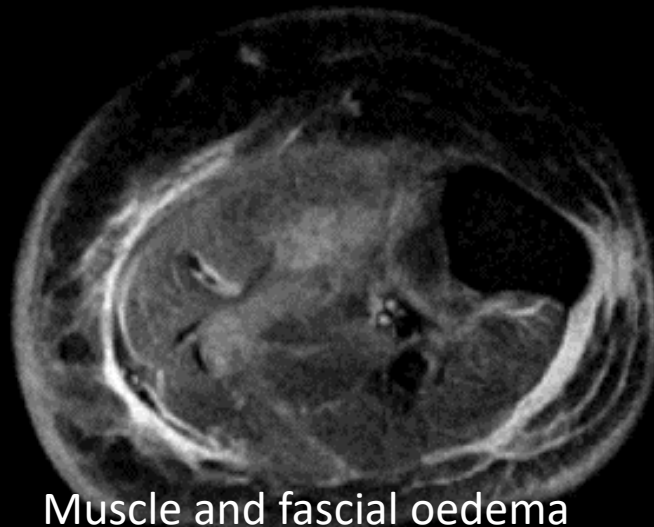
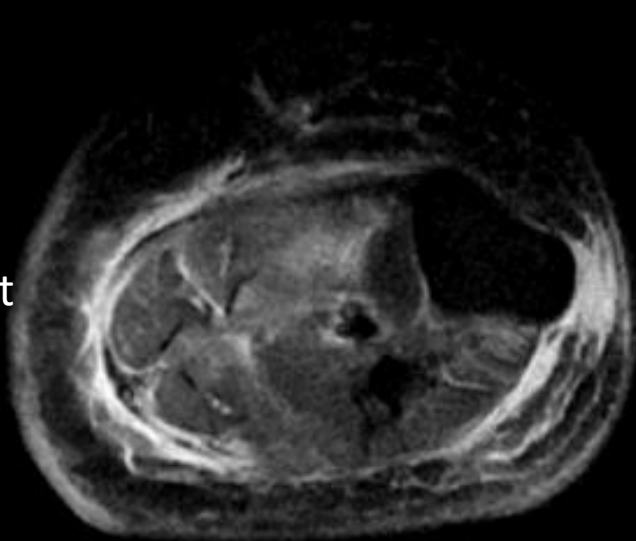


Ax T1Fatsat
Post gadolinium

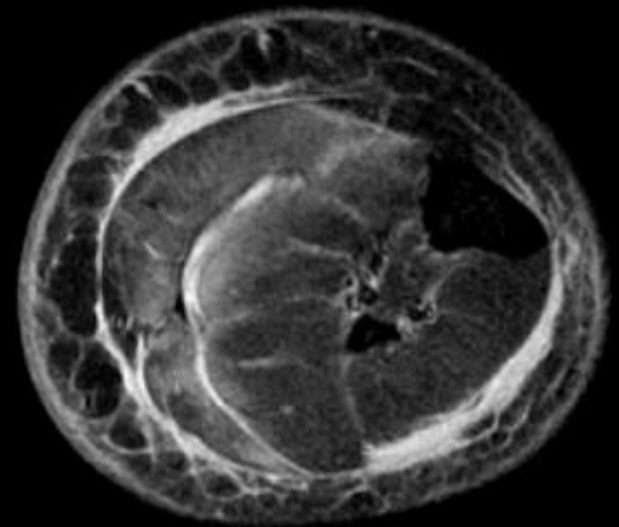


Diagnosis: Pyomyositis Calf muscles

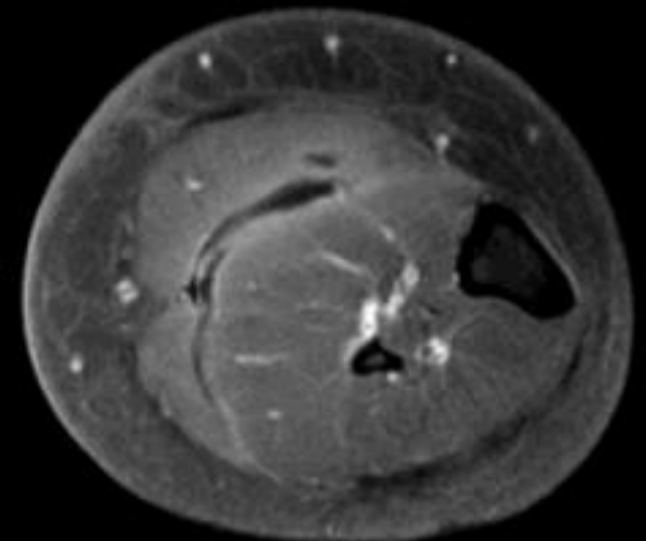
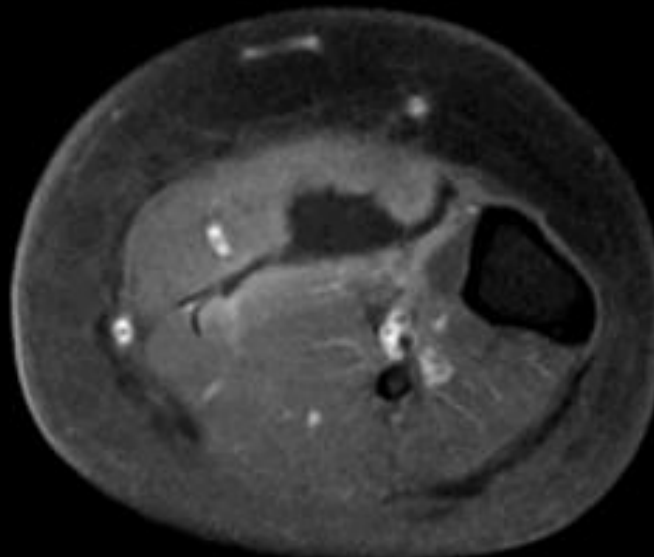
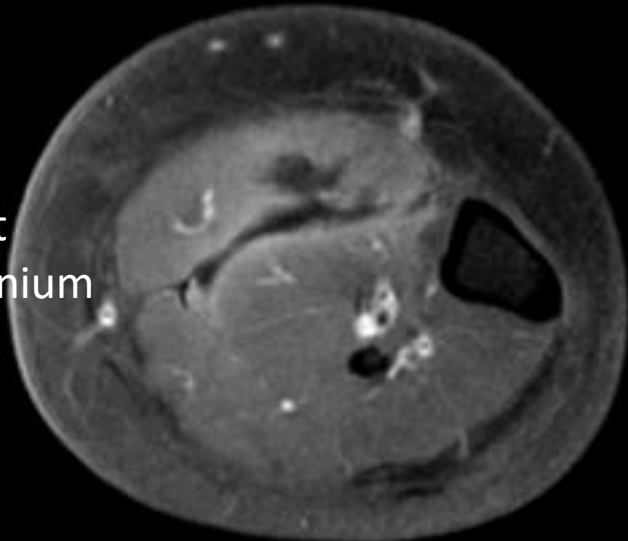
Ax T2Fatsat



Muscle and fascial oedema

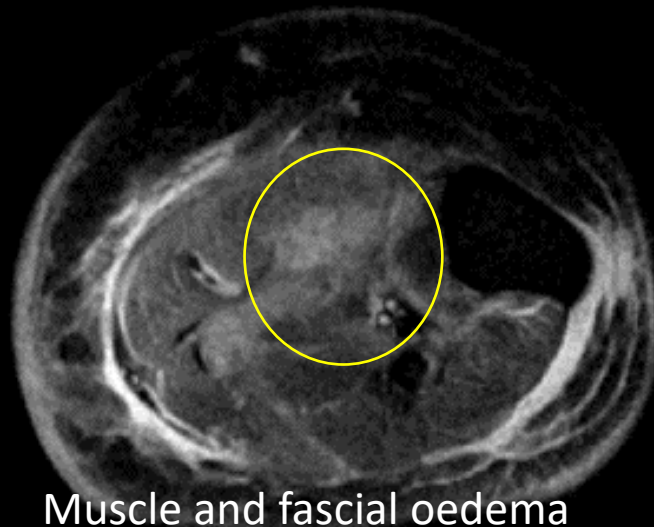
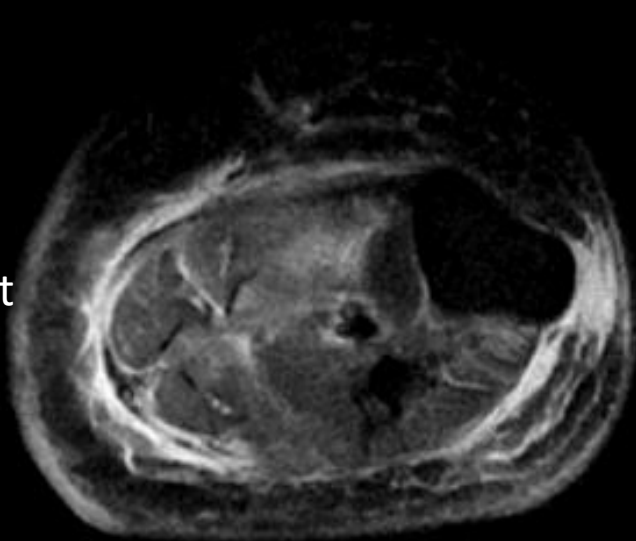


Ax T1Fatsat
Post gadolinium

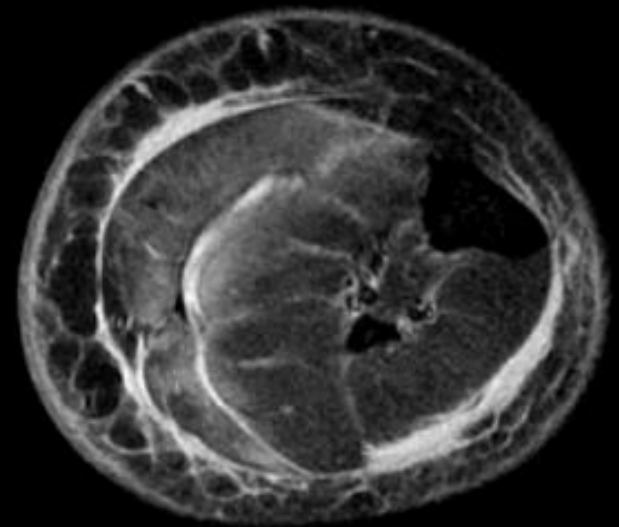


Diagnosis: Pyomyositis Calf muscles

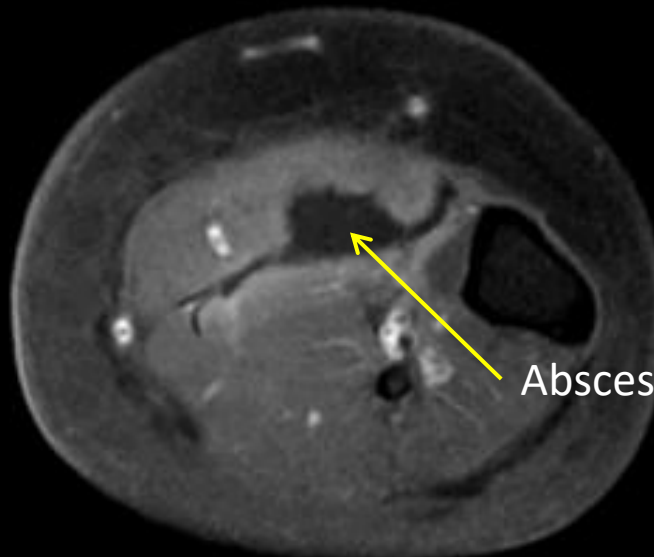
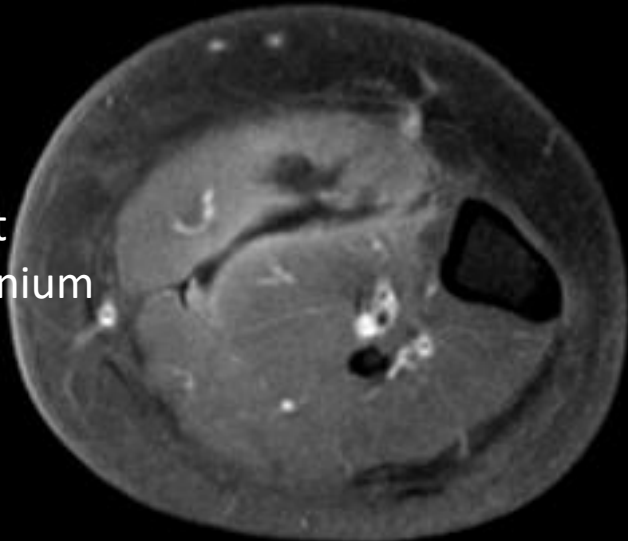
Ax T2Fatsat



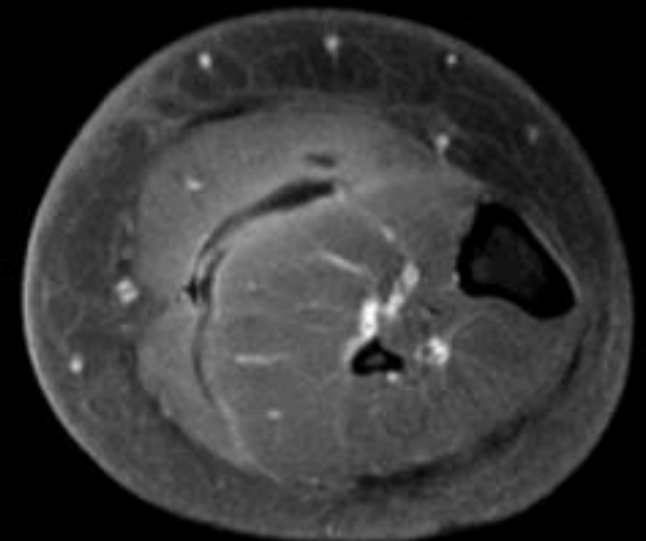
Muscle and fascial oedema



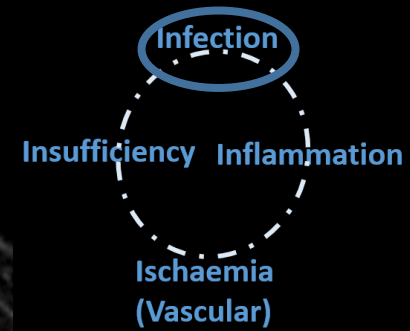
Ax T1Fatsat
Post gadolinium



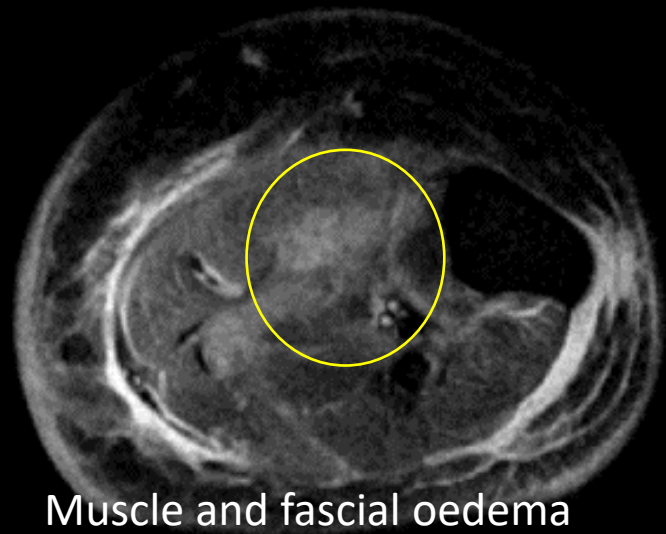
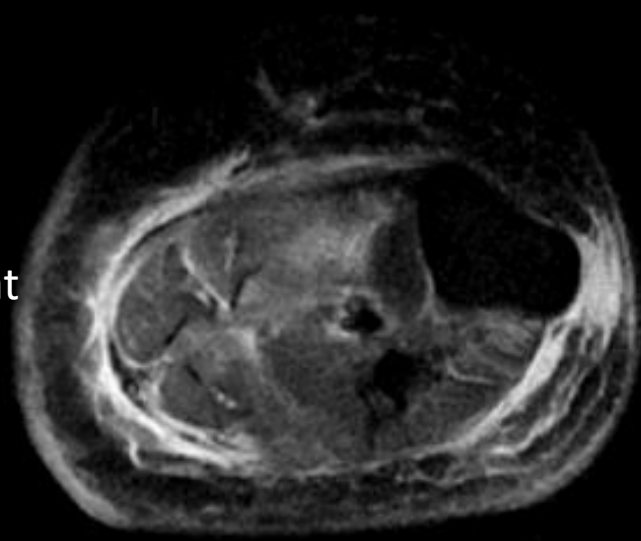
Abscess



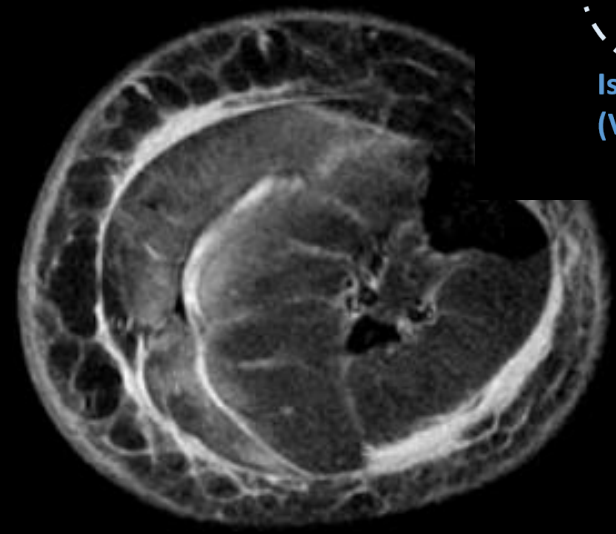
Diagnosis: Pyomyositis Calf muscles



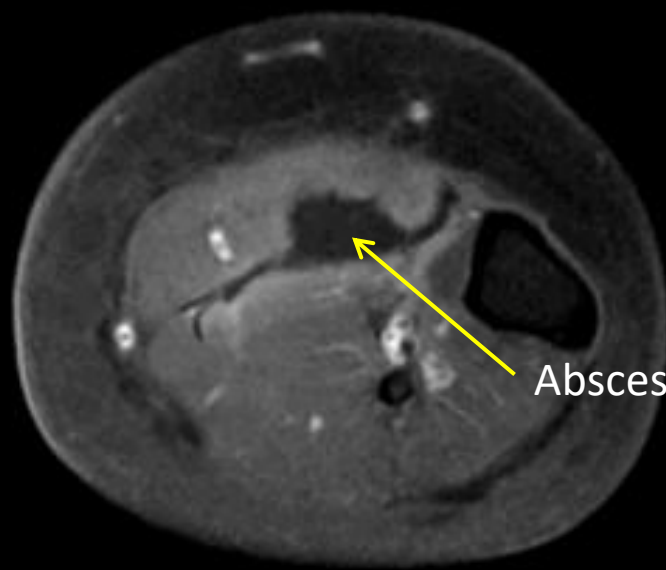
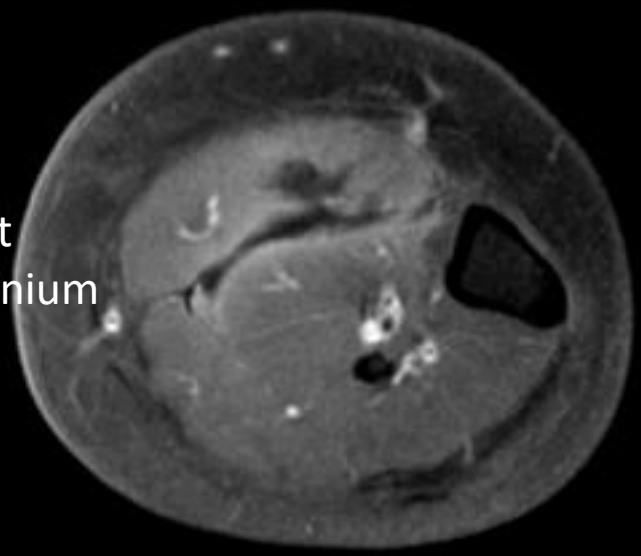
Ax T2Fatsat



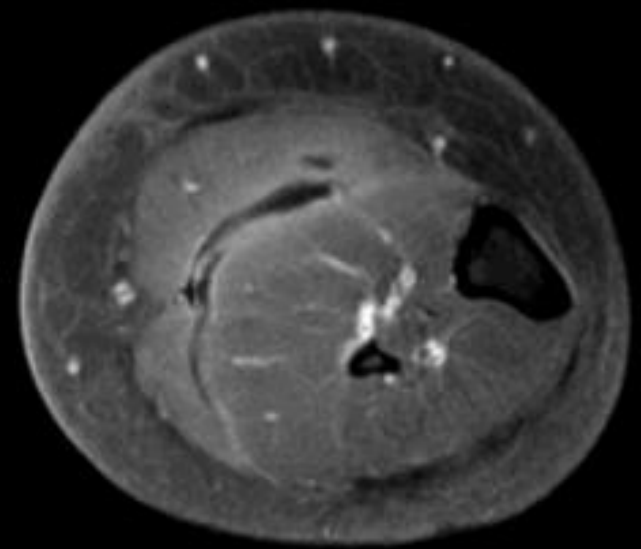
Muscle and fascial oedema



Ax T1Fatsat
Post gadolinium



Abscess



What the Clinicians Want to Know?

- Extent
- Neurovascular or bone involvement
- Abscess amenable to drainage?
- Are there MRI features of **Compartment Syndrome**?

Surgical
Emergency



What the Clinicians Want to Know?

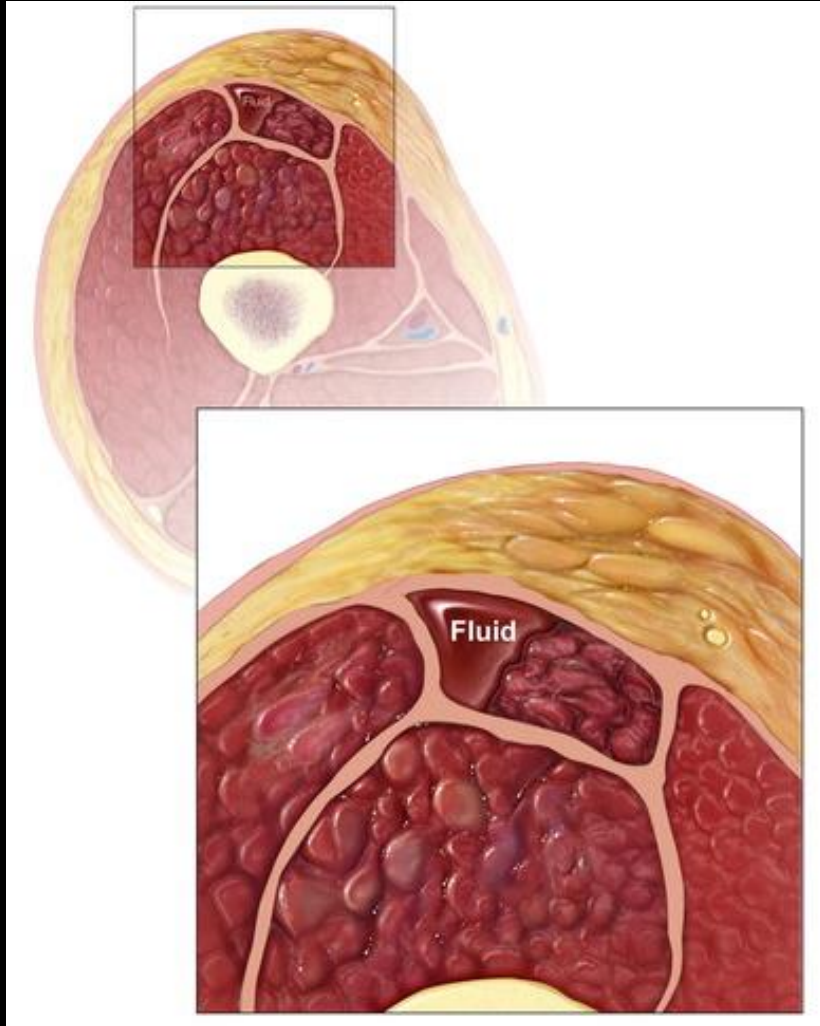
- Extent
- Neurovascular or bone involvement
- Abscess amenable to drainage?
- Are there MRI features of Compartment Syndrome?

Learning point:
consider complications
Eg Compartment Syndrome

Surgical
Emergency



Causes of Myositis

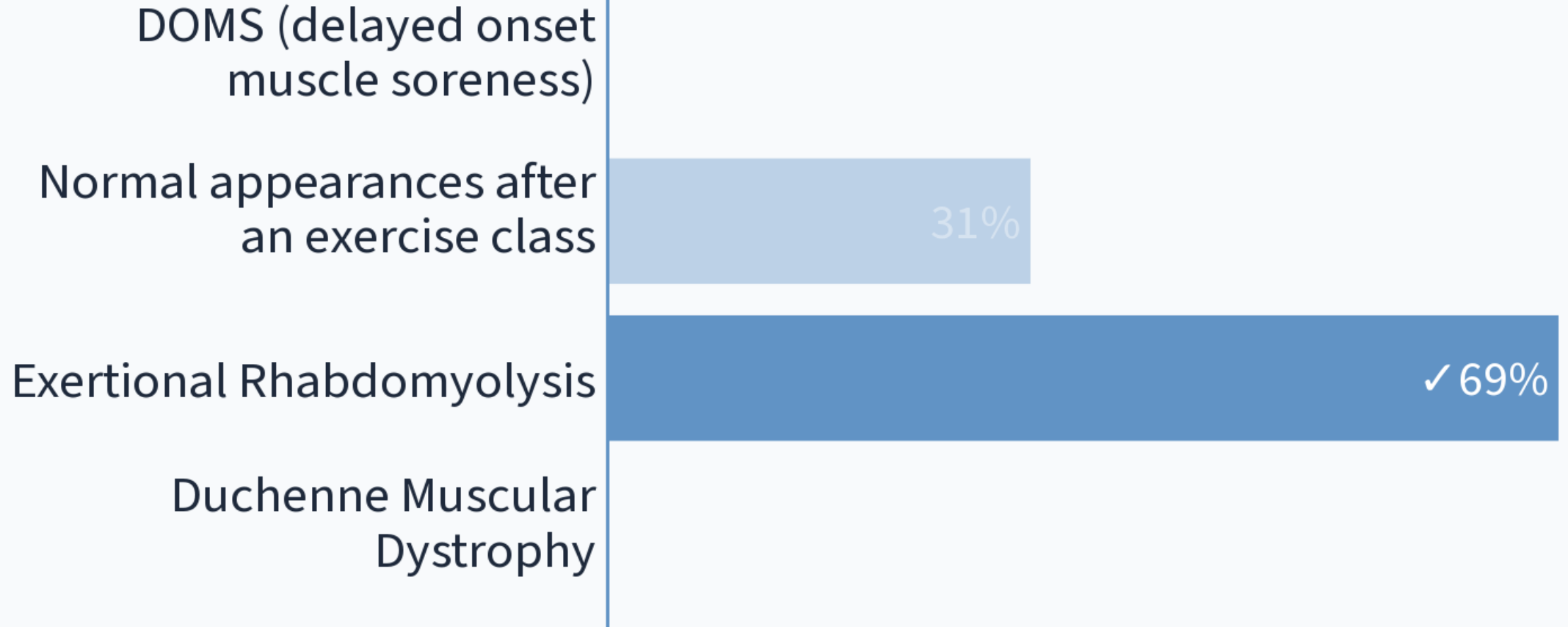


- Pyomyositis (infectious)
- **Diabetic myositis/myonecrosis**
- **Rhabdomyolysis**
- **[Traumatic]**

Other Causes of Myositis

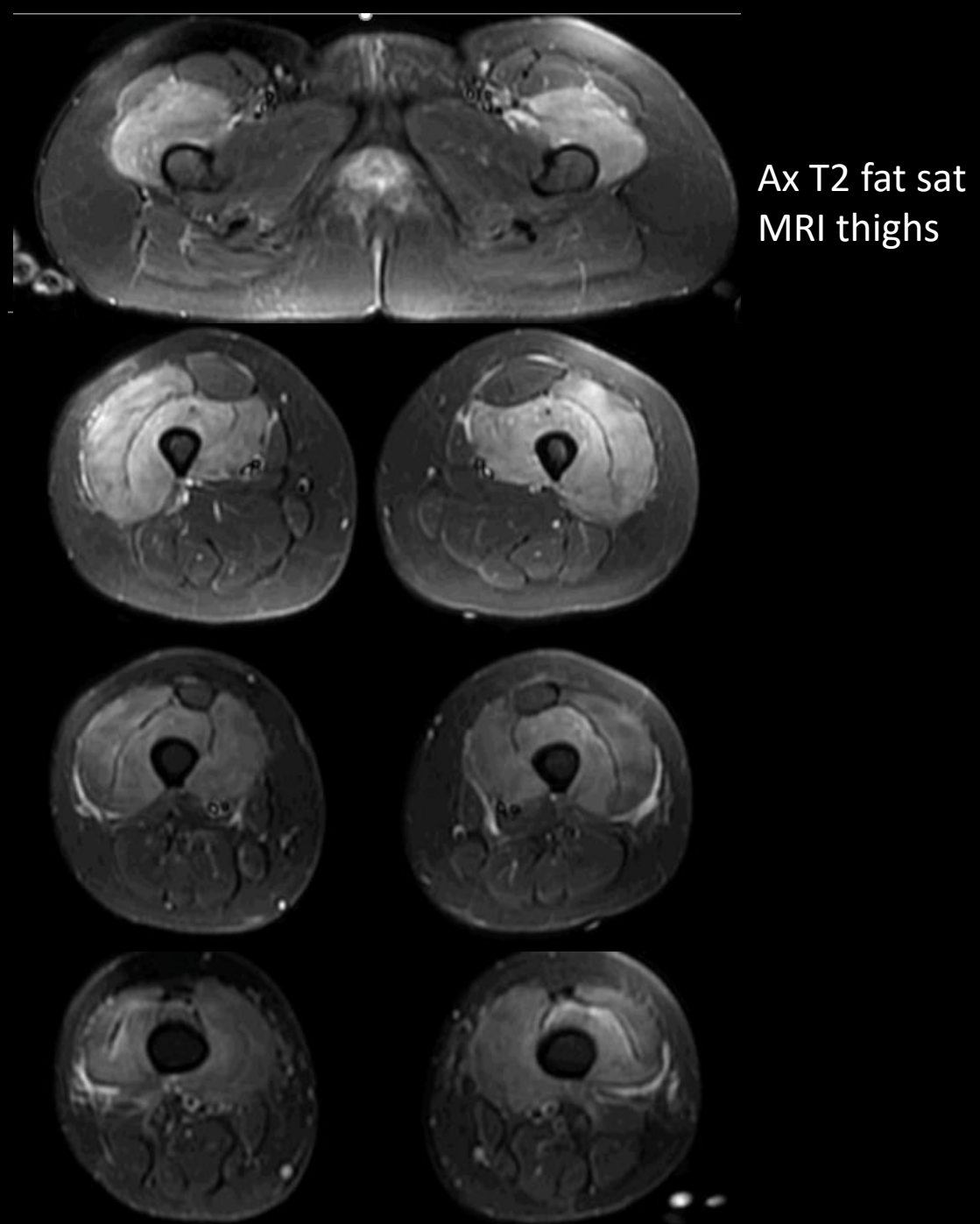
QUESTION

Acute pain after exercise . Diagnosis - Choose one.



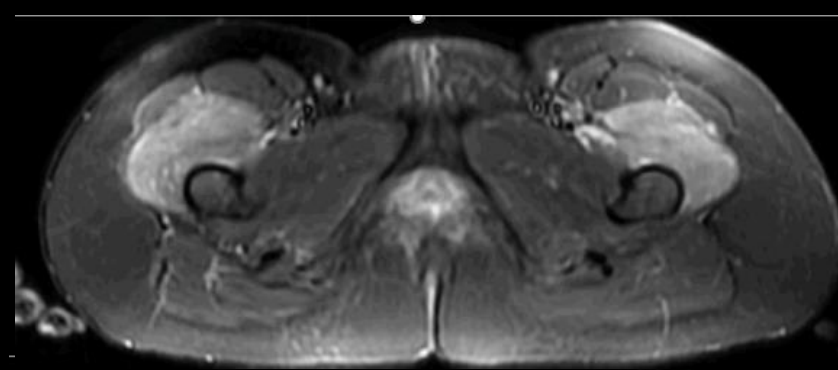
Acute and severe pain in the thighs after exercise. MRI performed 12 hours after. Diagnosis - Choose one.

- A. DOMS (delayed onset muscle soreness)
- B. Normal appearances after an exercise class
- C. Exertional Rhabdomyolysis
- D. Duchenne Muscular Dystrophy

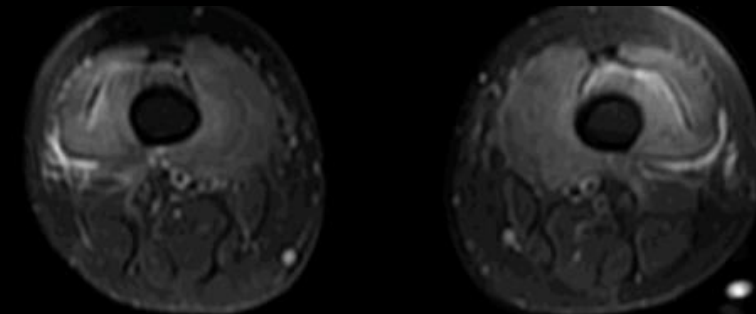
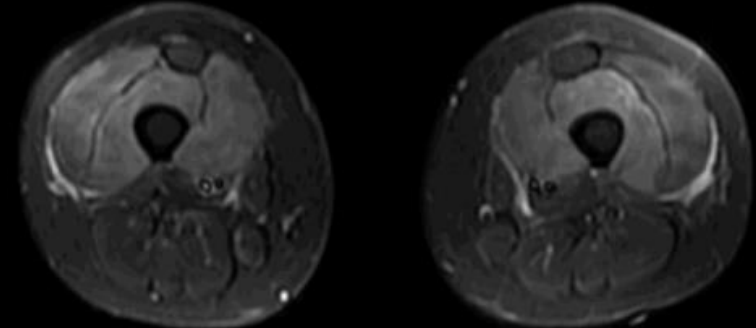
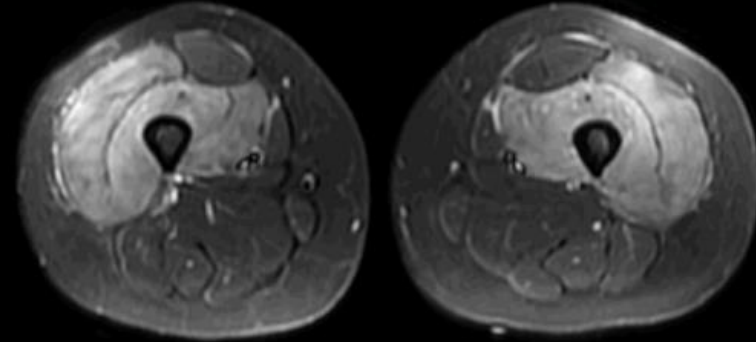


Acute and severe pain in the thighs after exercise. MRI performed 12 hours after. Diagnosis - Choose one.

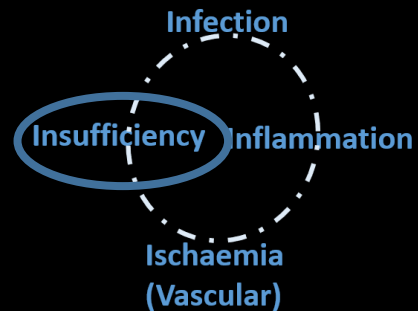
- A. DOMS (delayed onset muscle soreness) FALSE
- B. Normal appearances after an exercise class FALSE
- C. Exertional Rhabdomyolysis TRUE**
- D. Duchenne Muscular Dystrophy FALSE



Ax T2 fat sat
MRI thighs

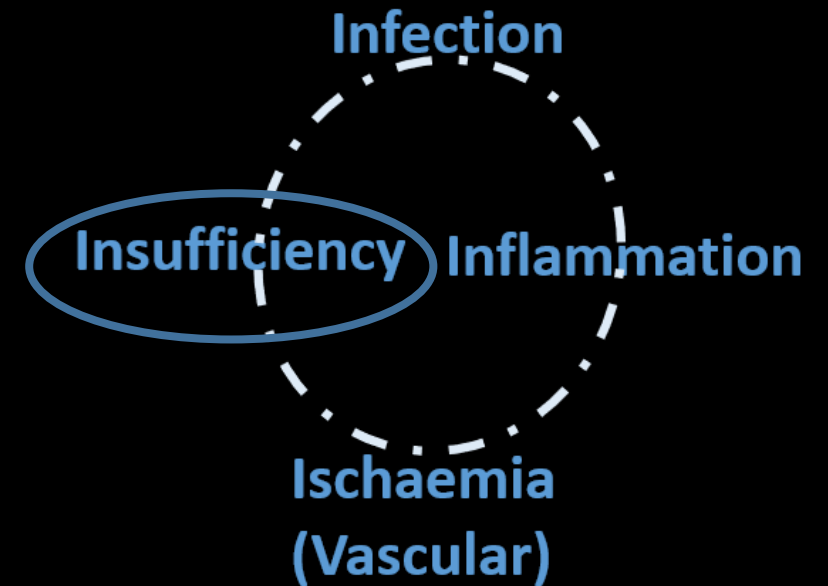


Oedema ++
Quads muscles
Rectus femoris
spared



Exertional Rhabdomyolysis

- Following intense muscular exercise
- Mostly individuals who were inexperienced exercisers and dehydrated
- Very high CPK (creatine phosphokinase) levels
- Urine myoglobinuria



QUESTION

- Yes or no

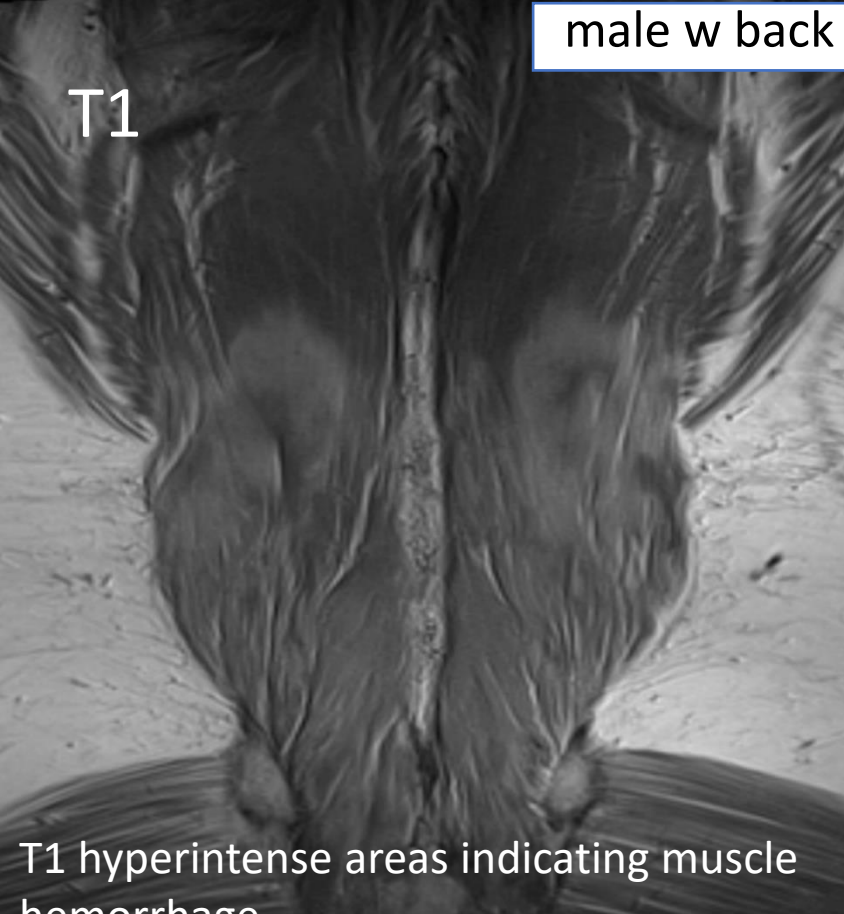
Can Radiology make the diagnosis of compartment syndrome?

Yes

No

male w back pain post exercise. ↑↑CPK. Dx: Rhabdomyolysis

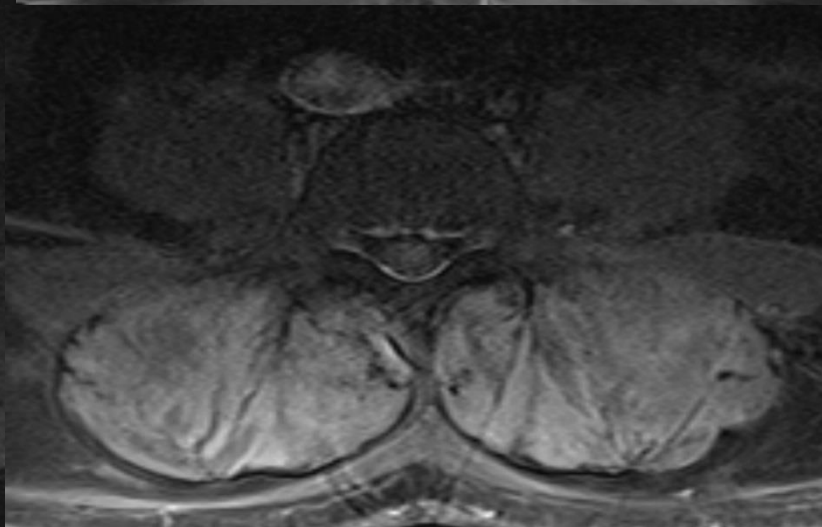
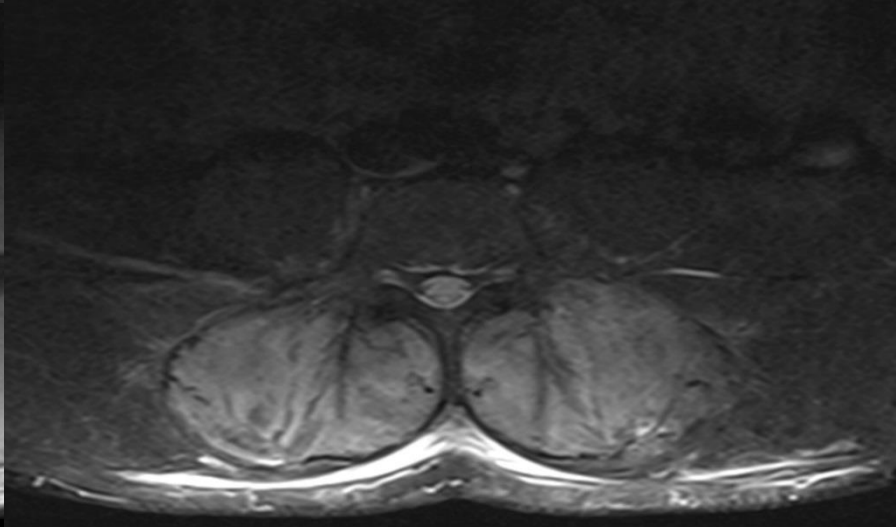
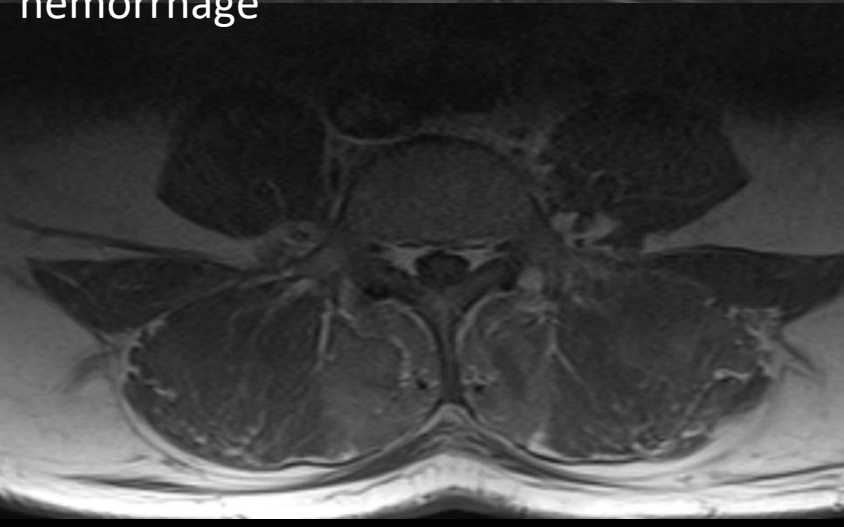
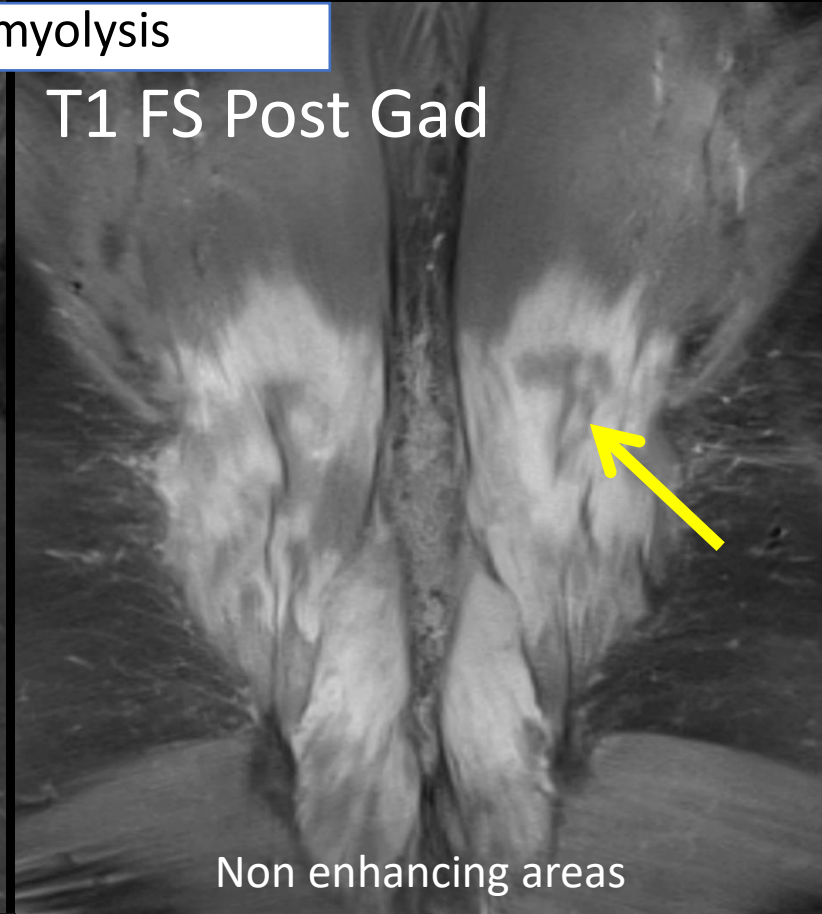
T1



T2

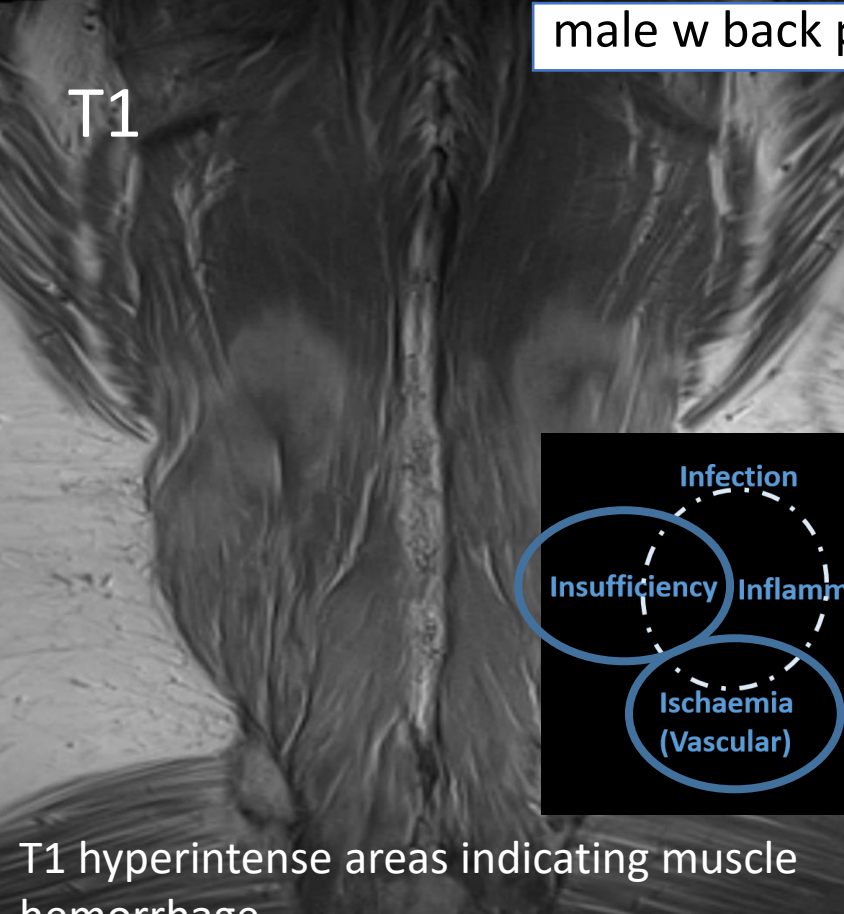


T1 FS Post Gad

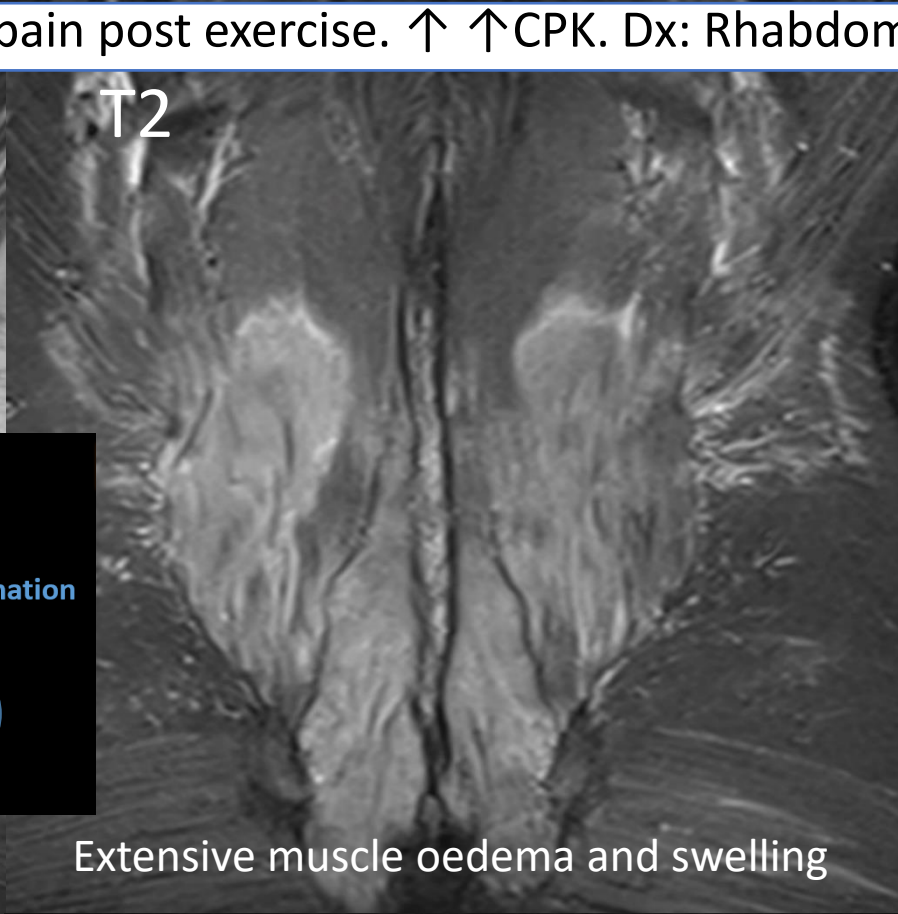


male w back pain post exercise. ↑↑CPK. Dx: Rhabdomyolysis

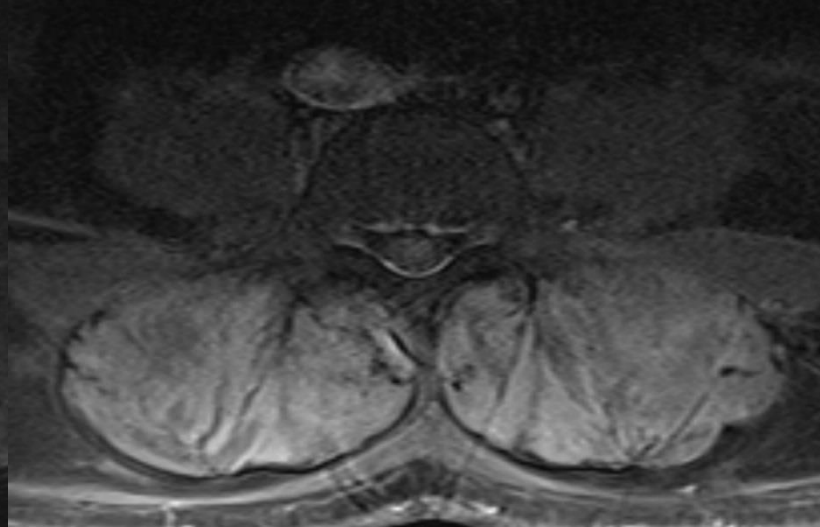
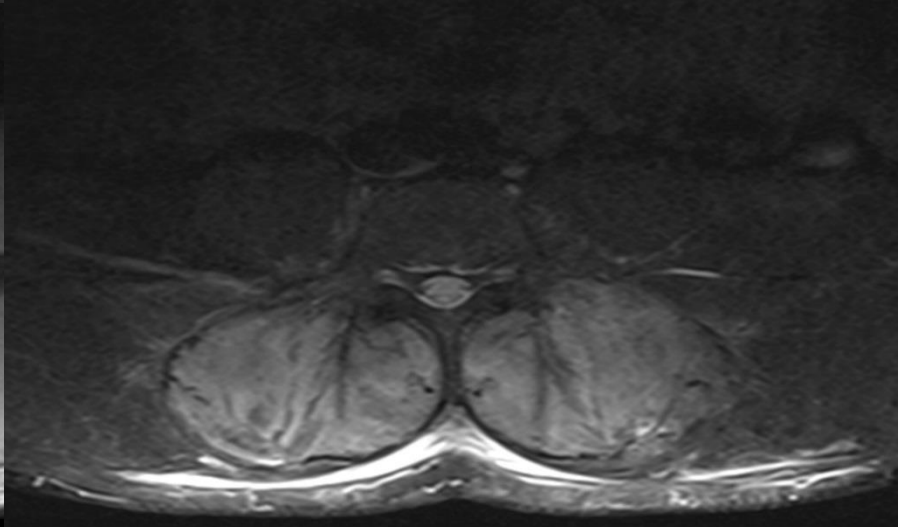
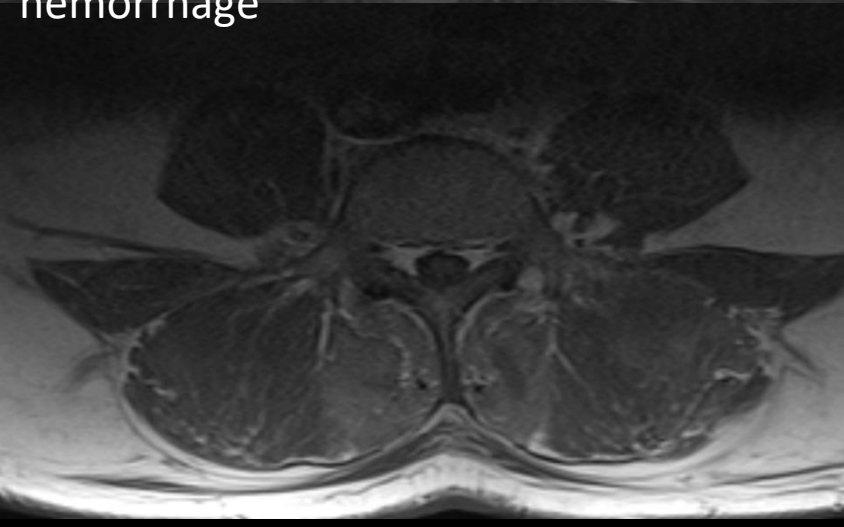
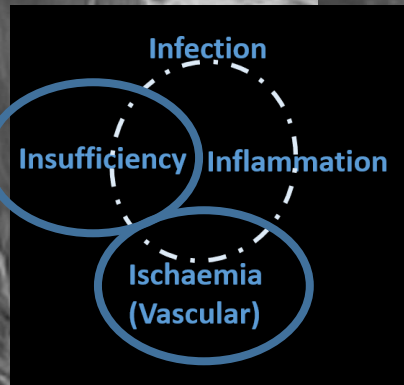
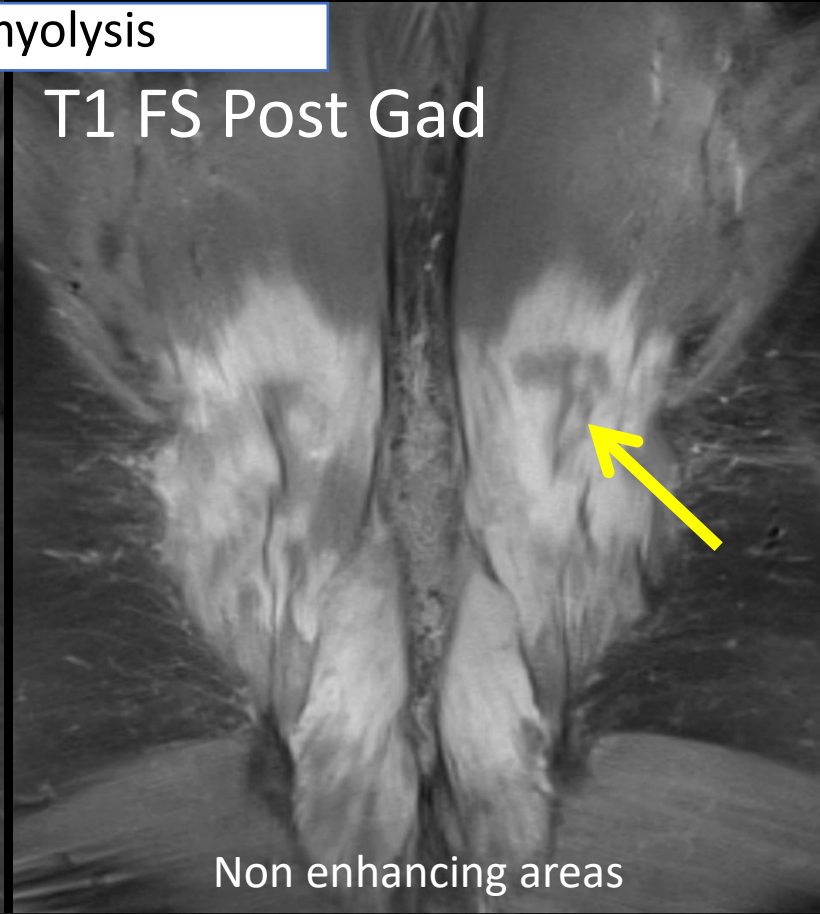
T1



T2

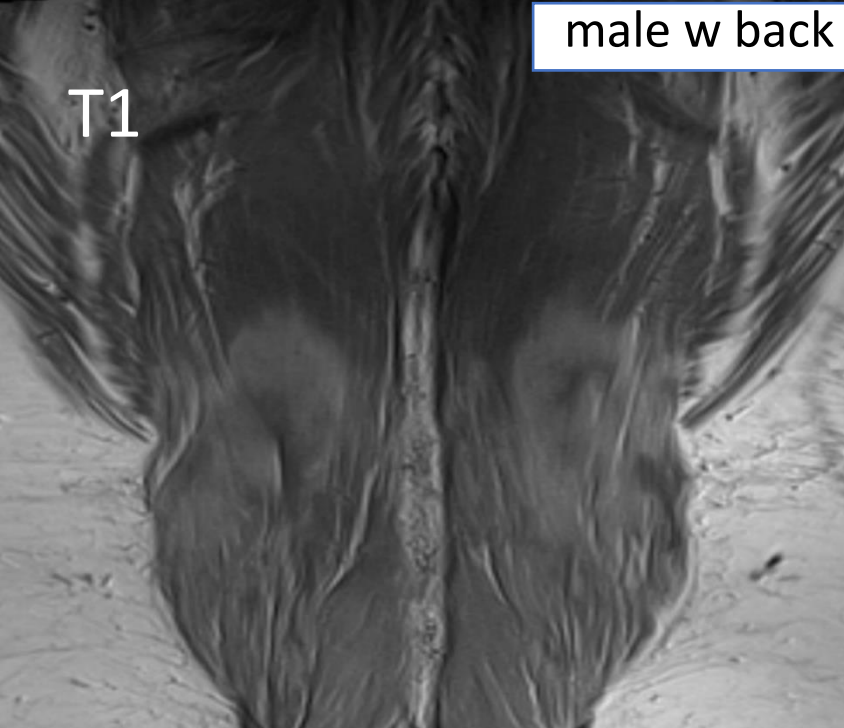


T1 FS Post Gad

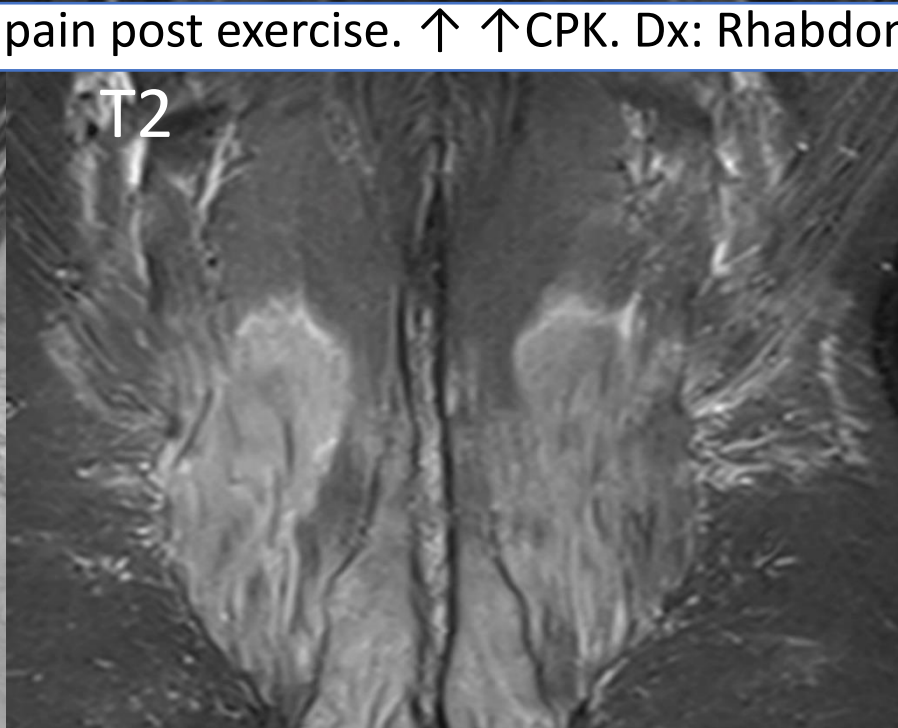


male w back pain post exercise. ↑ ↑CPK. Dx: Rhabdomyolysis

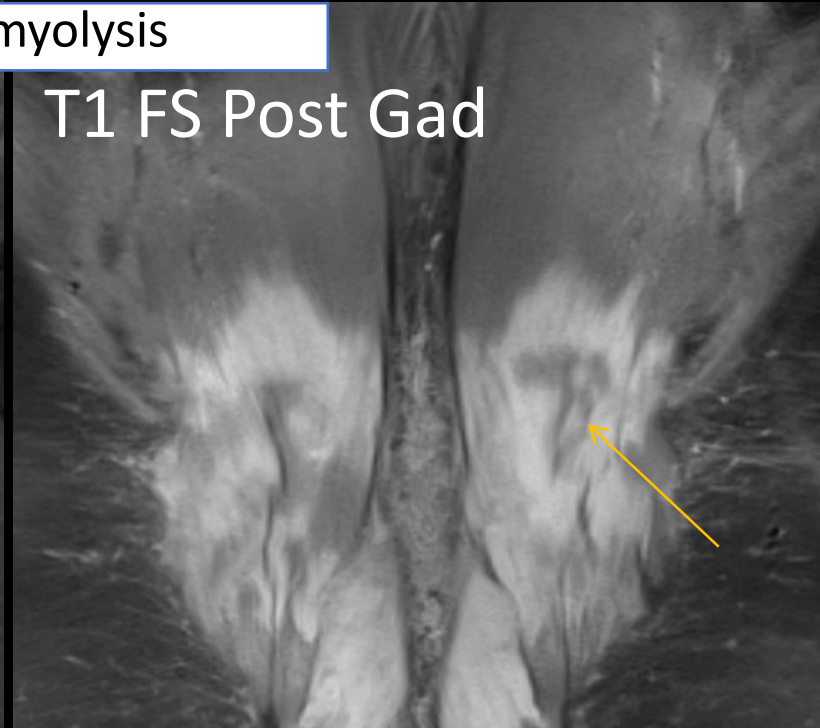
T1



T2

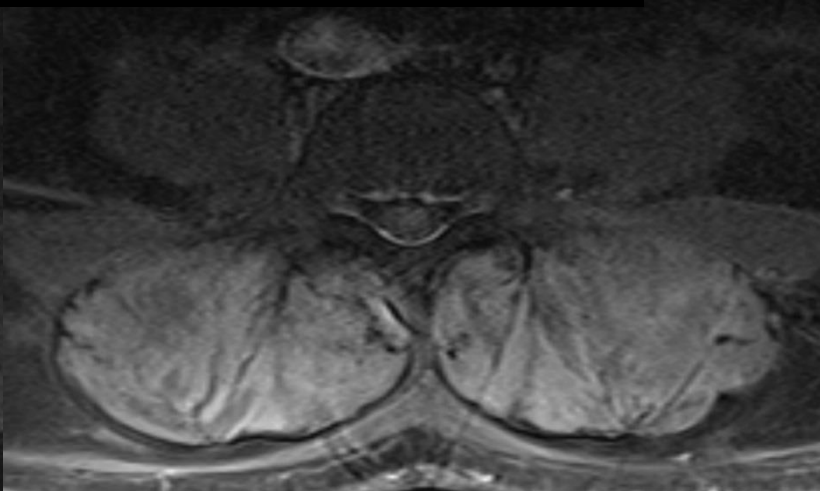
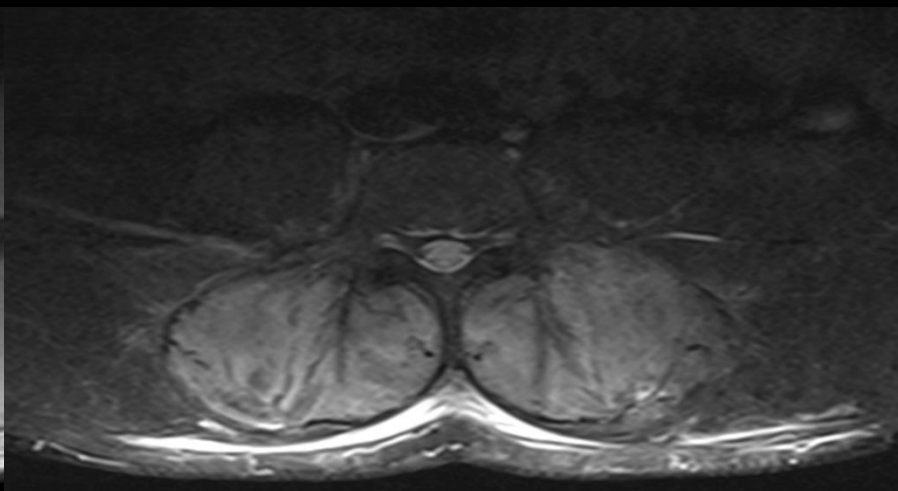
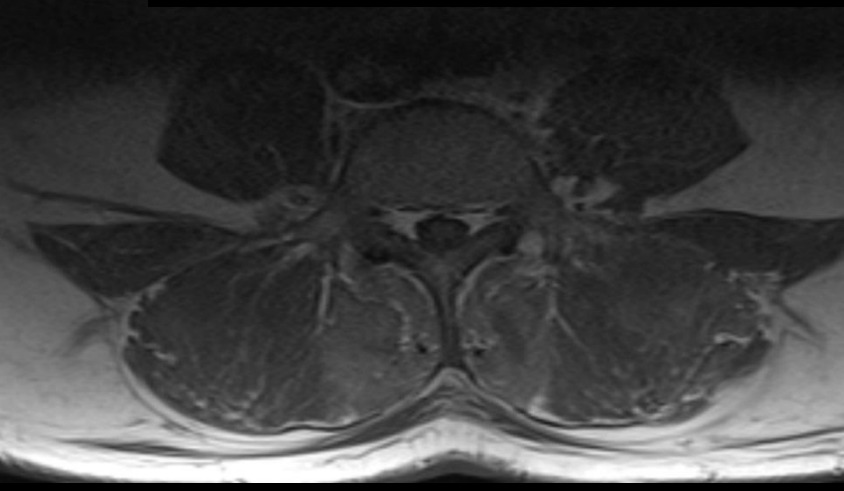


T1 FS Post Gad



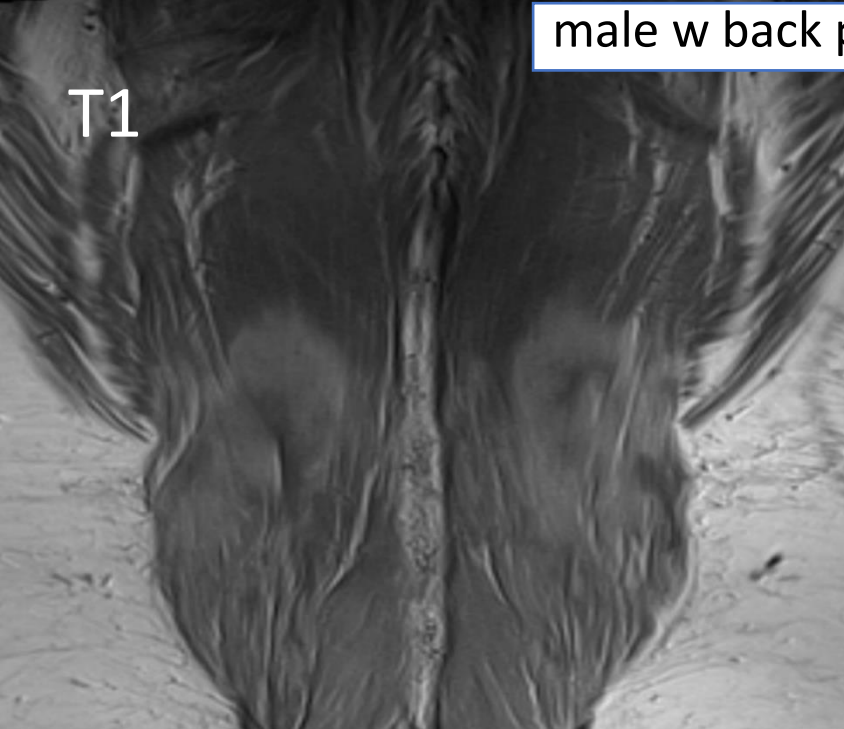
Can Radiology make the diagnosis of Compartment syndrome?
Please vote. Yes or No?

T1 hyp
hemor

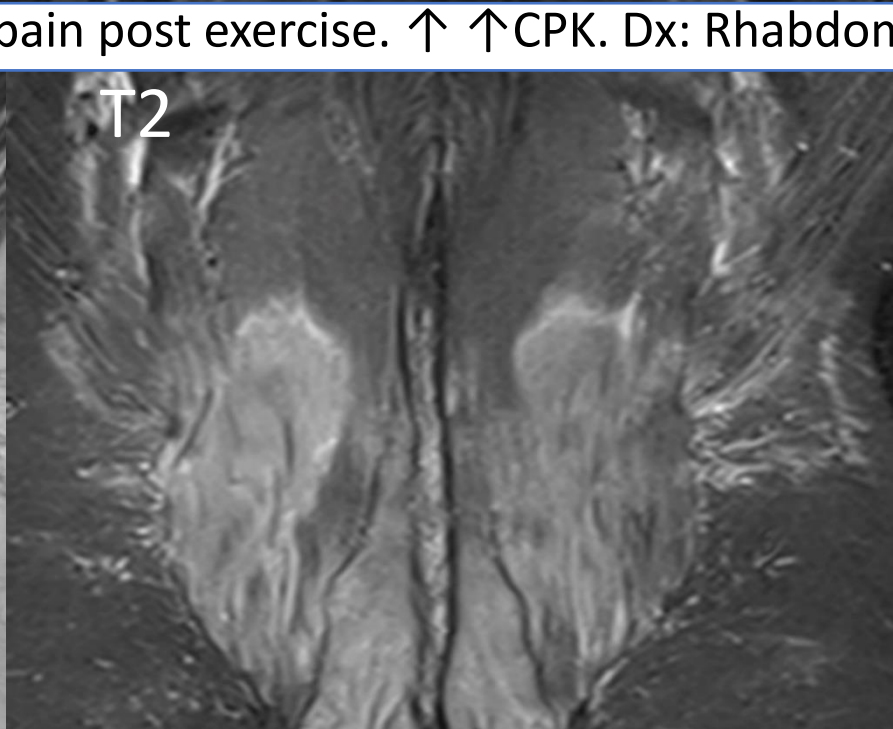


male w back pain post exercise. ↑↑CPK. Dx: Rhabdomyolysis

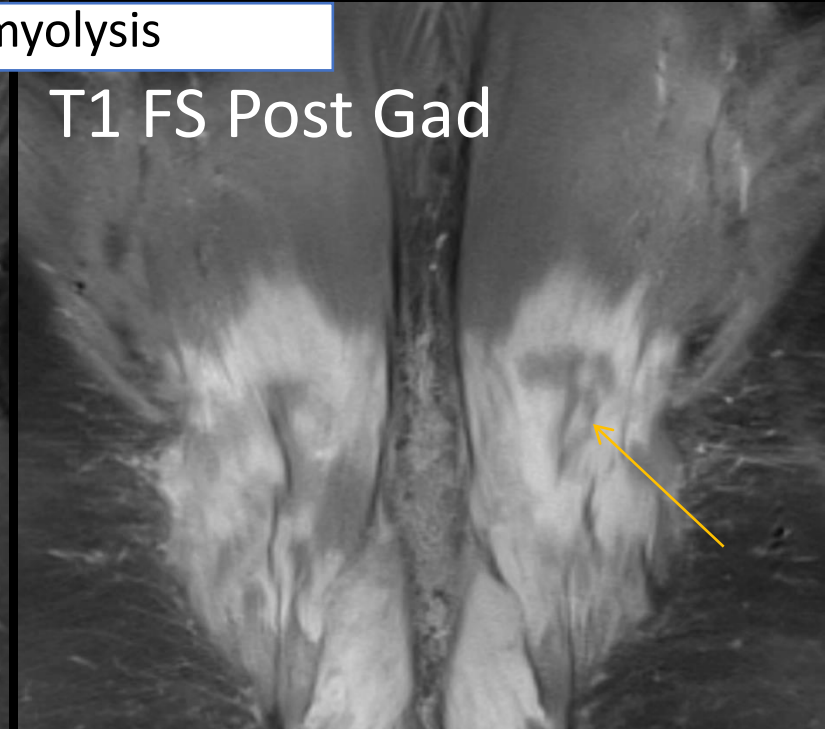
T1



T2

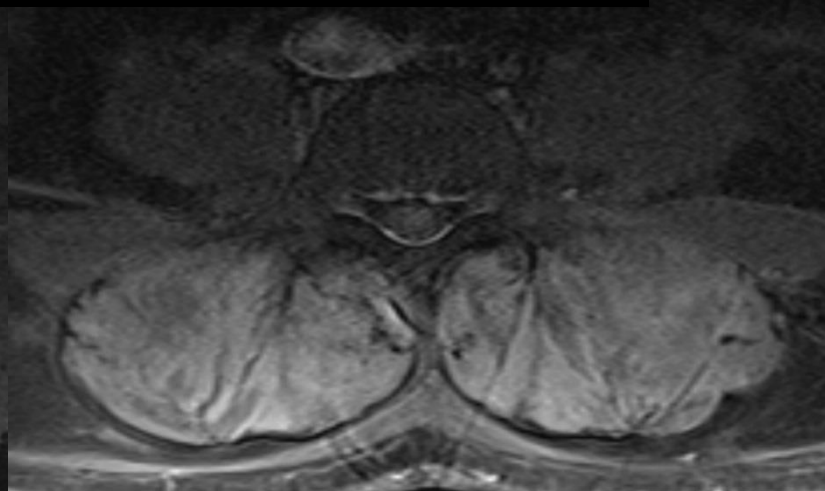
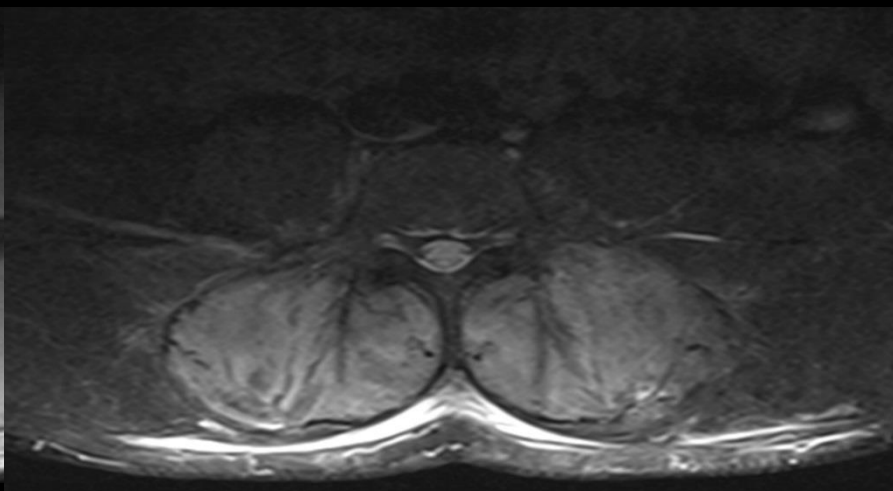
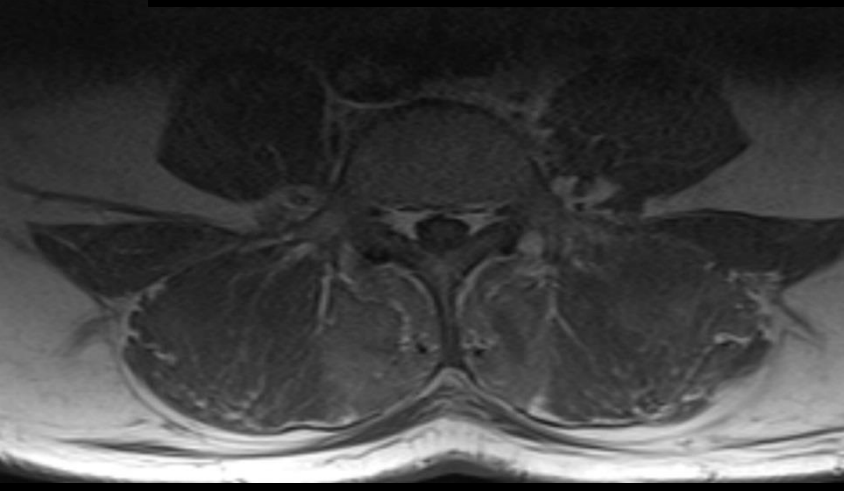


T1 FS Post Gad

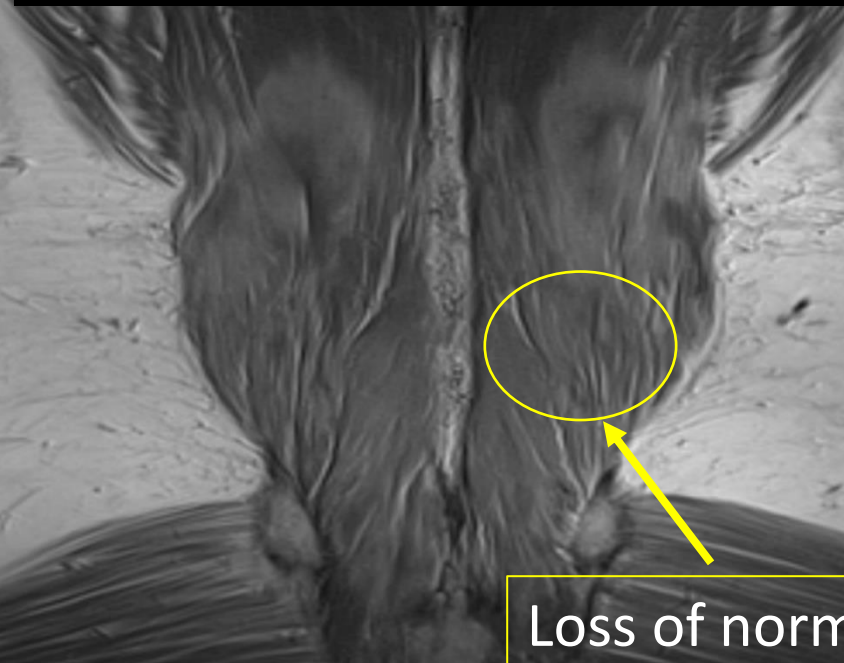


Can Radiology make the diagnosis of Compartment syndrome?
Answer: No. Compartment syndrome is a clinical diagnosis

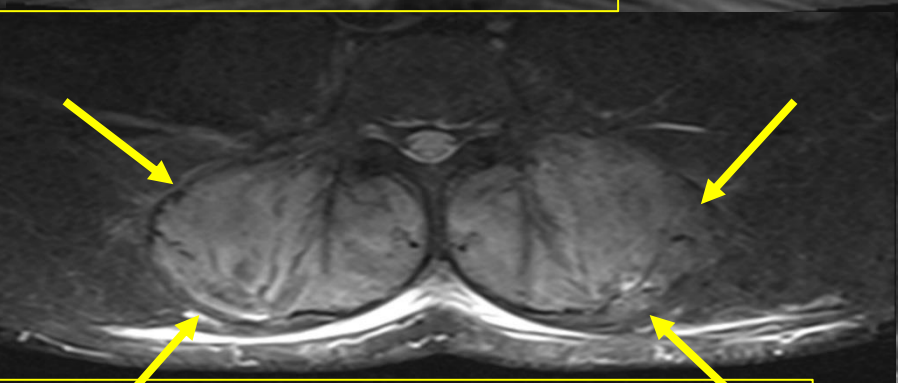
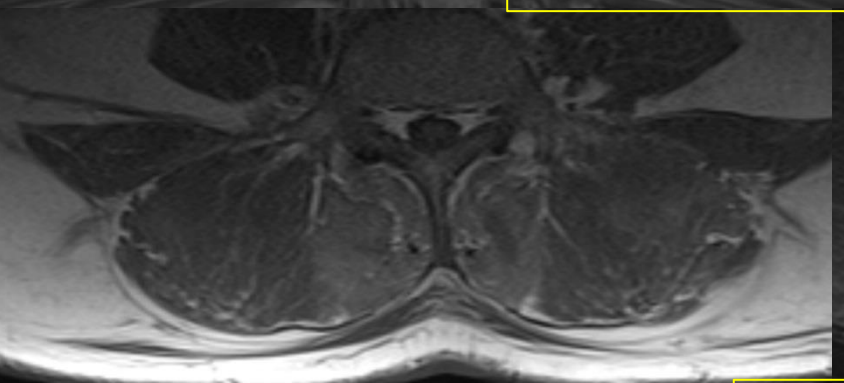
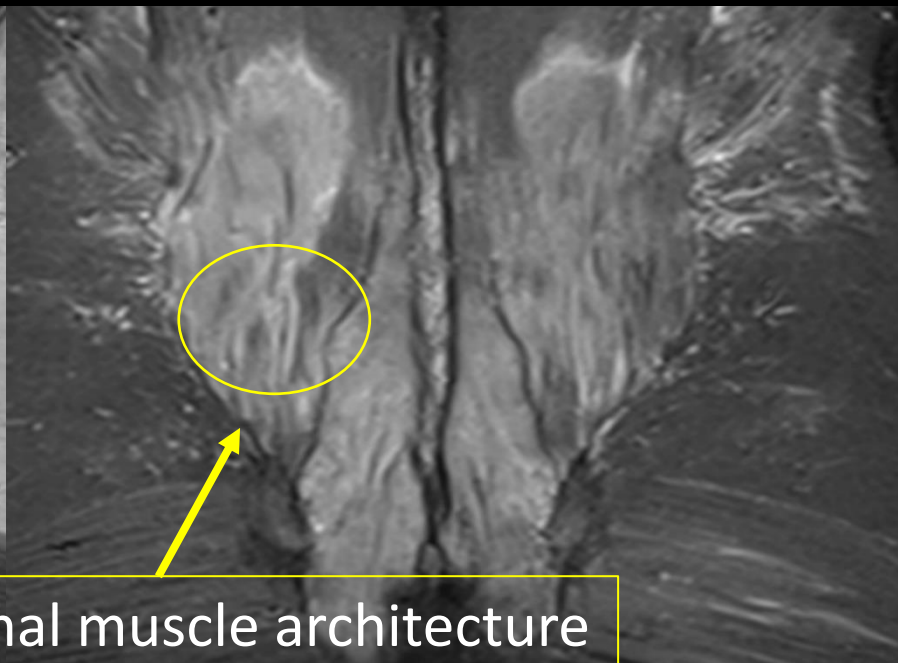
T1 hyp
hemor



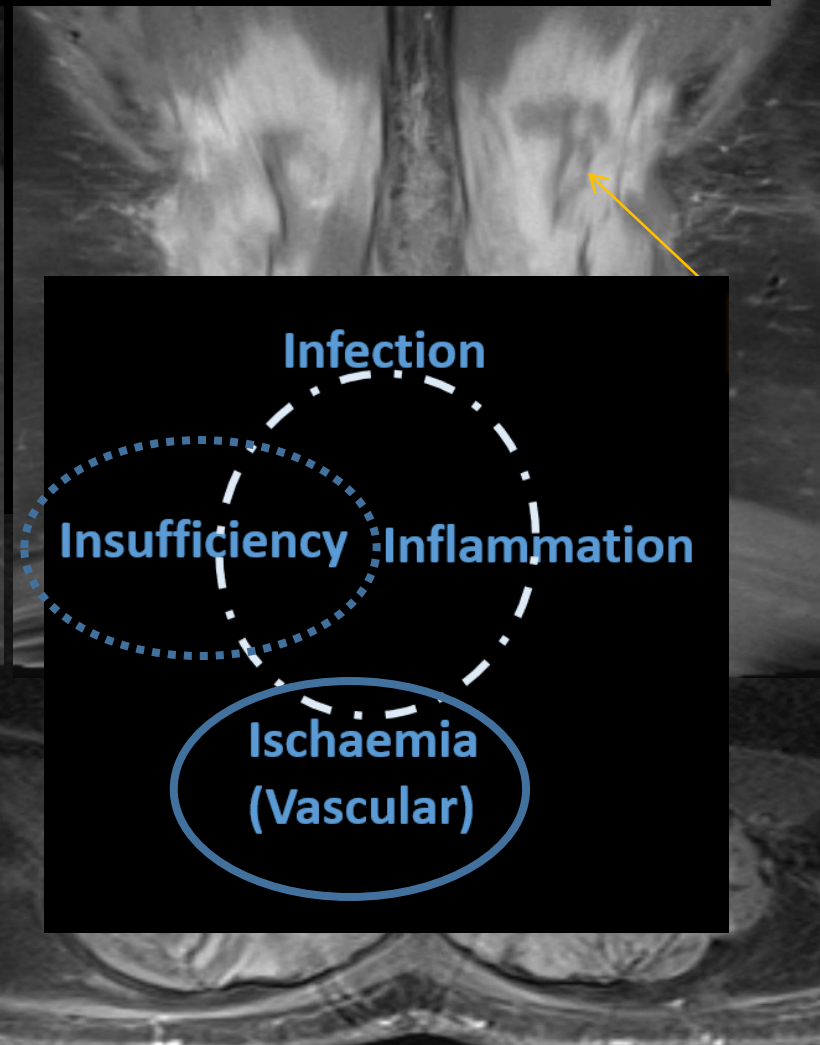
Learning Point: Compartment syndrome is a clinical Dx, MRI can suggest compartment Syndrome and guide fasciotomy



Loss of normal muscle architecture



Swelling of muscle compartments



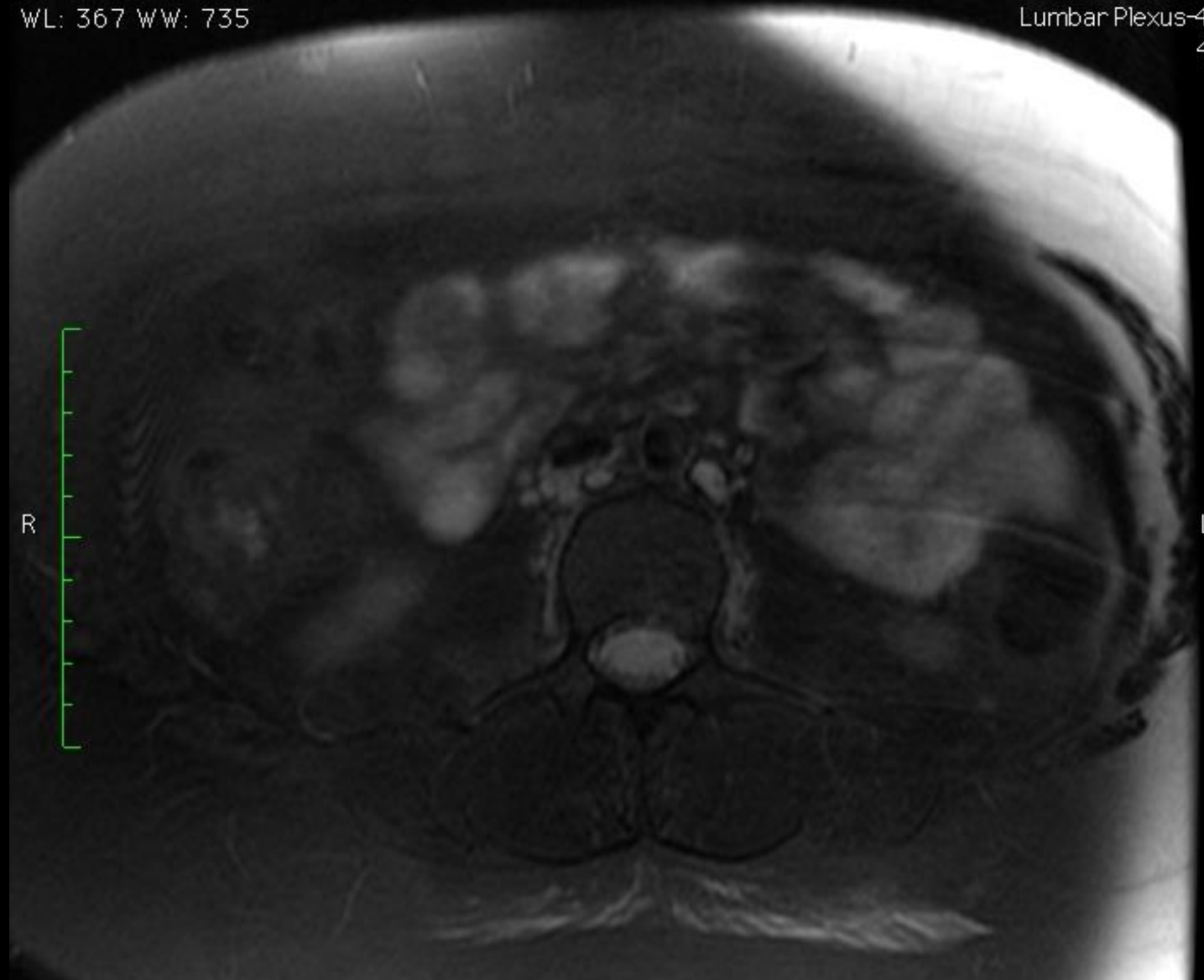
Young man. Difficulty in walking for the last year.

- Coronal and Axial T2 fat sat

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 35/40 S (I -> S)
Uncompressed

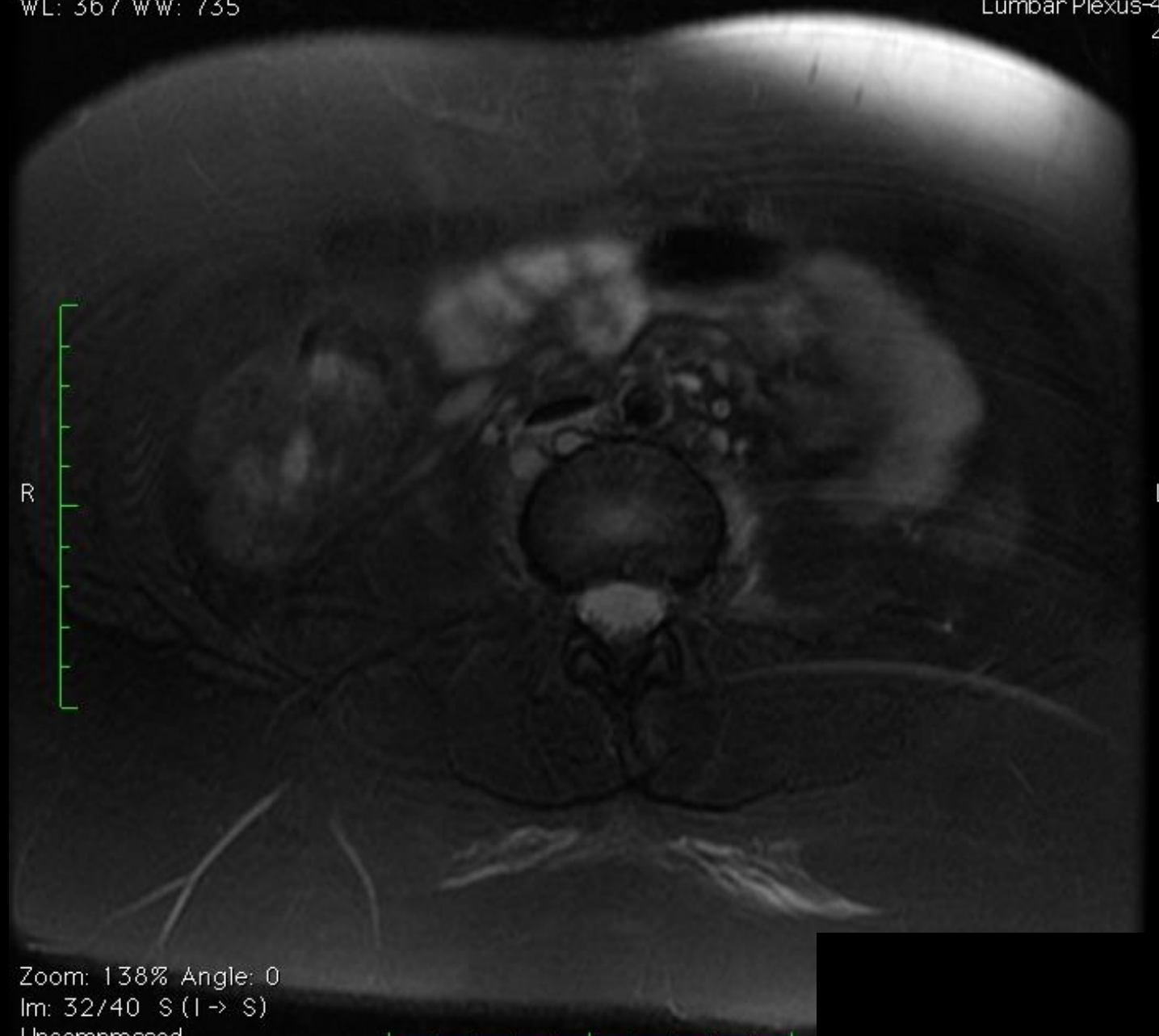
Thickness: 6.00 mm Location: 85.78 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 32/40 S (I -> S)
Uncompressed

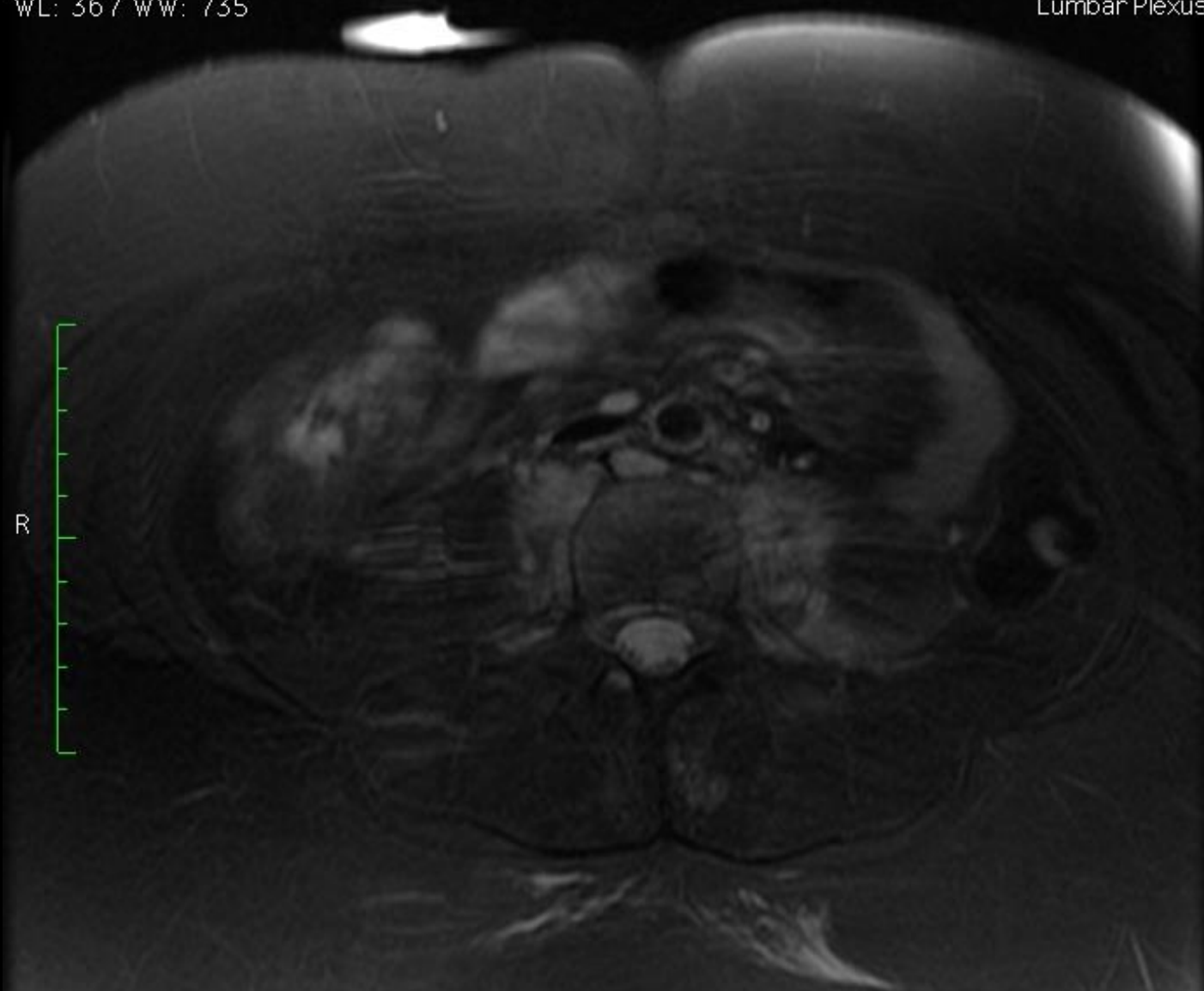
Thickness: 6.00 mm Location: 64.85 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 30/40 S (I -> S)
Uncompressed

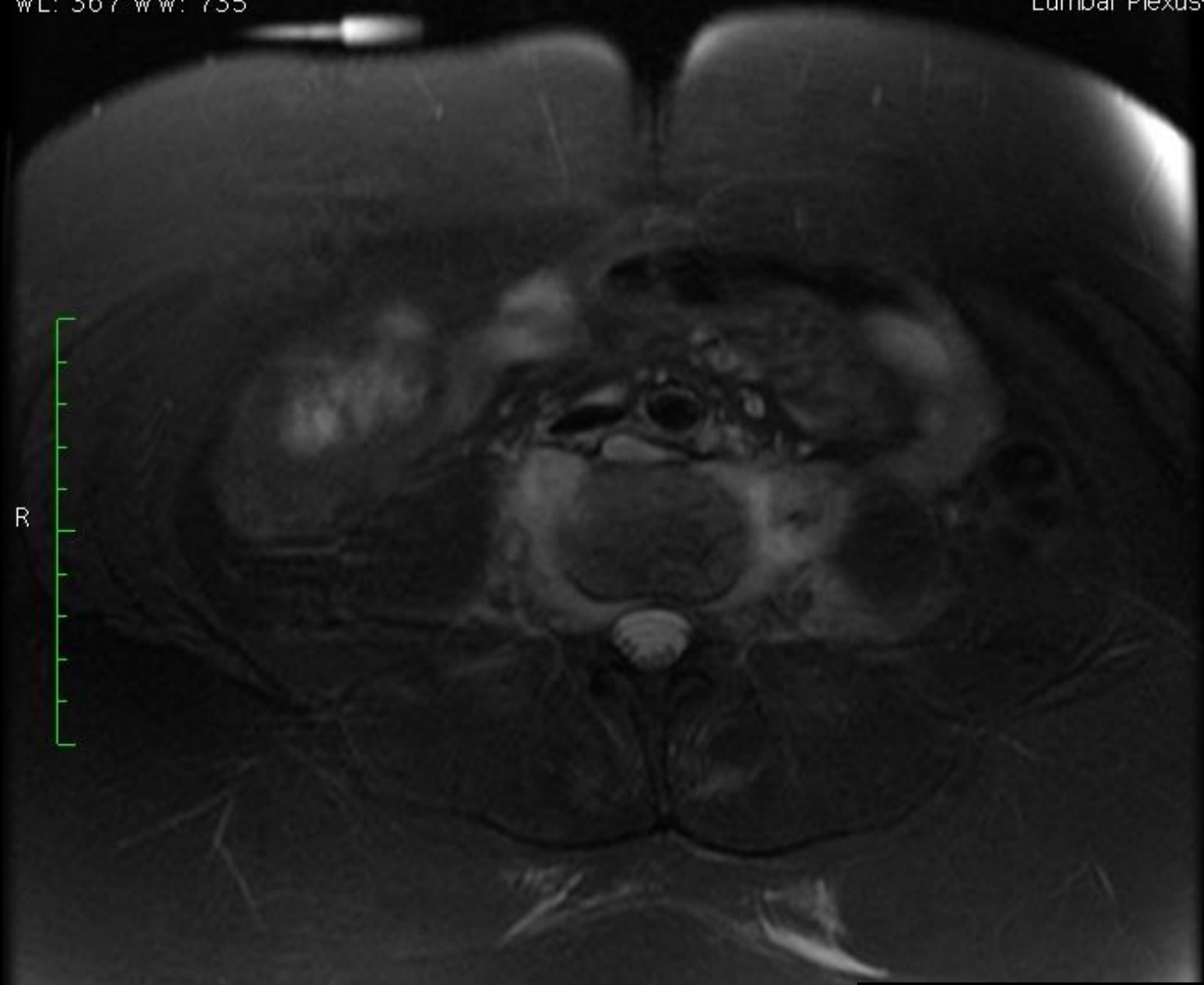
Thickness: 6.00 mm Location: 50.89 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4

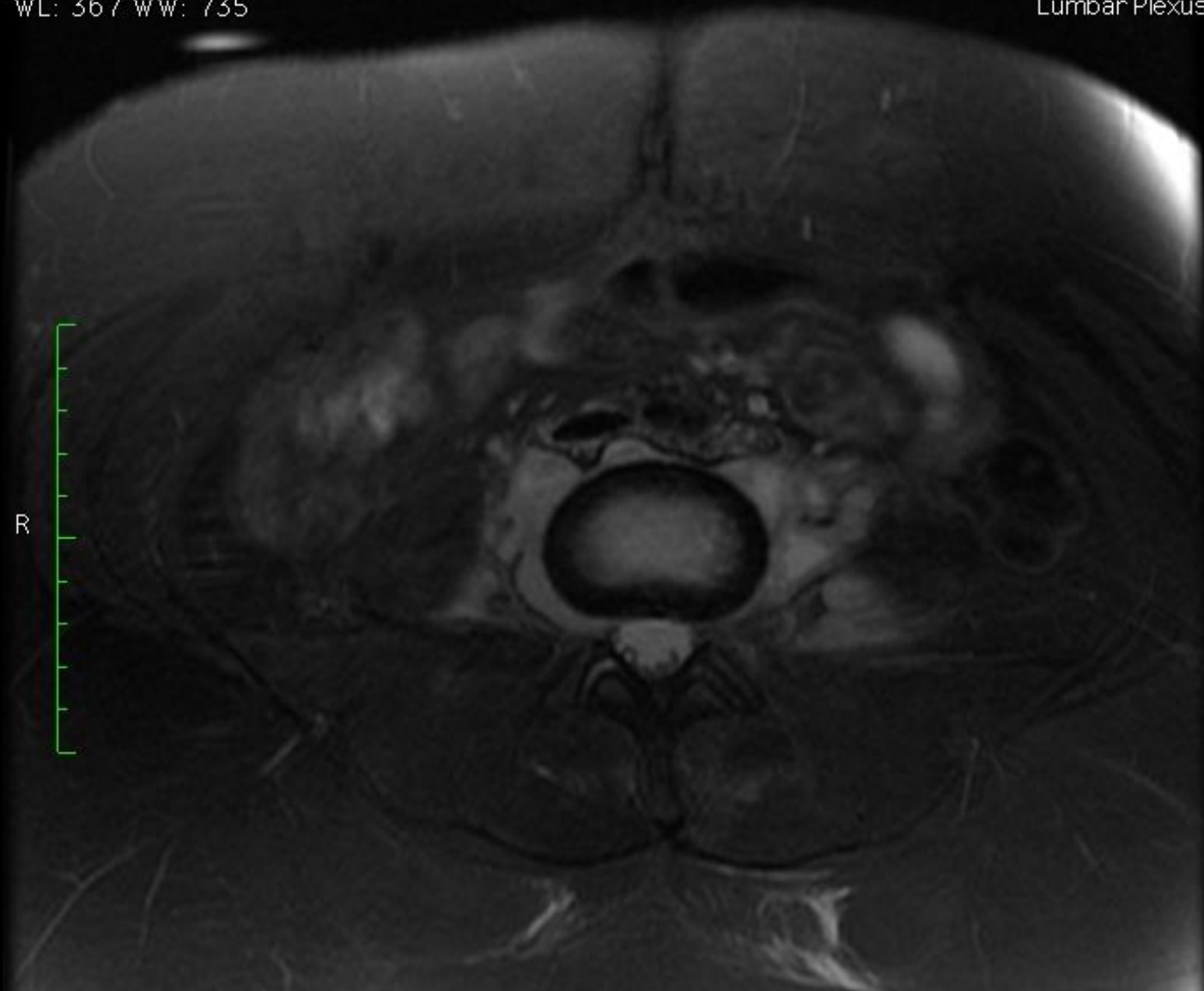


Zoom: 138% Angle: 0
Im: 29/40 S (I -> S)
Uncompressed
Thickness: 6.00 mm Location: 43.92 mm
P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 28/40 S (I -> S)
Uncompressed

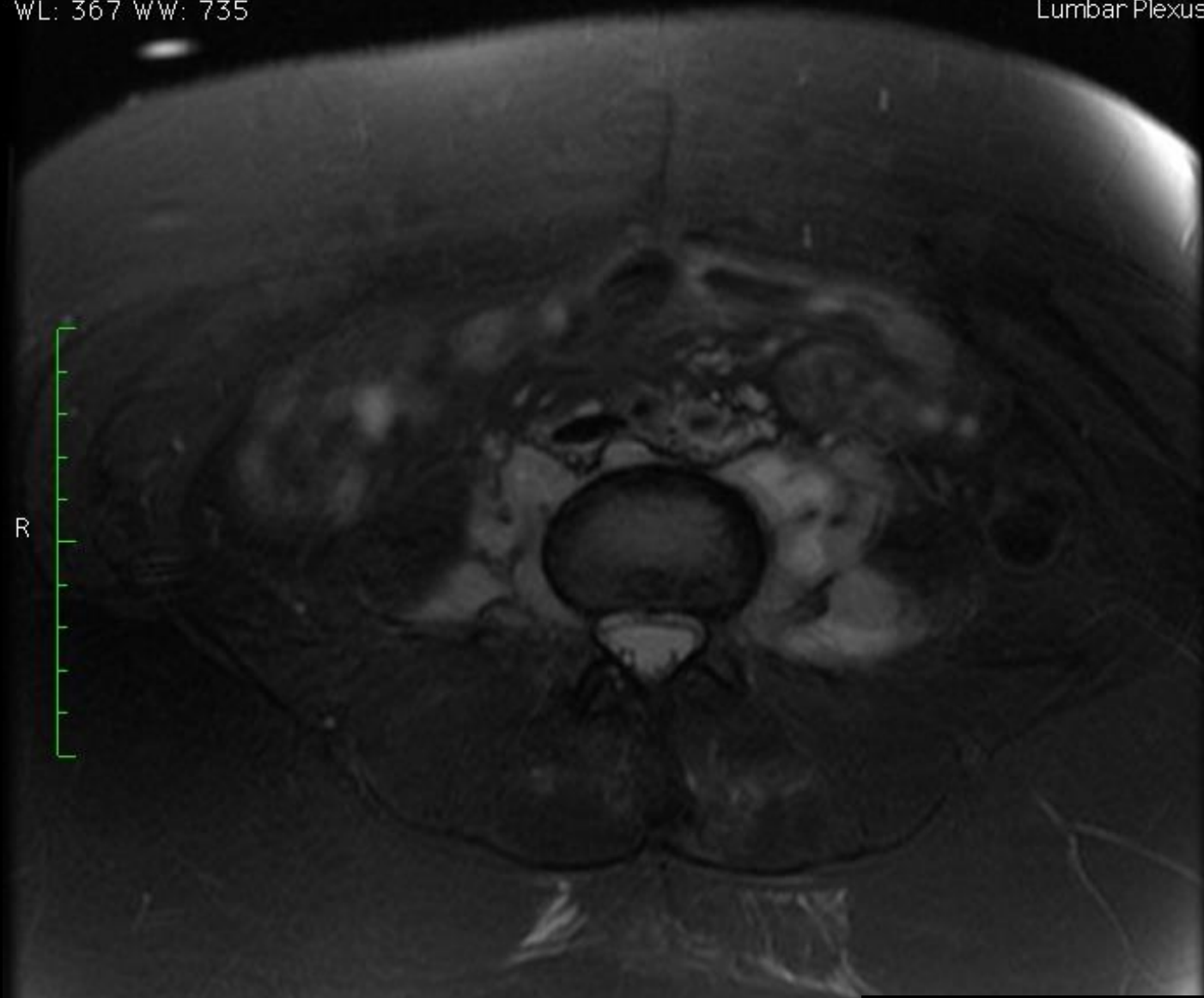
Thickness: 6.00 mm Location: 36.94 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 27/40 S (I -> S)
Uncompressed

Thickness: 6.00 mm Location: 29.96 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 25/40 S (I -> S)
Uncompressed
Thickness: 6.00 mm Location: 16.01 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



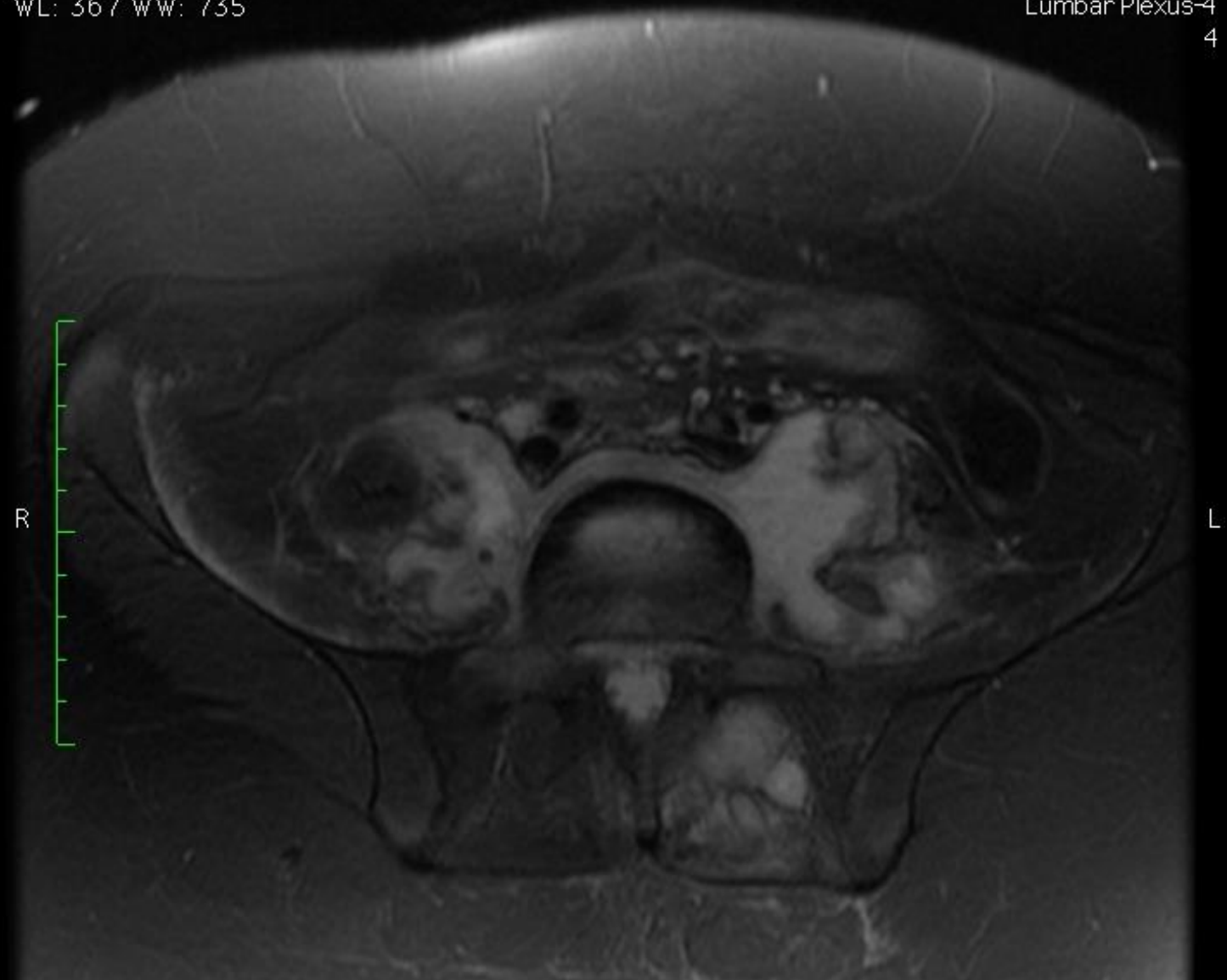
Zoom: 138% Angle: 0
Im: 24/40 (I -> S)
Uncompressed
Thickness: 6.00 mm Location: 9.03 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



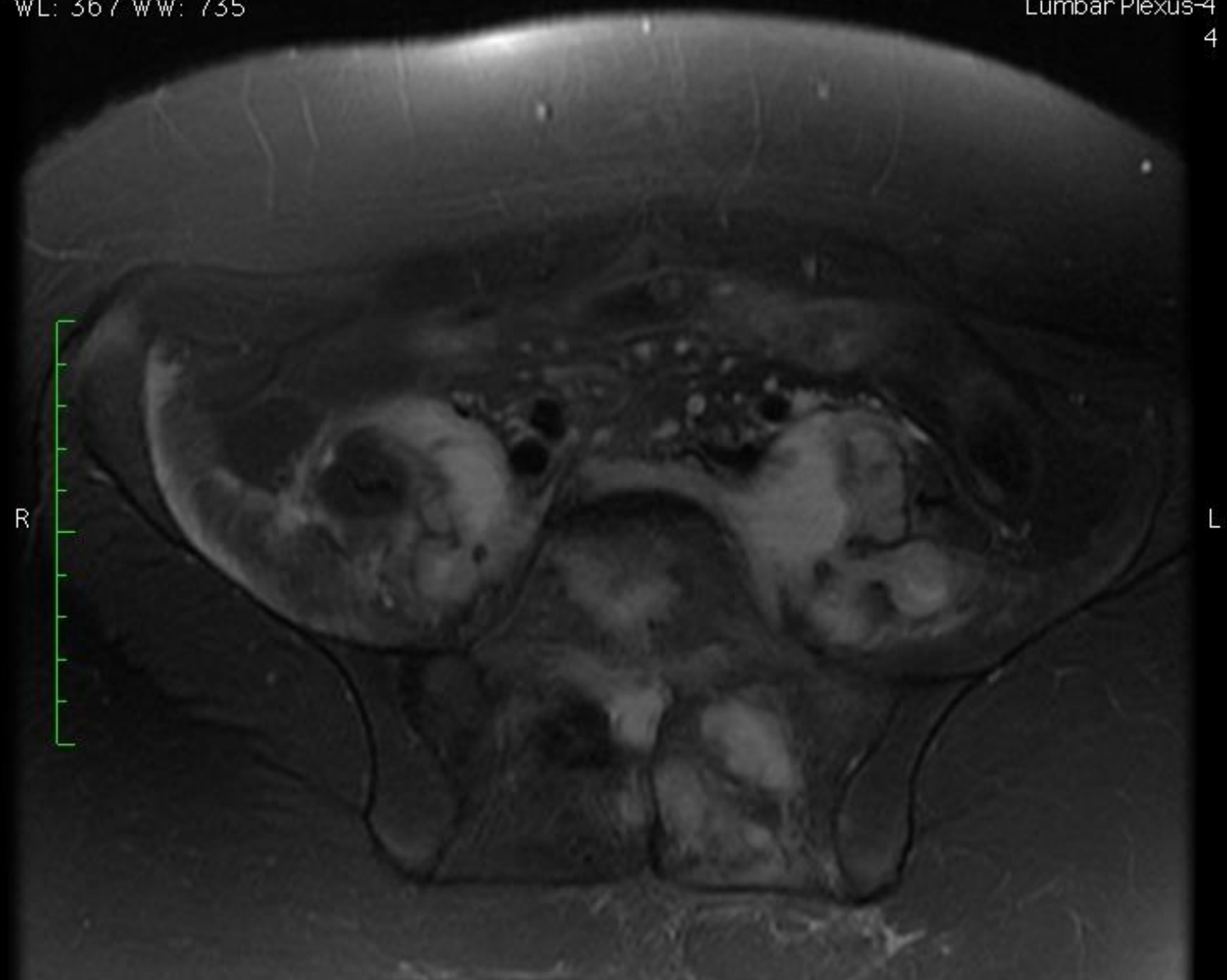
Zoom: 138% Angle: 0
Im: 22/40 (I -> S)
Uncompressed
Thickness: 6.00 mm Location: -4.92 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 21/40 (I -> S)
Uncompressed

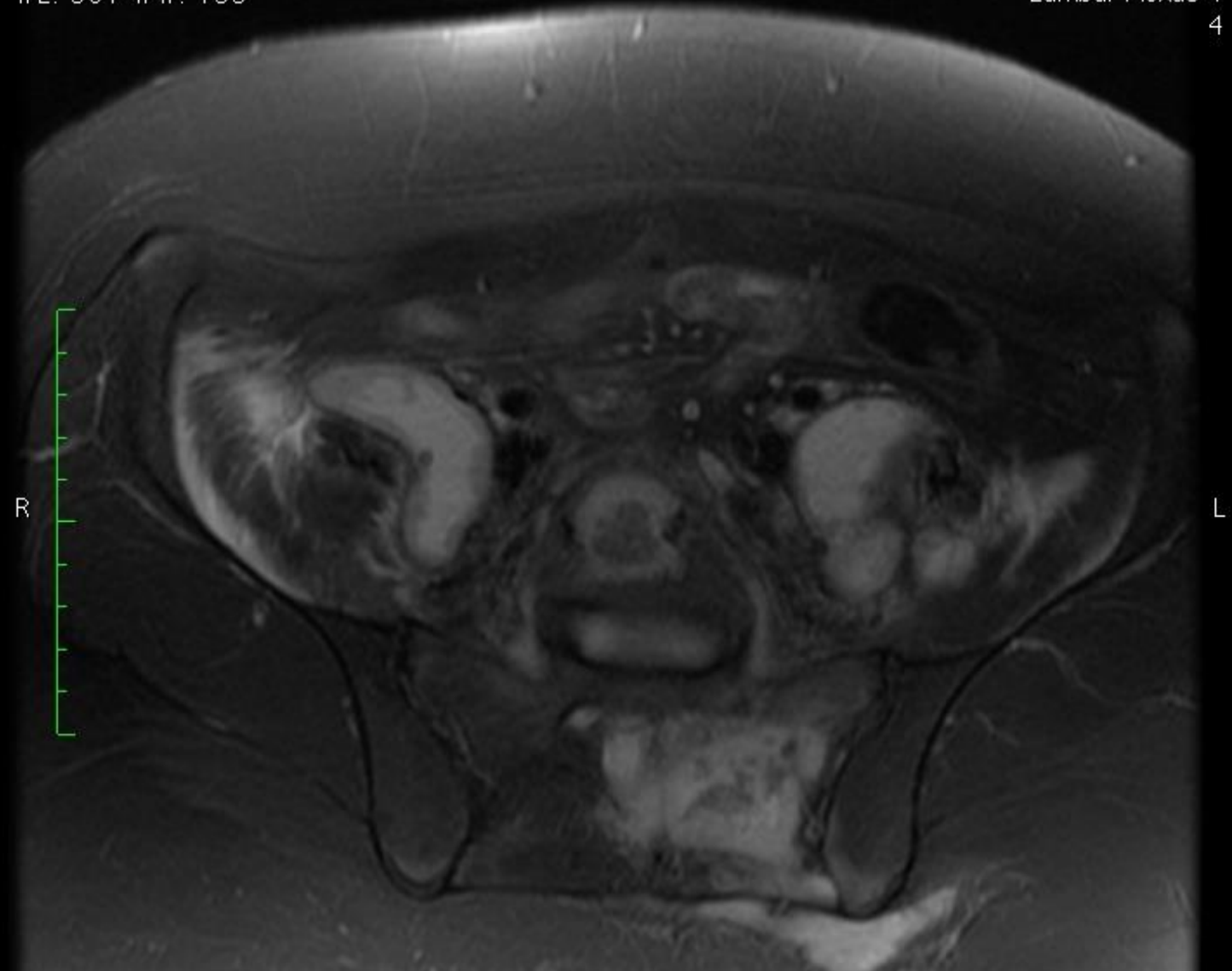
Thickness: 6.00 mm Location: -11.90 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



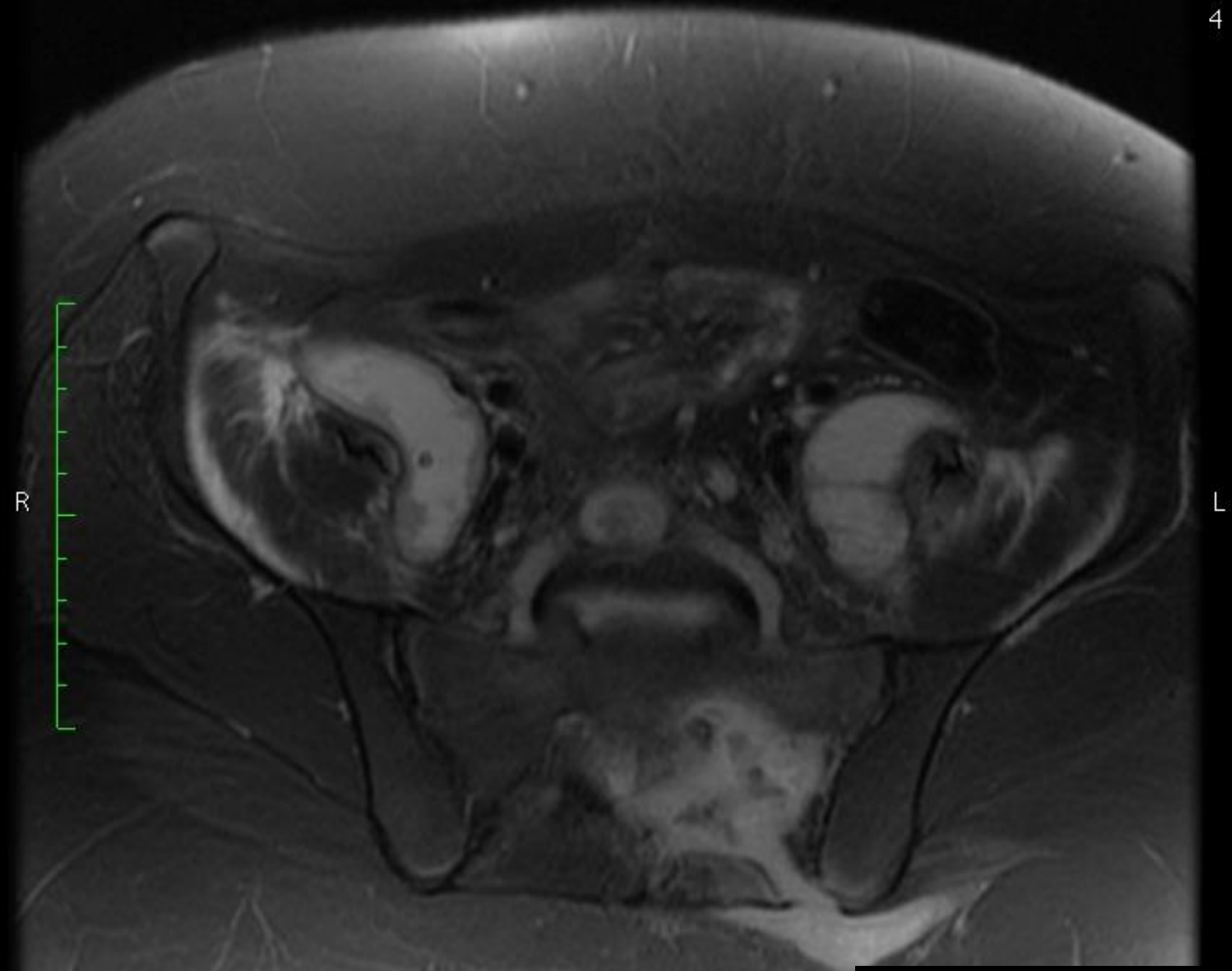
Zoom: 138% Angle: 0
Im: 19/40 (I -> S)
Uncompressed
Thickness: 6.00 mm Location: -25.85 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 18/40 (I -> S)
Uncompressed

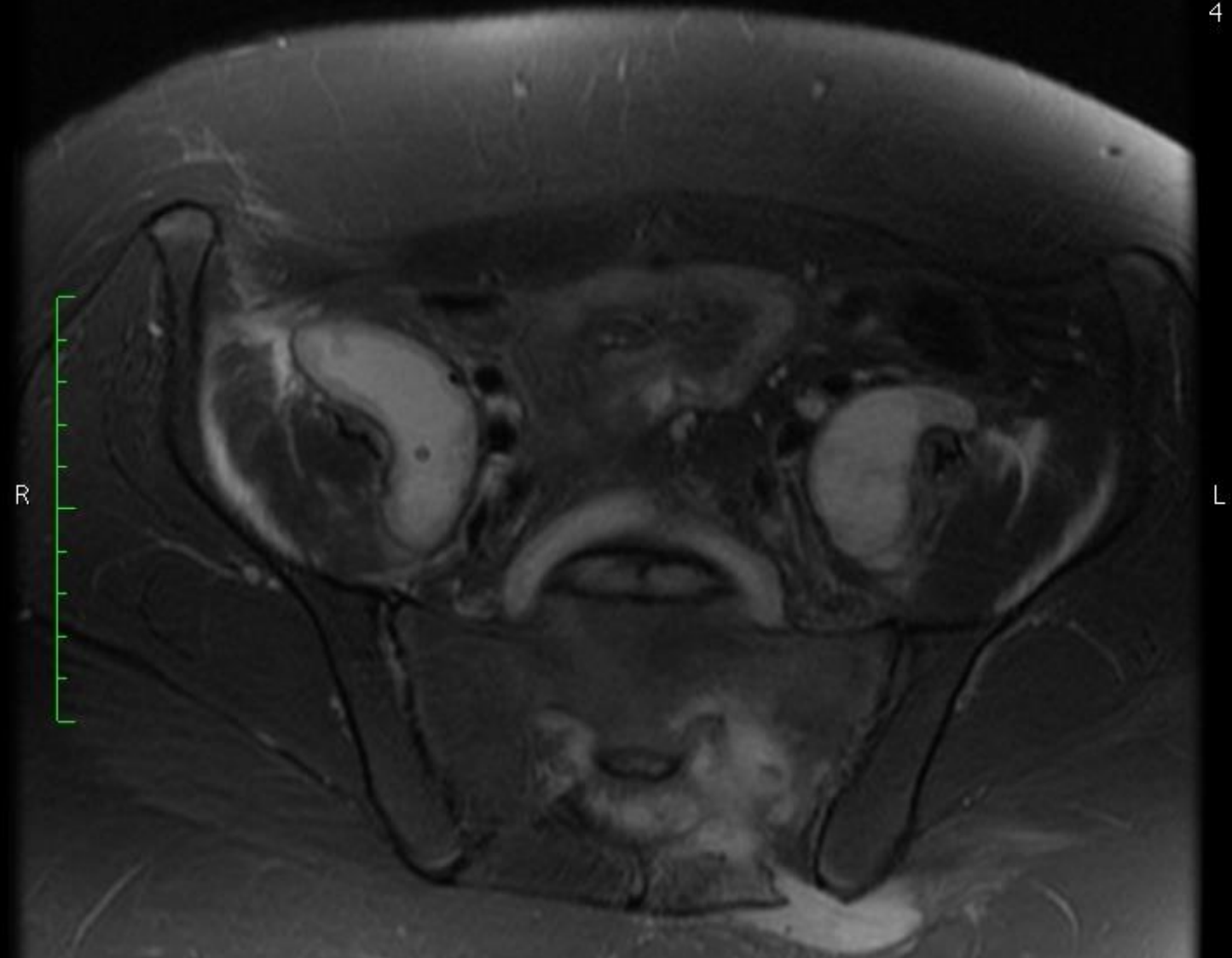
Thickness: 6.00 mm Location: -32.83 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



R

L

Zoom: 138% Angle: 0
Im: 17/40 (I -> S)
Uncompressed

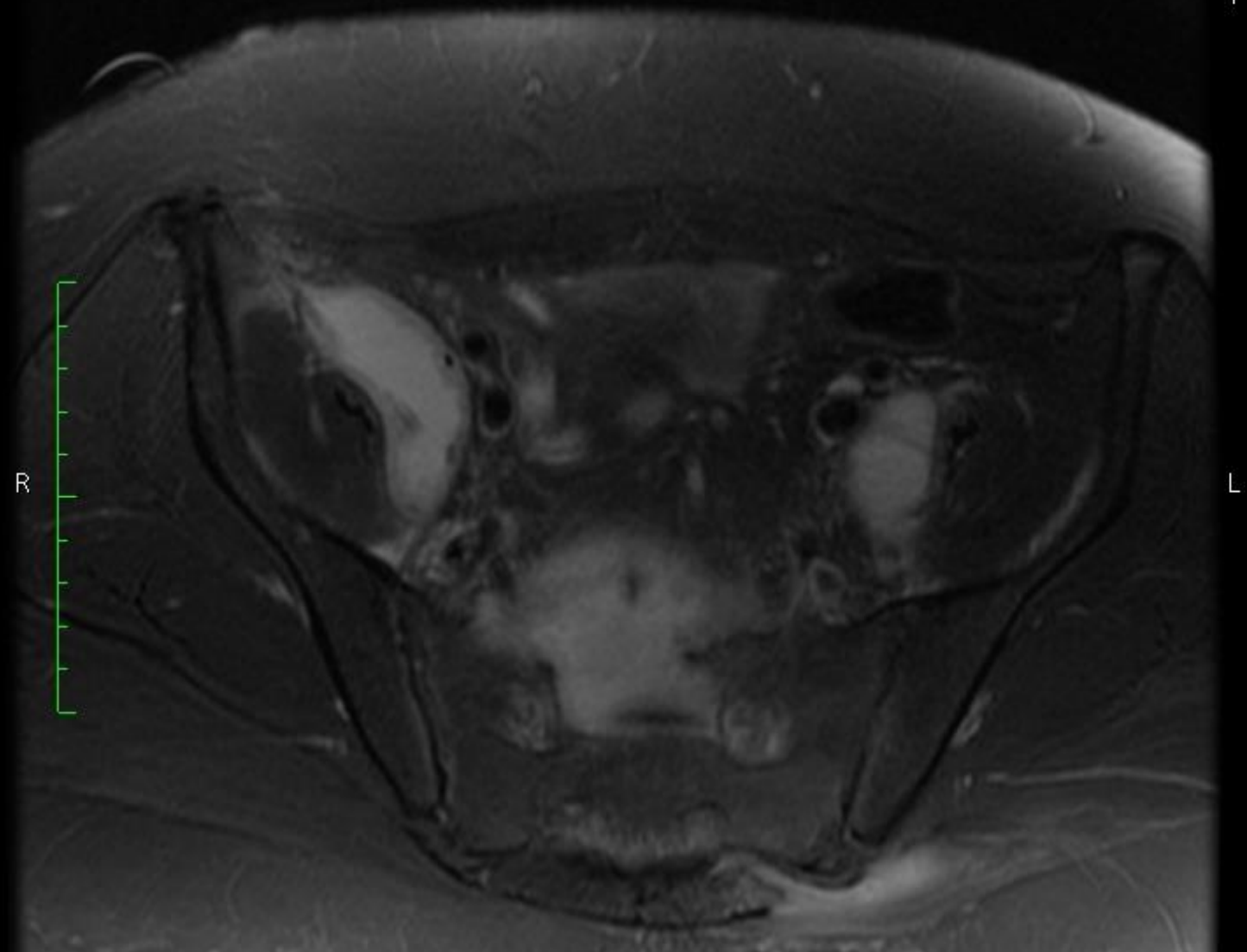
Thickness: 6.00 mm Location: -39.80 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 15/40 1(1 -> 3)
Uncompressed

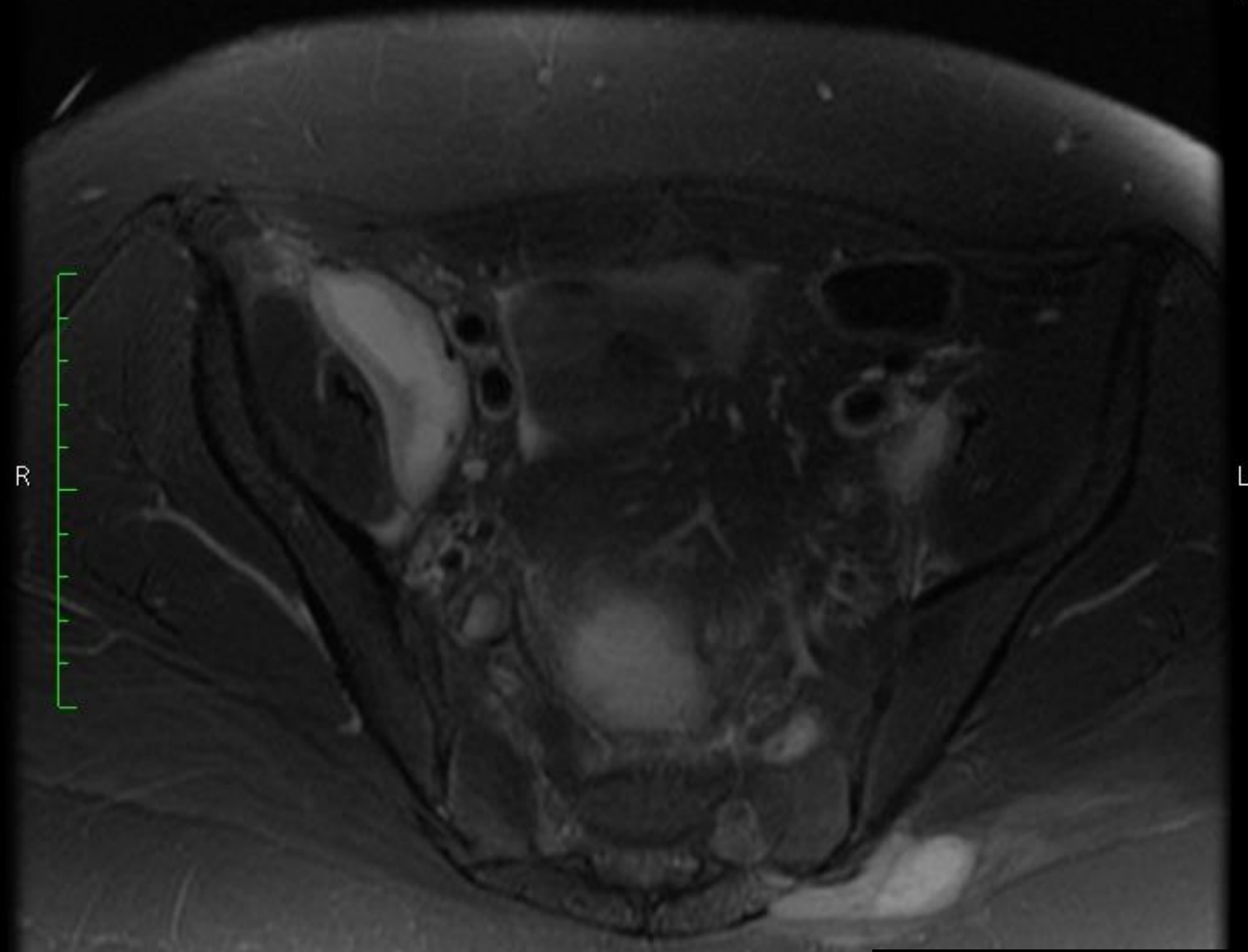
Thickness: 6.00 mm Location: -53.76 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 14/40 1(1 -> 3)
Uncompressed

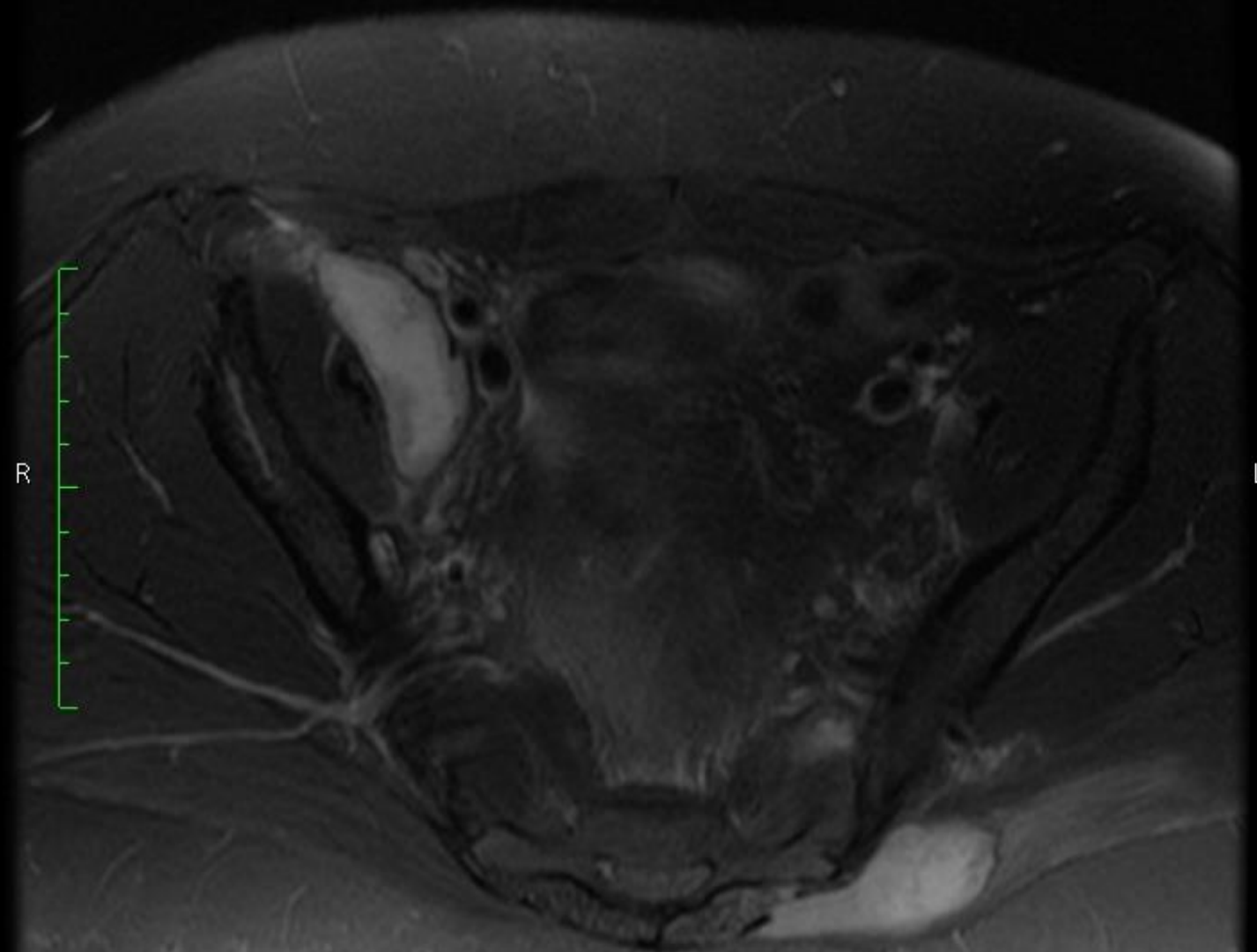
Thickness: 6.00 mm Location: -60.73 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



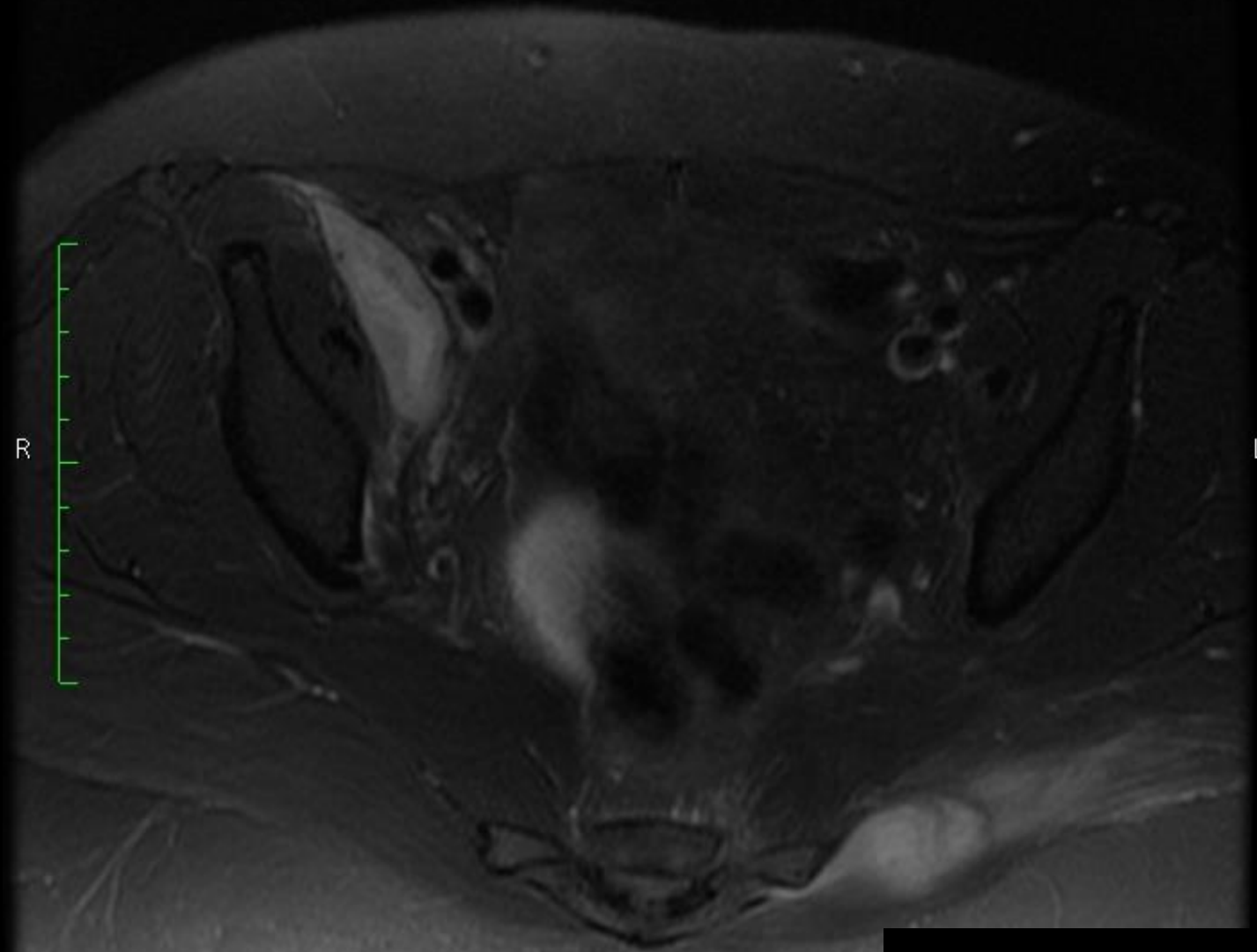
Zoom: 138% Angle: 0
Im: 13/40 1(1 -> 3)
Uncompressed
Thickness: 6.00 mm Location: -67.71 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



R

L

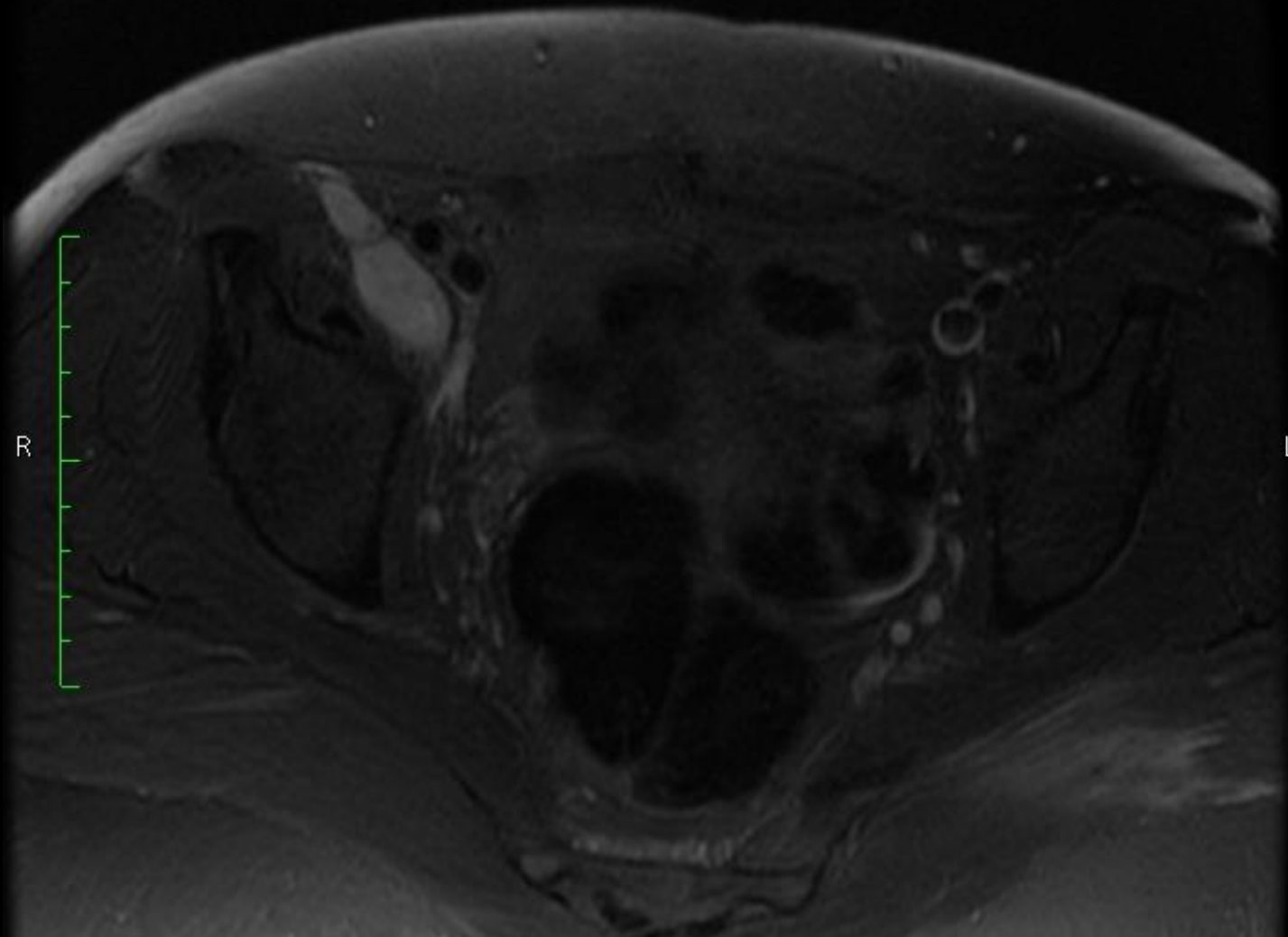
Zoom: 138% Angle: 0
Im: 11/40 1(1 -> 3)
Uncompressed
Thickness: 6.00 mm Location: -81.66 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



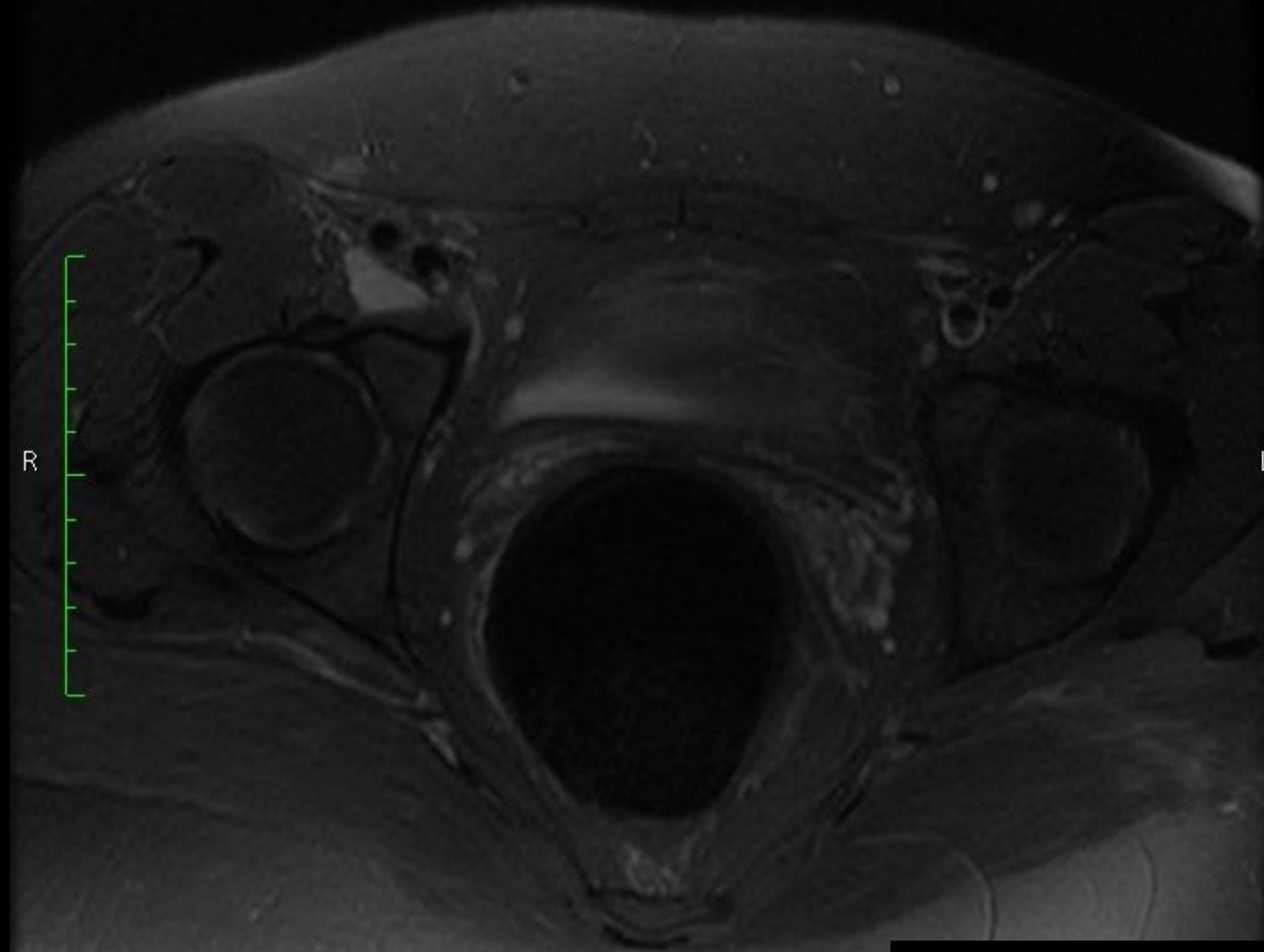
Zoom: 138% Angle: 0
Im: 9/40 1(1 -> 3)
Uncompressed
Thickness: 6.00 mm Location: -95.62 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 367 WW: 735

A

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-4
4



Zoom: 138% Angle: 0
Im: 6/40 1 (I -> S)
Uncompressed

Thickness: 6.00 mm Location: -116.55 mm

P

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

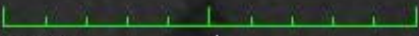
PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



R

L

Zoom: 138% Angle: 0
Im: 2/20 P (P -> A)
Uncompressed
Thickness: 6.00 mm Location: 17.35 mm



I

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 3/20 P (P -> A)
Uncompressed
Thickness: 6.00 mm Location: 10.36 mm

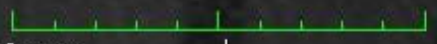


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 4/20 P (P -> A)
Uncompressed
Thickness: 6.00 mm Location: 3.37 mm

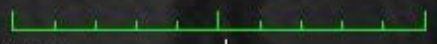


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3

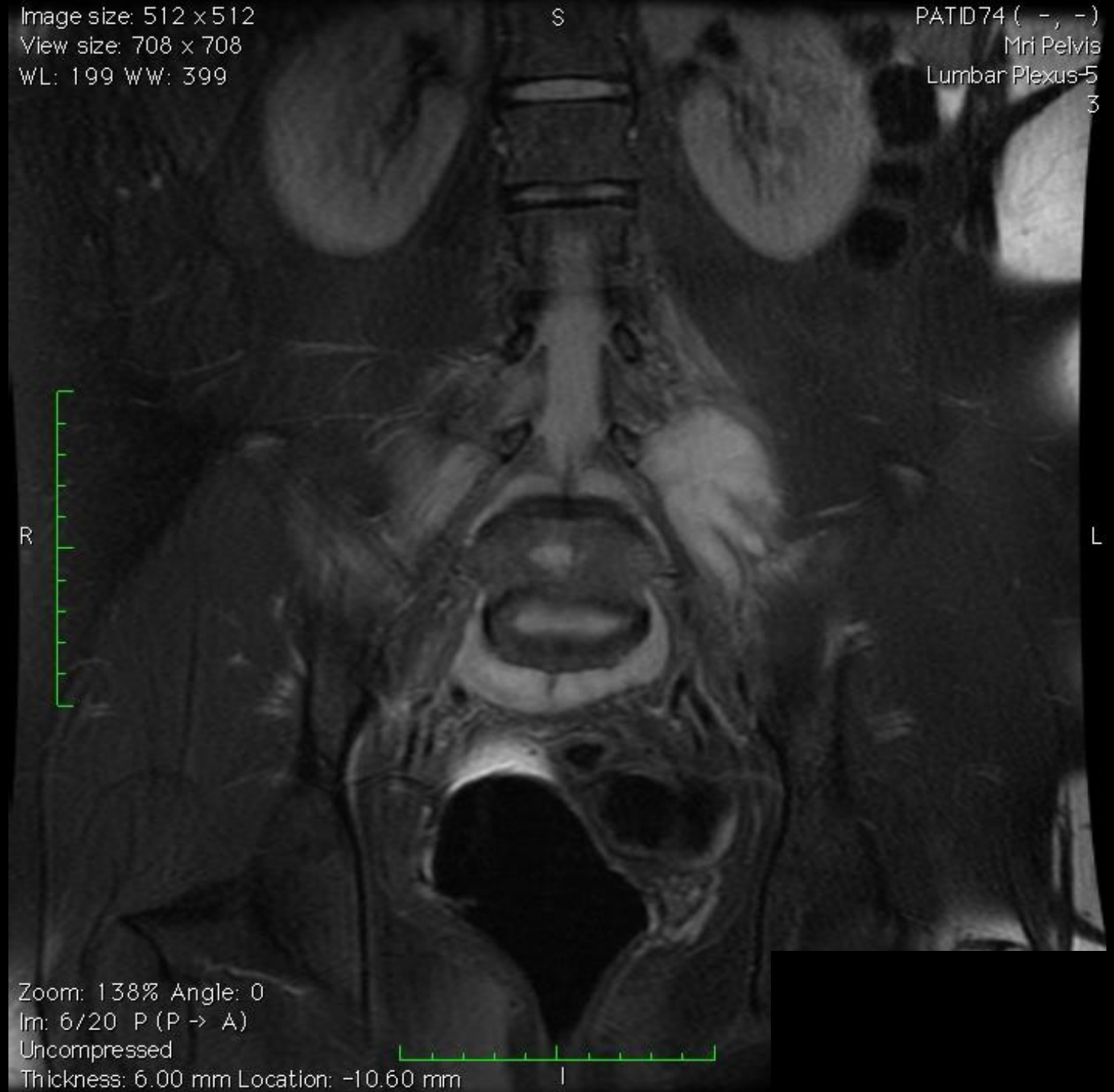


Zoom: 138% Angle: 0
Im: 5/20 P (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -3.62 mm

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 6/20 P (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -10.60 mm

I

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 7/20 P (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -17.59 mm

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3

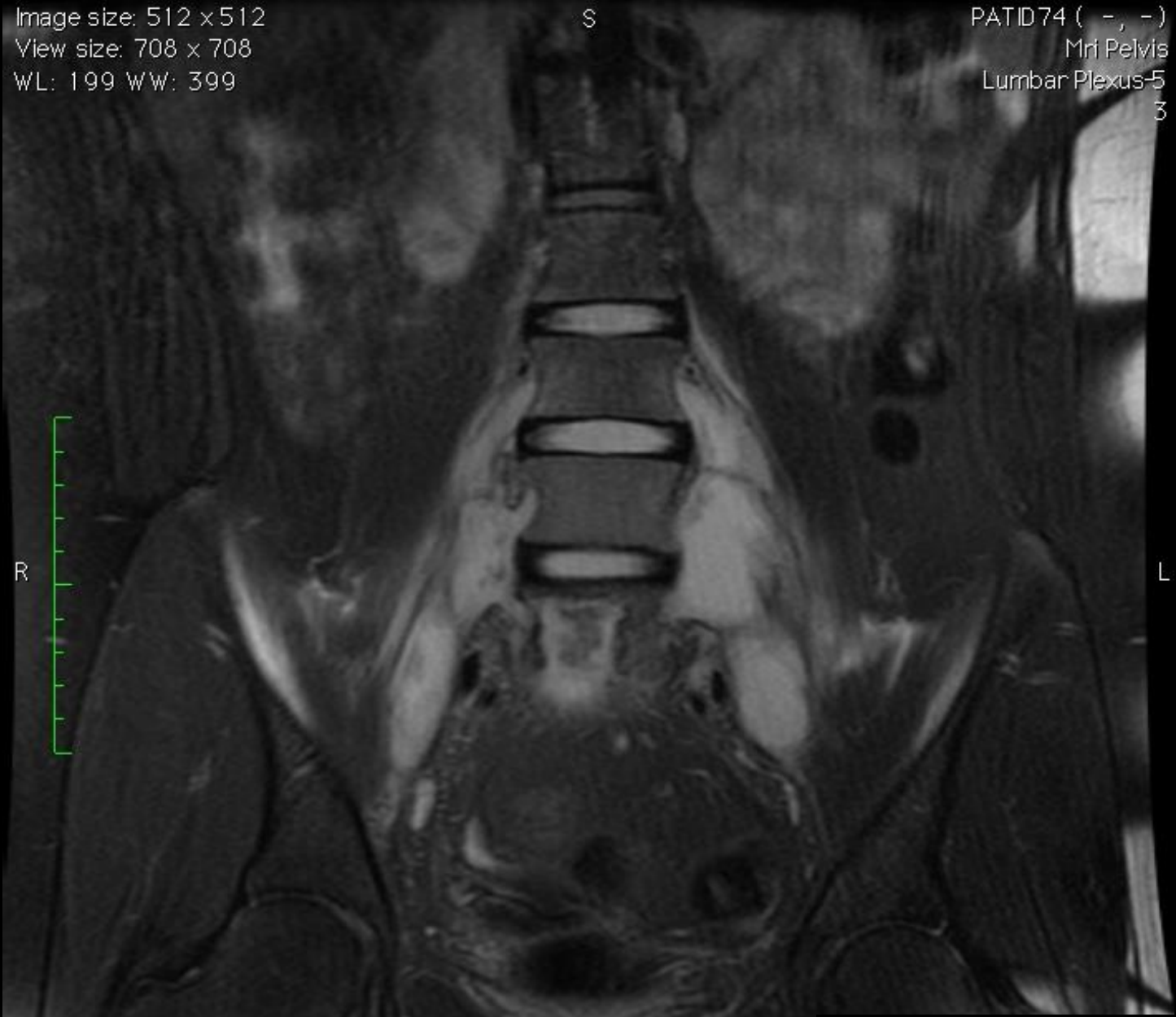


Zoom: 138% Angle: 0
Im: 8/20 (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -24.58 mm

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



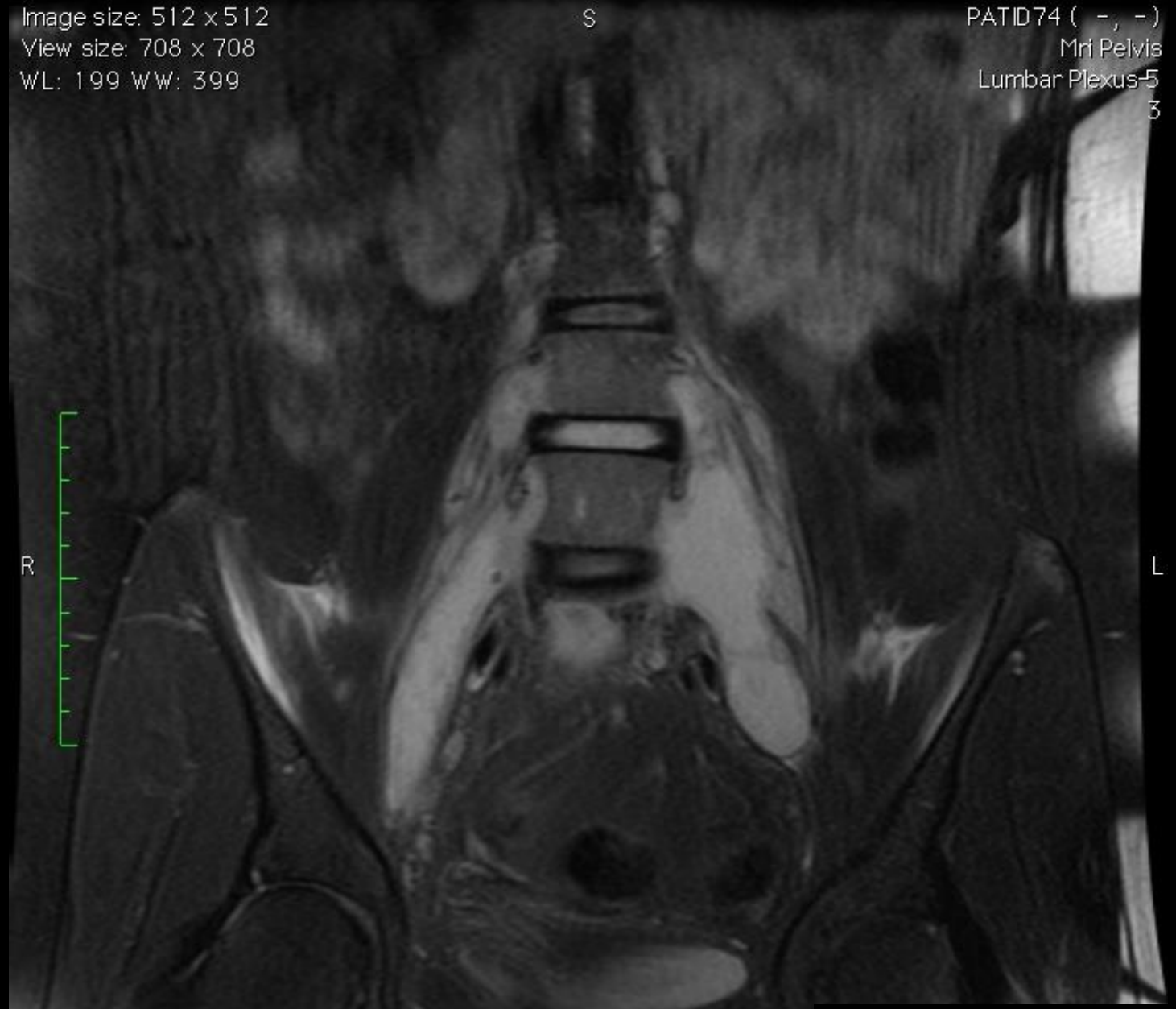
Zoom: 138% Angle: 0
Im: 9/20 (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -31.56 mm

I

Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 10/20 (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -38.55 mm

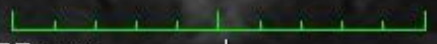
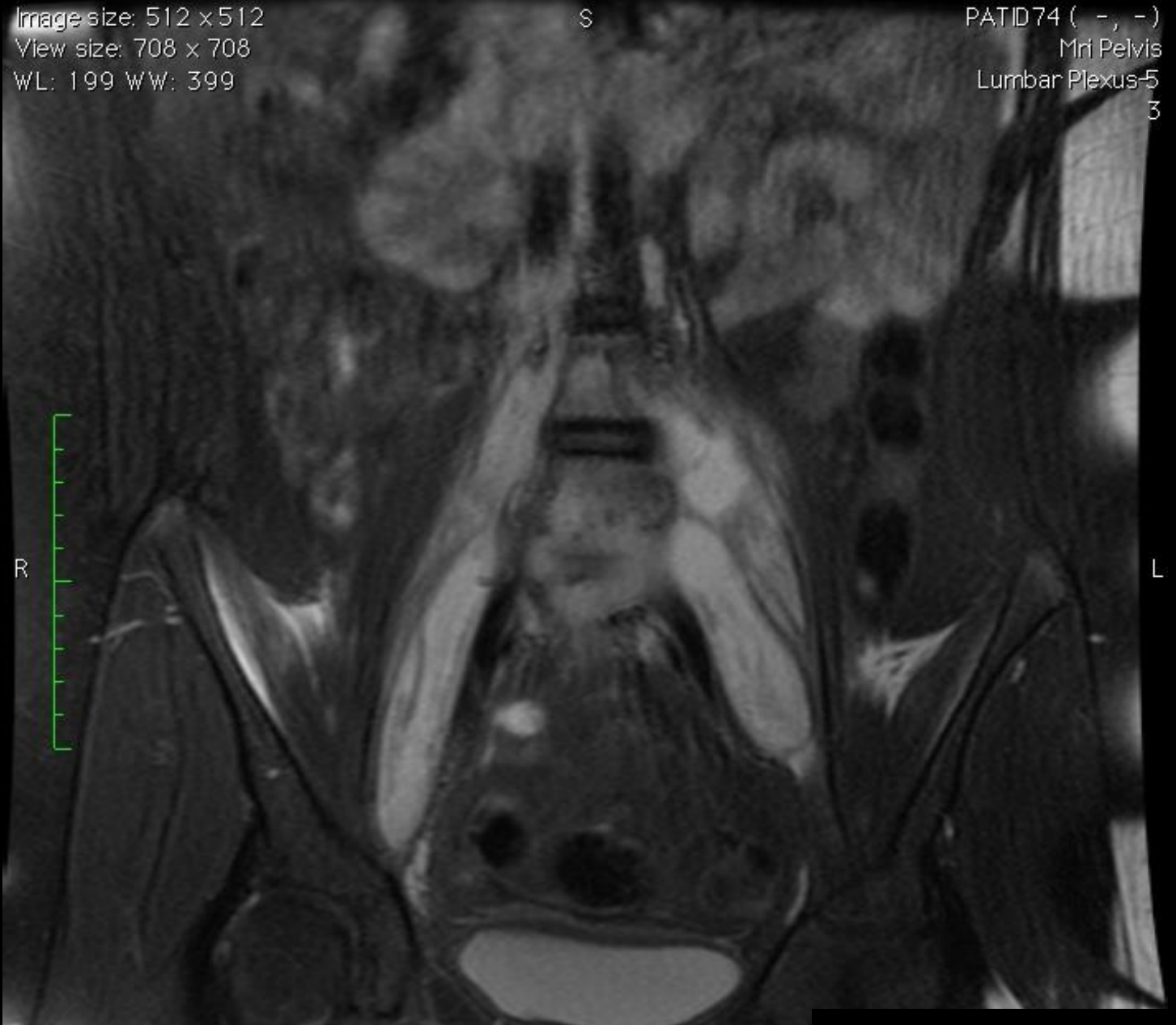


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



R

L

Zoom: 138% Angle: 0
Im: 11/20 (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -45.54 mm

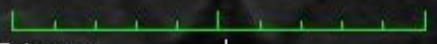
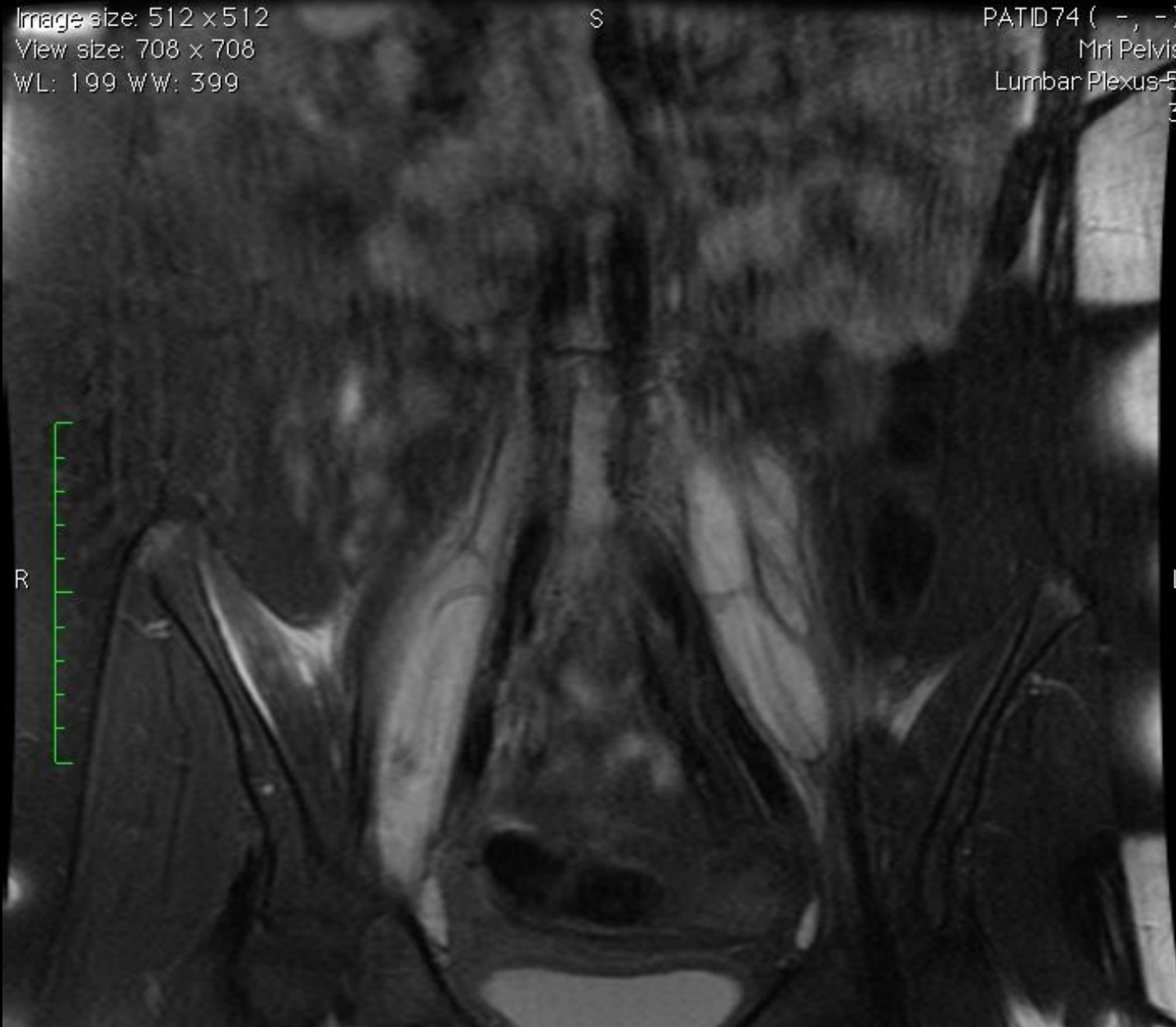


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 12/20 A (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -52.53 mm

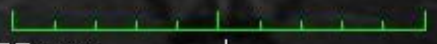
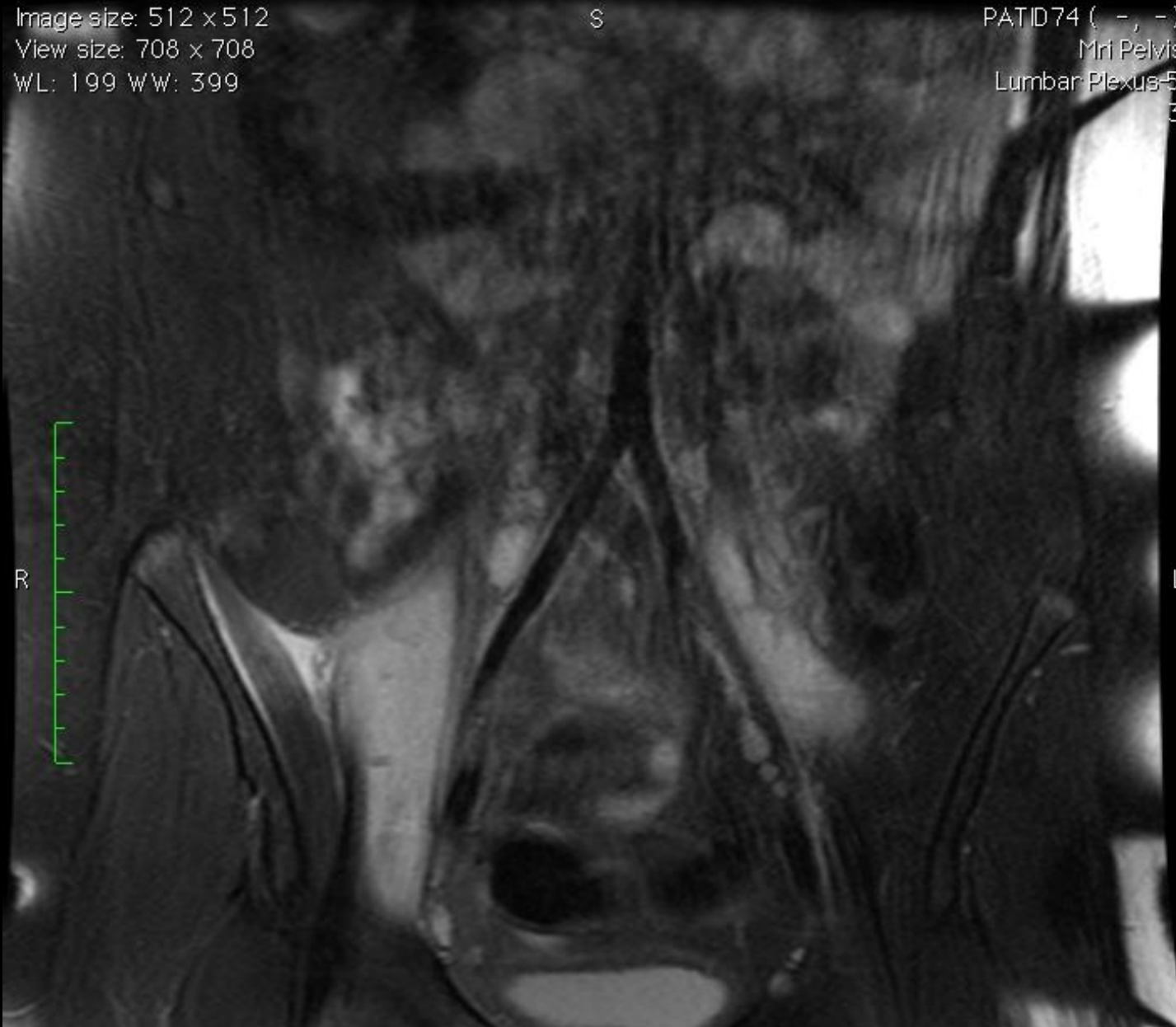


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



R

L

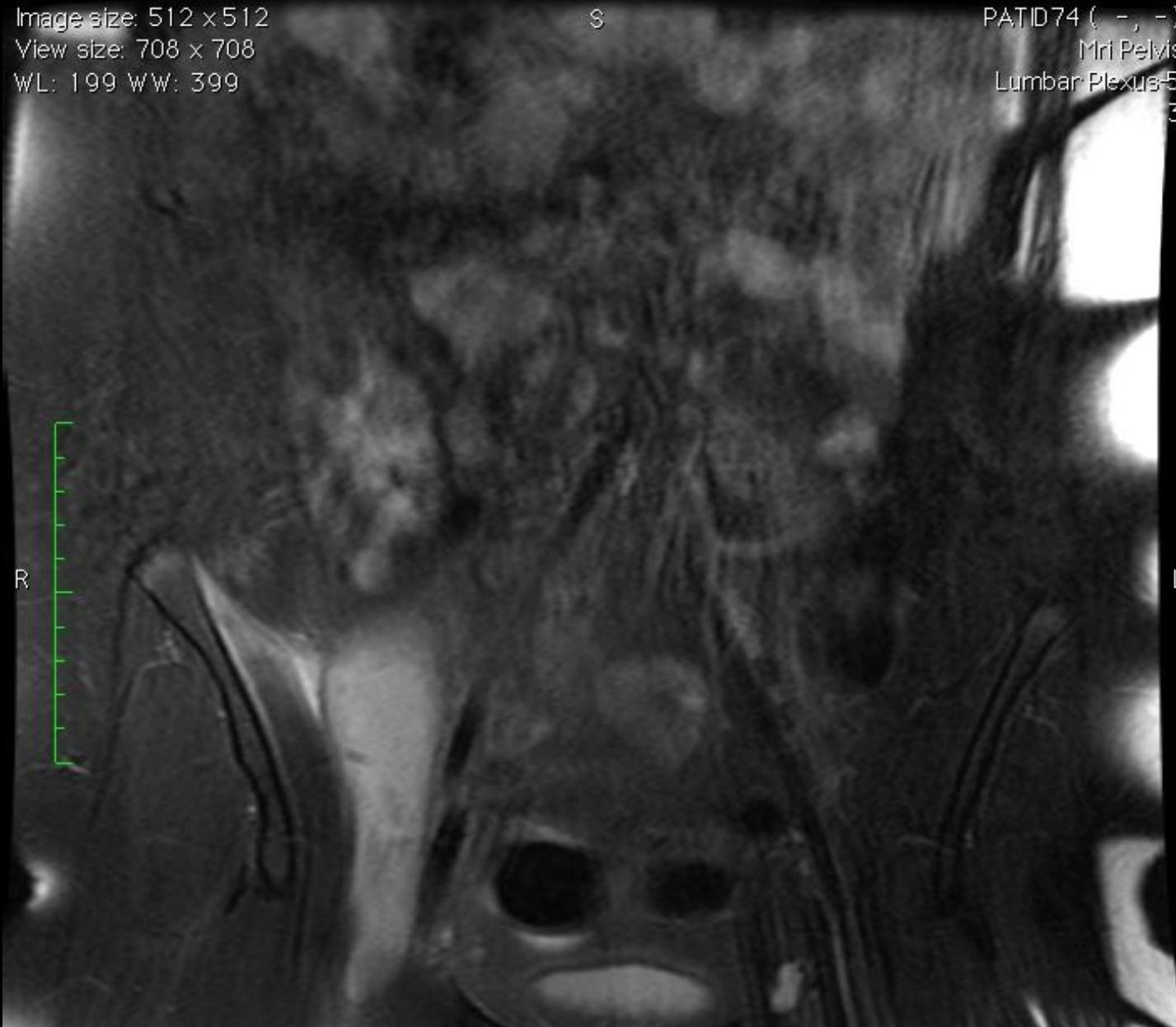
Zoom: 138% Angle: 0
Im: 13/20 A (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -59.51 mm



Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
Mri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 14/20 A (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -66.50 mm

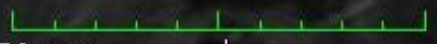
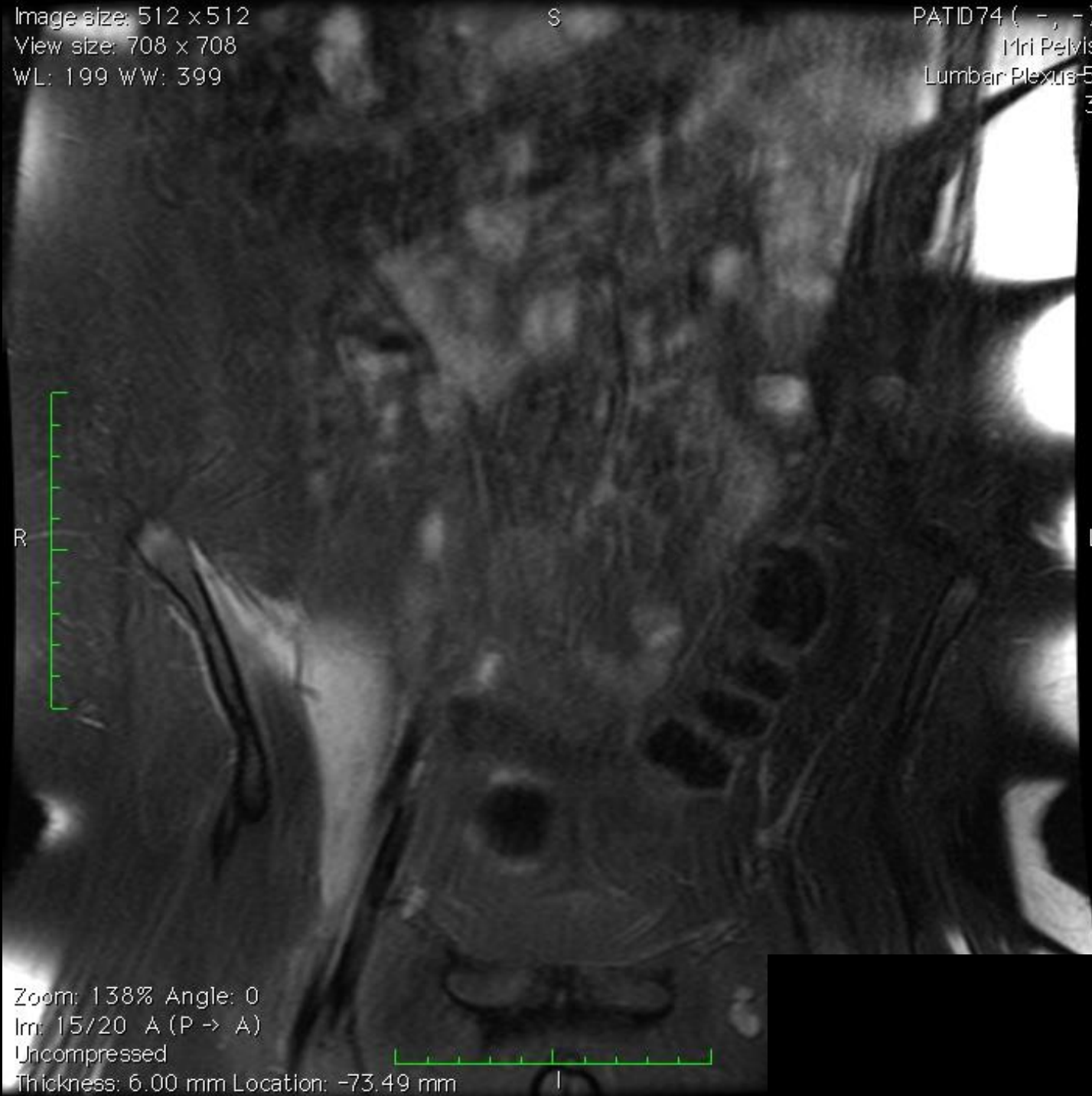


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (-, -)
11ri Pelvis
Lumbar Plexus-5
3



Zoom: 138% Angle: 0
Im: 15/20 A (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -73.49 mm

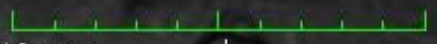
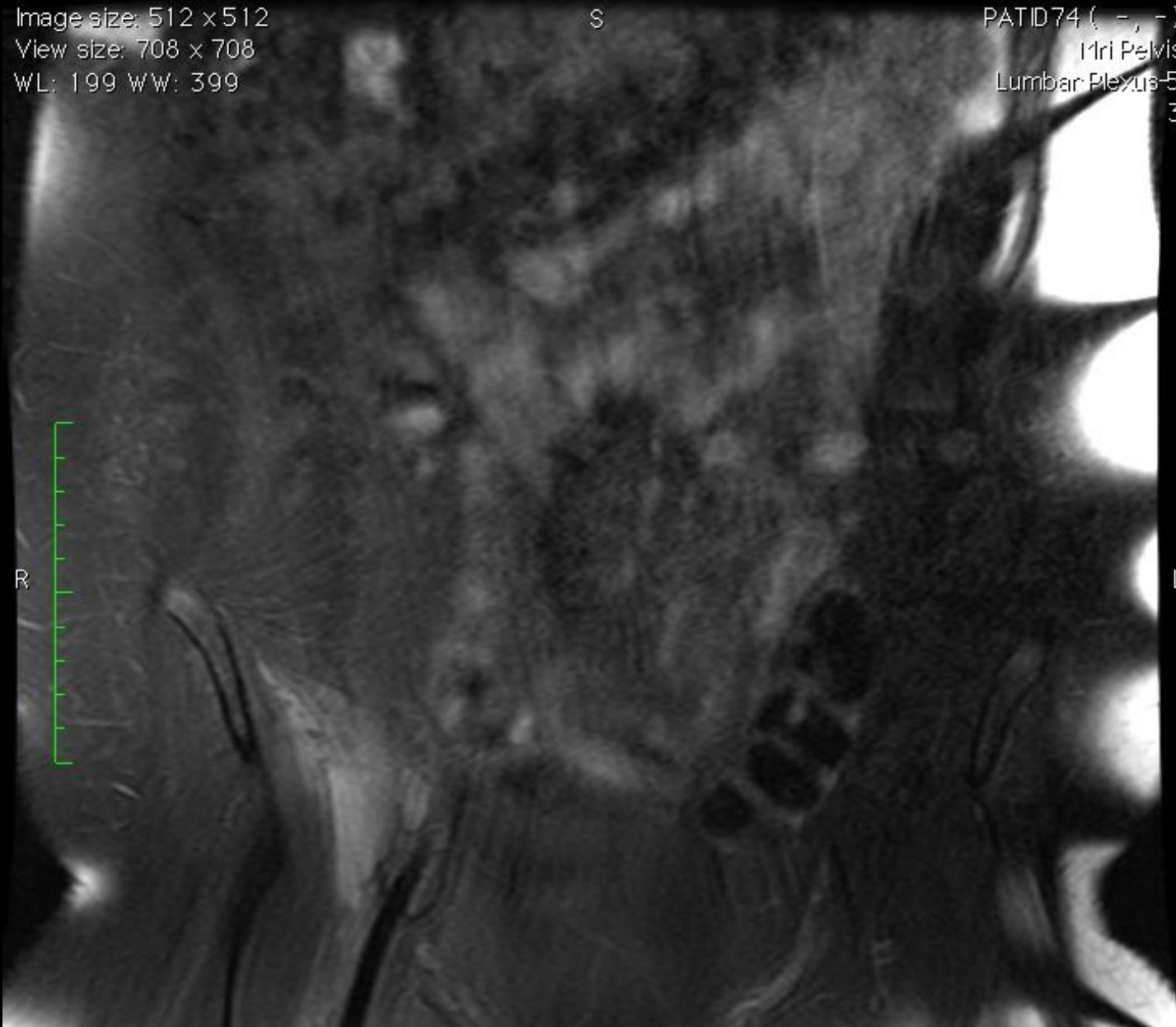


Image size: 512 x 512
View size: 708 x 708
WL: 199 WW: 399

S

PATID74 (- , -)
11ri Pelvis
Lumbar Plexus-5
3



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L

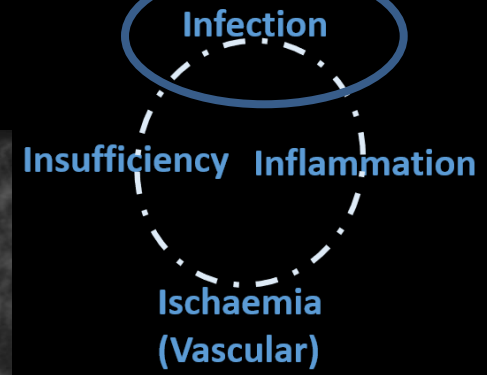
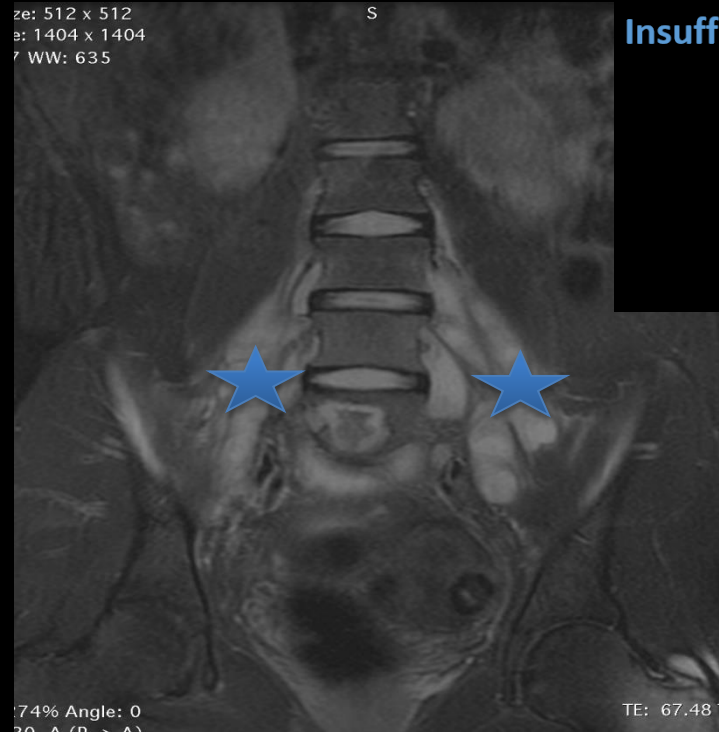
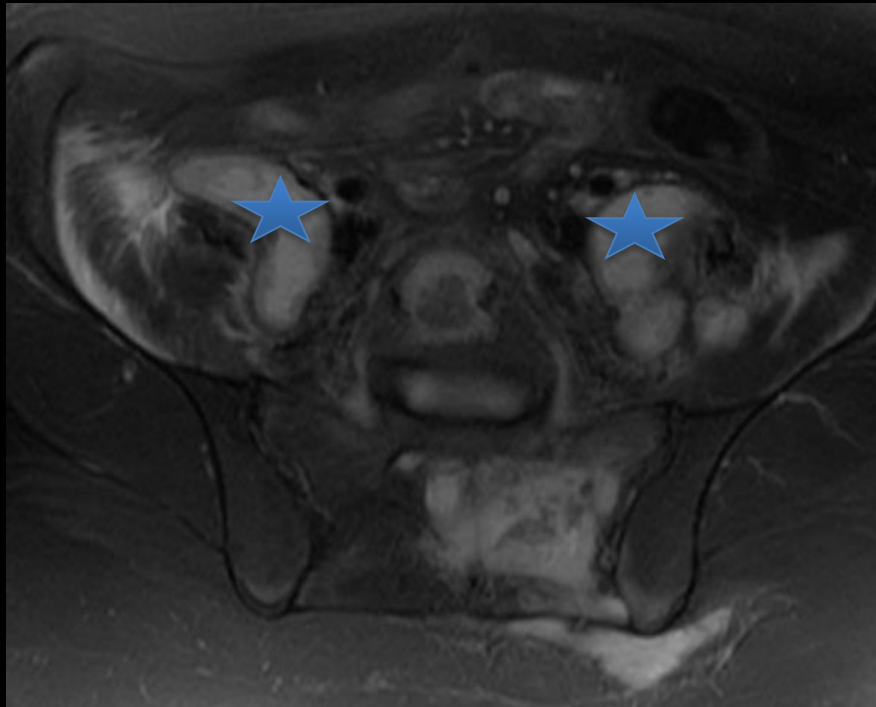
Zoom: 138% Angle: 0
Im: 16/20 A (P -> A)
Uncompressed
Thickness: 6.00 mm Location: -80.48 mm

I

What do you think the Organism is?

What do you think the organism is

Tuberculosis. “Cold” psoas abscess, L5 osteomyelitis, Epidural collection



- Extra-pulmonary form of TB (“Pott’s disease”) secondary to haematogenous spread
- Screening of the whole spine

- Concomitant pulmonary TB is common (up to 50-75%) !!! → Chest X-ray , isolation if +

What is a MSK Emergency?

Infection

Insufficiency Inflammation

Ischaemia
(Vascular)

Non-Traumatic

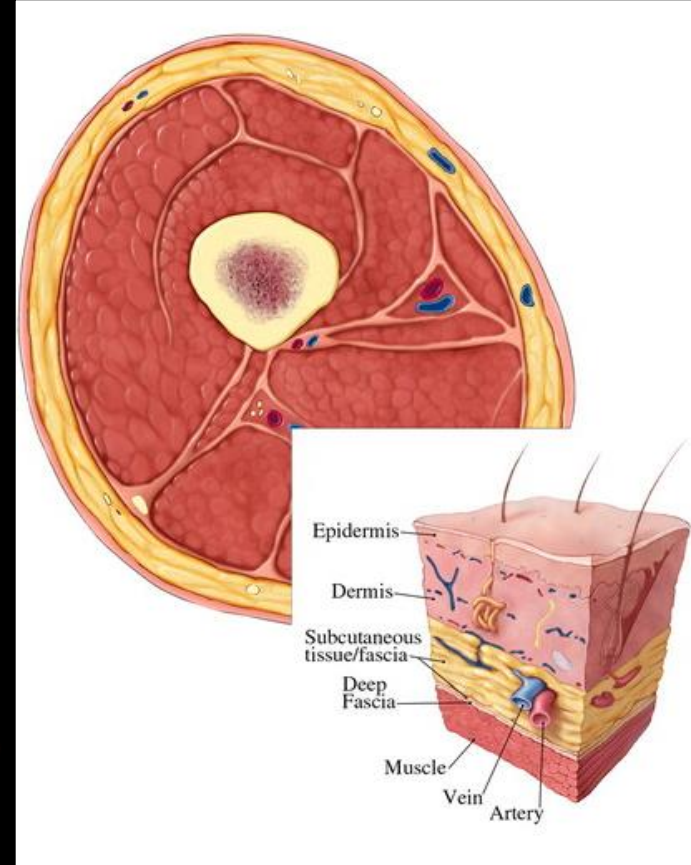
Subcutaneous

Fascia

Muscle

Bone

Joint



Case. Infant with difficulty in weight bearing



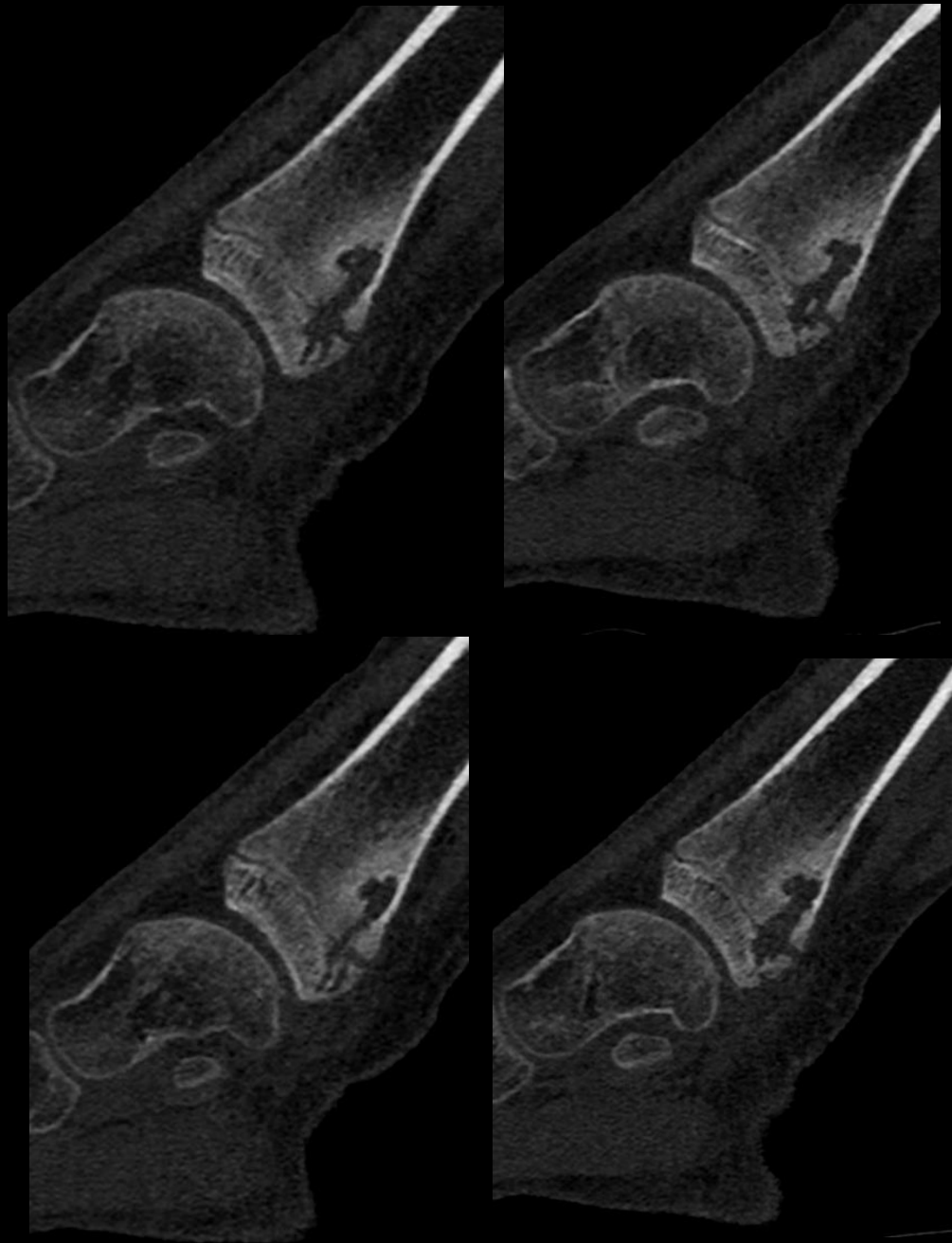
Where is the abnormality





What imaging technique would you recommend next in your report?

What is your clinical suspicion?



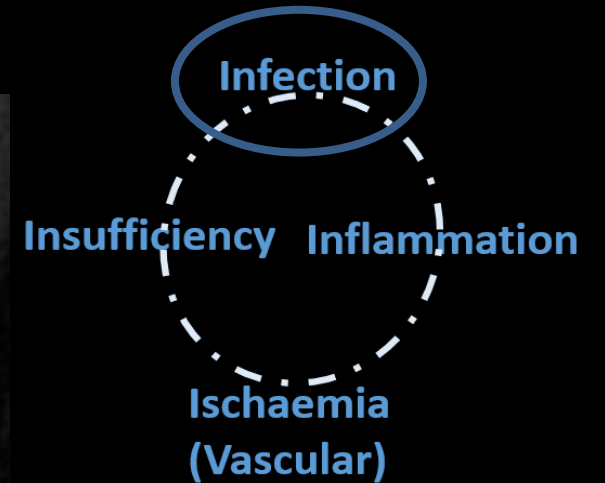
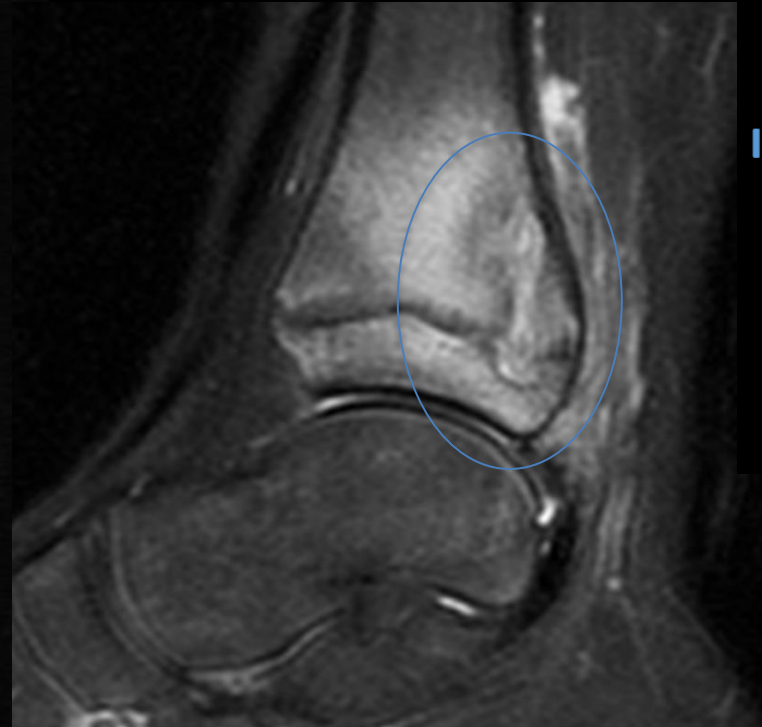
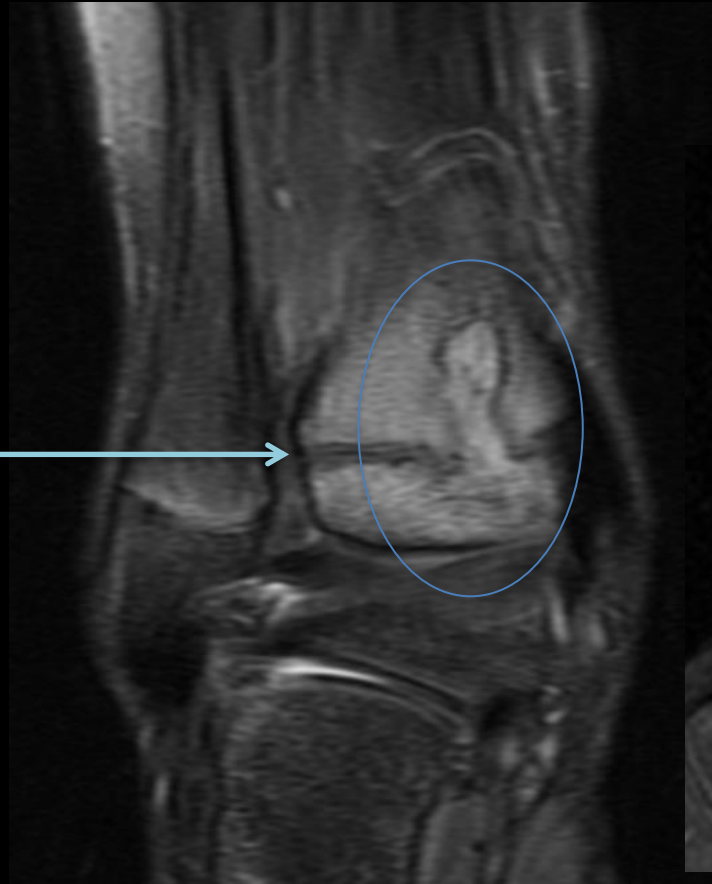
COR T1

COR T2FS



Osteomyelitis

Physis

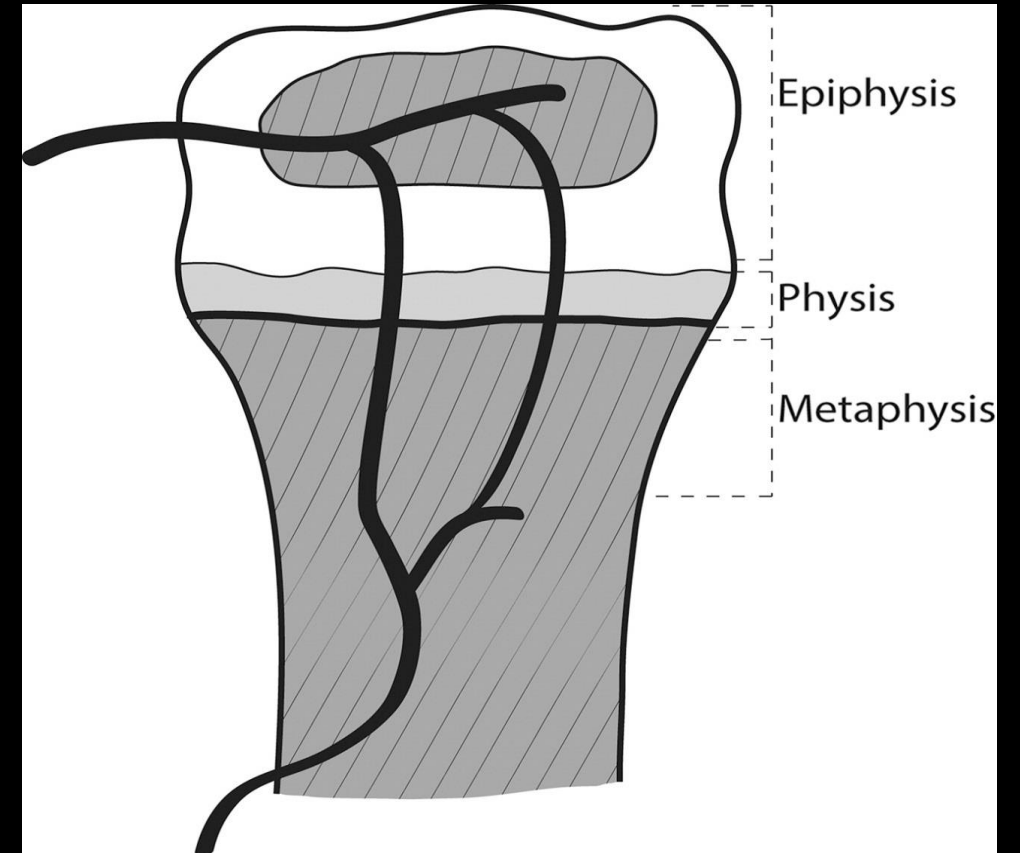


Why does the infection involves the Metaphysis and Epiphysis?

Blood Supply in Infancy (First 18m)

There is free communication between the vessels of the **epiphysis** and the **metaphysis**.

Transphyseal vessels can serve as a path of spread of infection from one region to another, usually from metaphysis to epiphysis.



What other risk is this patient at?

Reimage 3-6 months later to detect early transphyseal bony bridge formation?

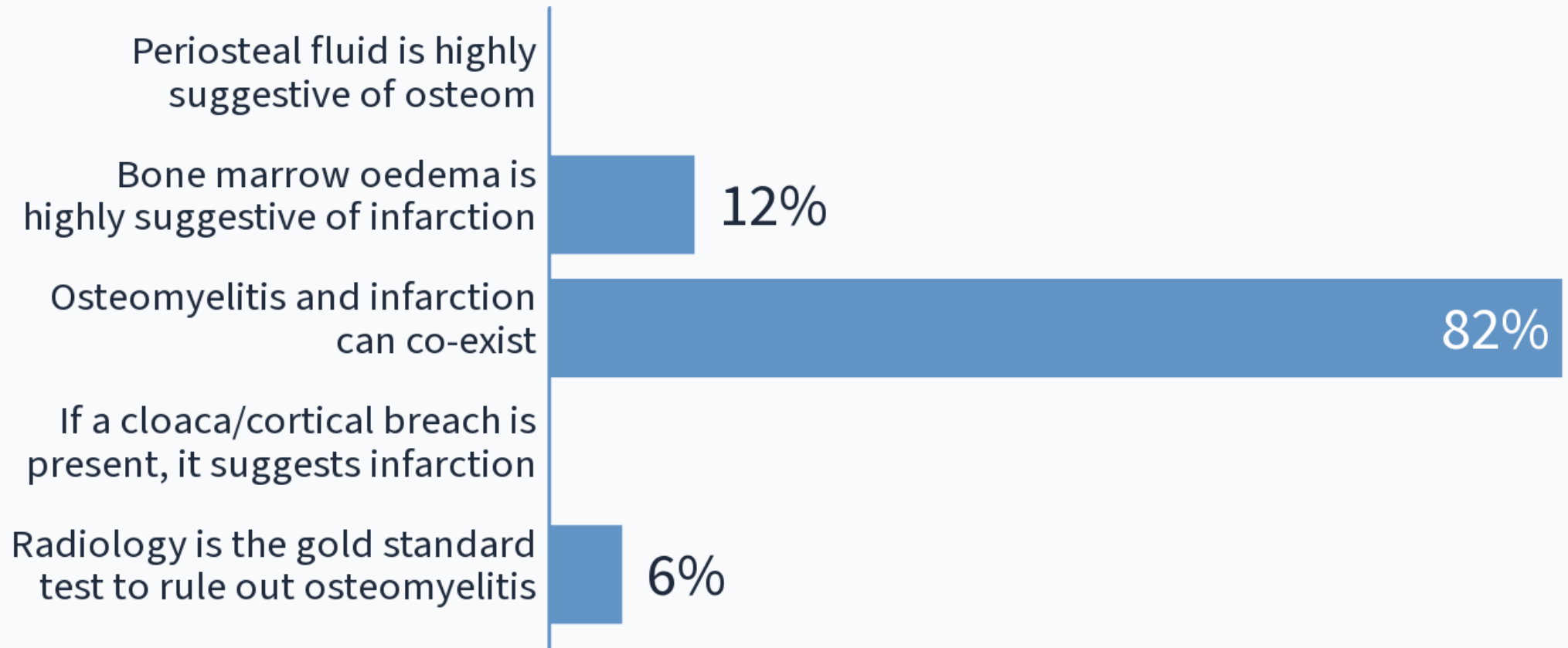
Child with Sickle Cell Disease and acute R leg pain

- Infection, Infarction or both?

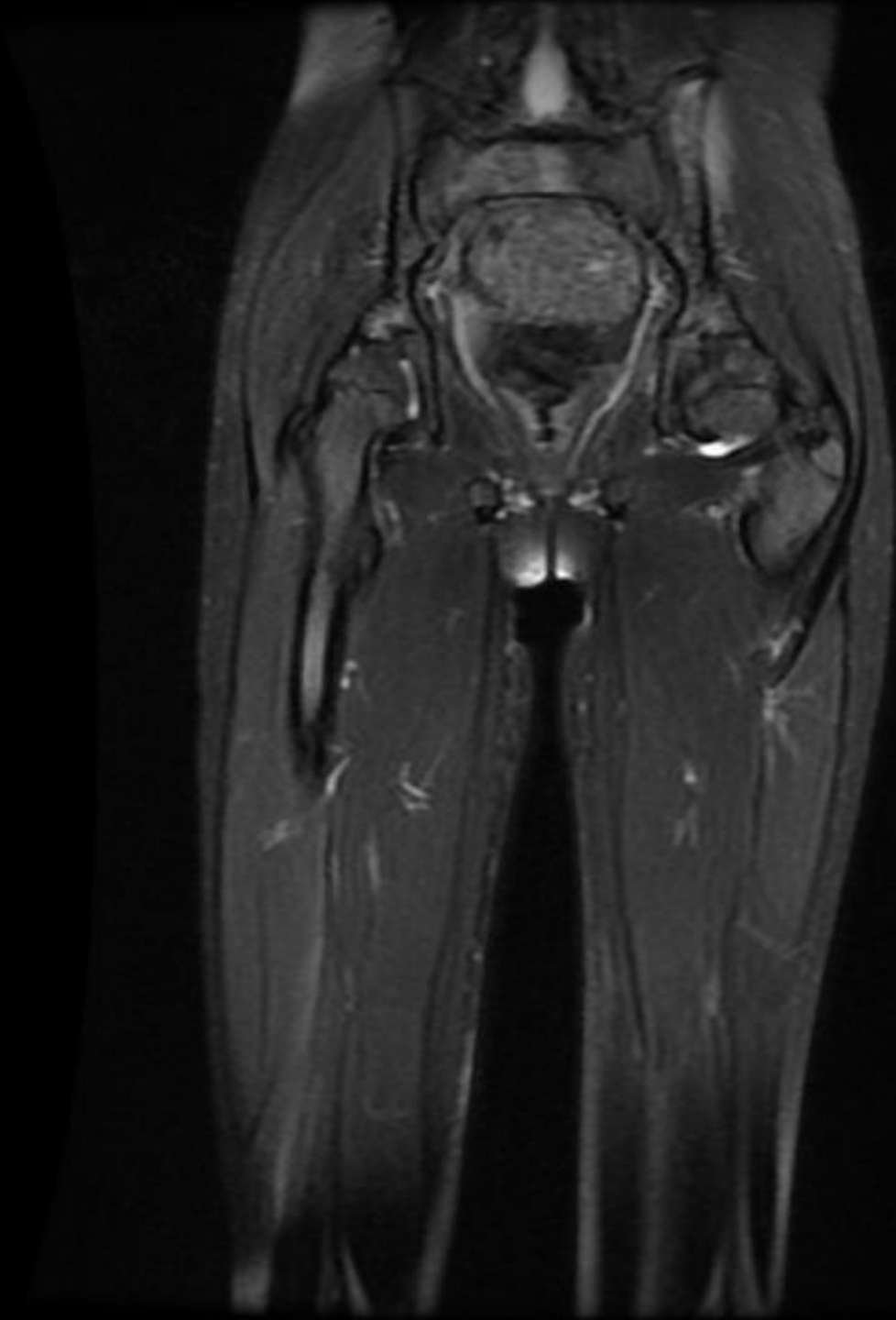
Preview Q5. Child with Sickle Cell disease and acute leg pain Choose the single correct answer

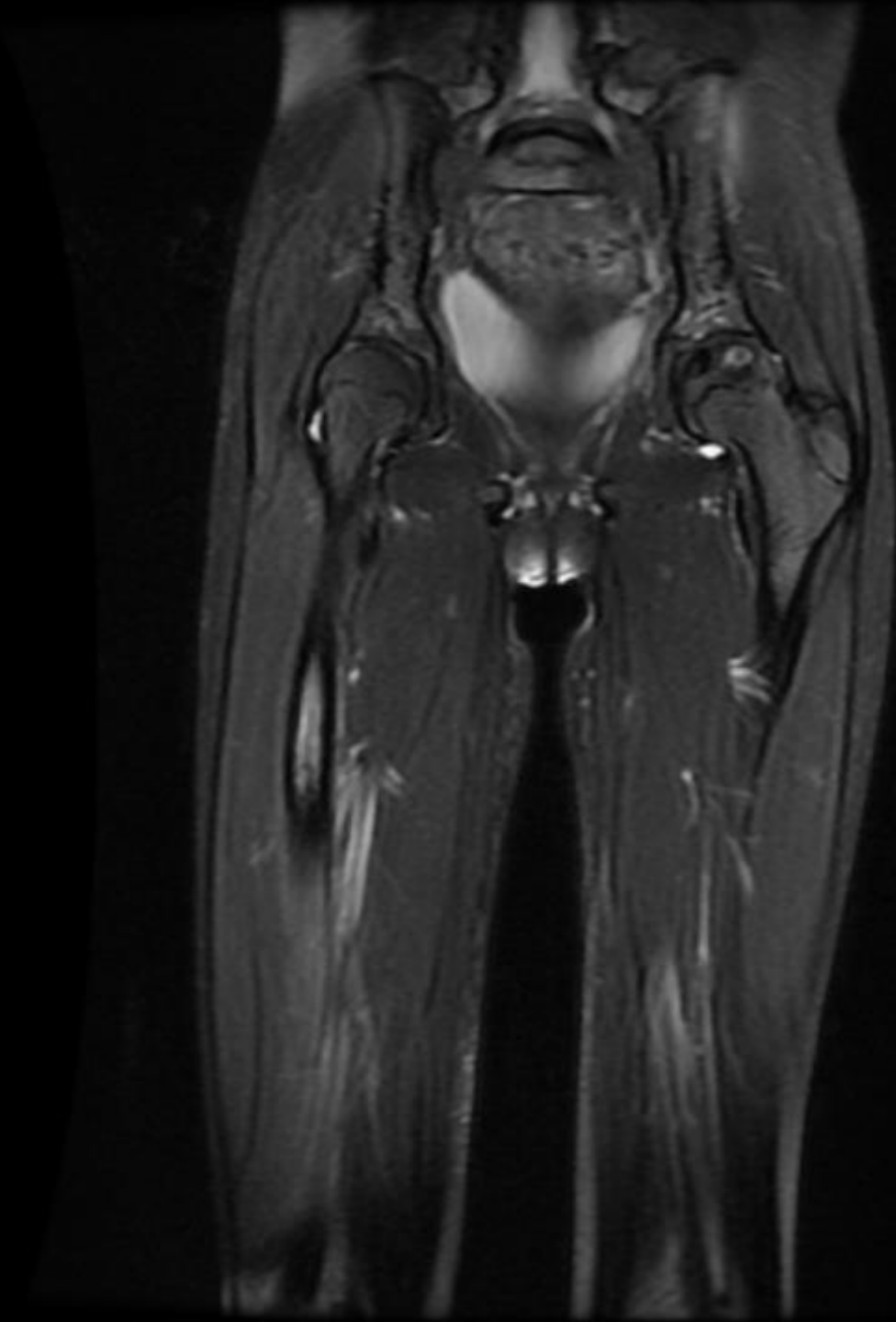
- A. Periosteal fluid is highly suggestive of osteomyelitis
- B. Bone marrow oedema is highly suggestive of infarction
- C. Osteomyelitis and infarction can co-exist
- D. If a cloaca/cortical breach is present, it suggests infarction
- E. Radiology is the gold standard test to rule out osteomyelitis

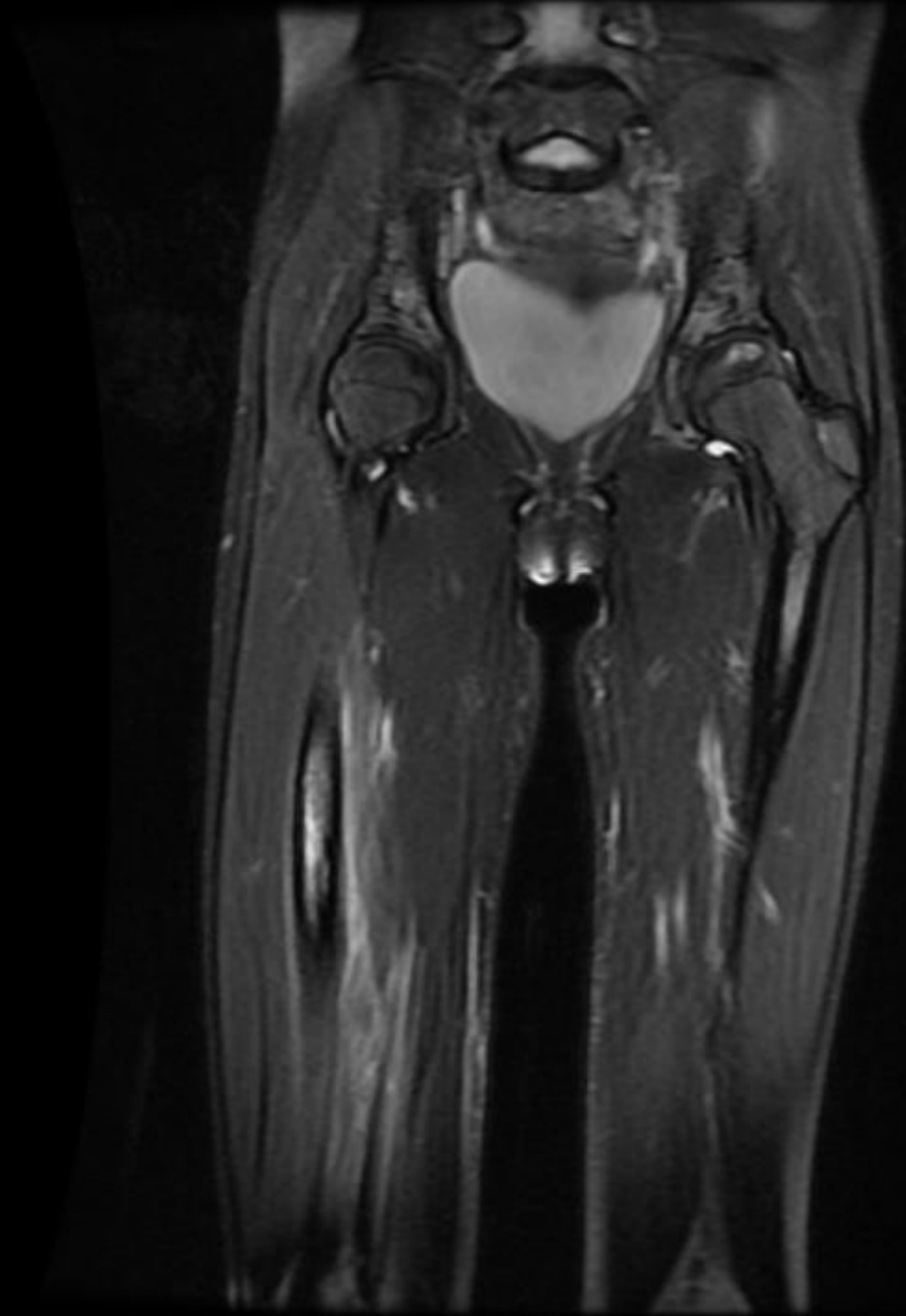
Child with Sickle Cell disease and acute leg pain Choose the single correct answer

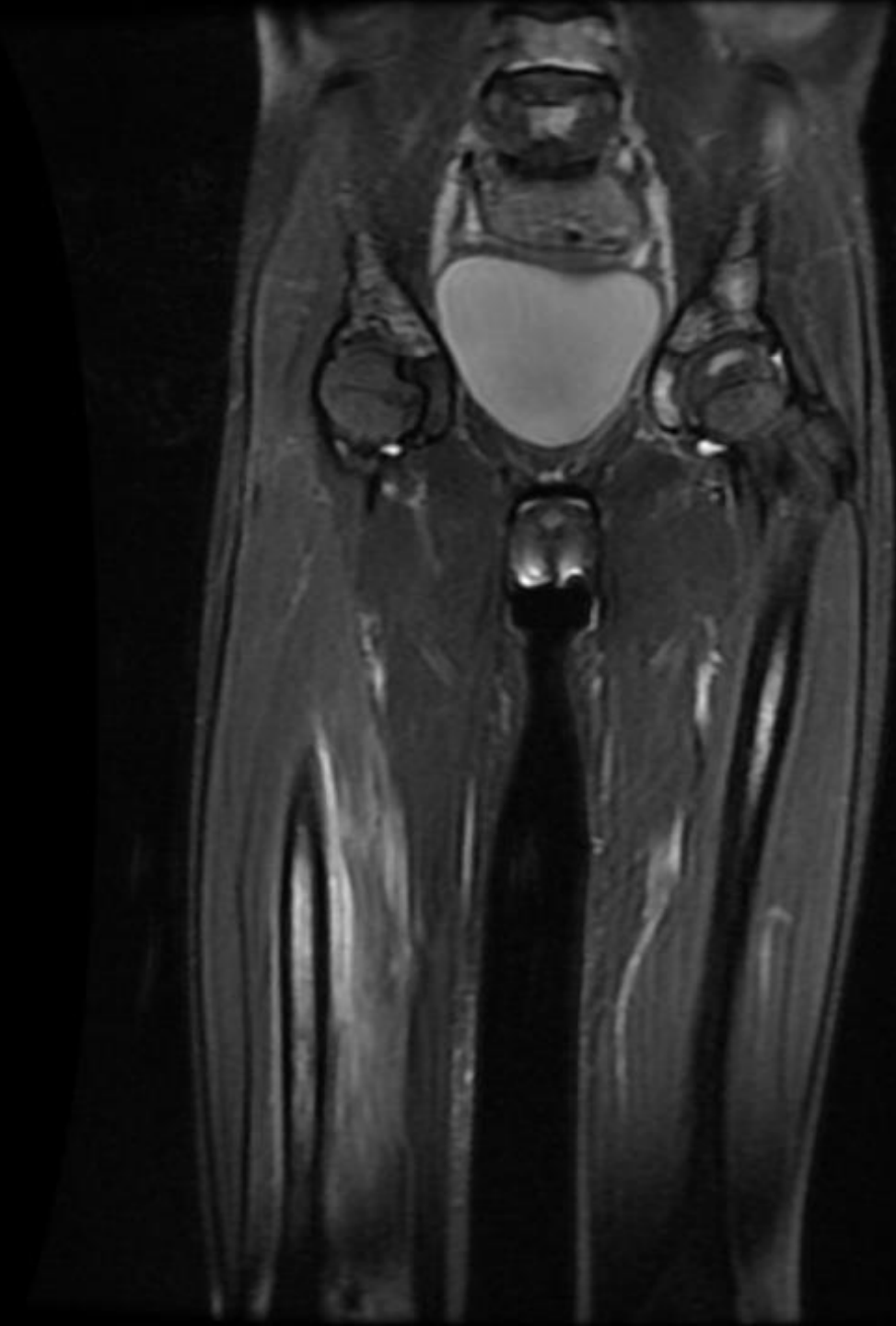


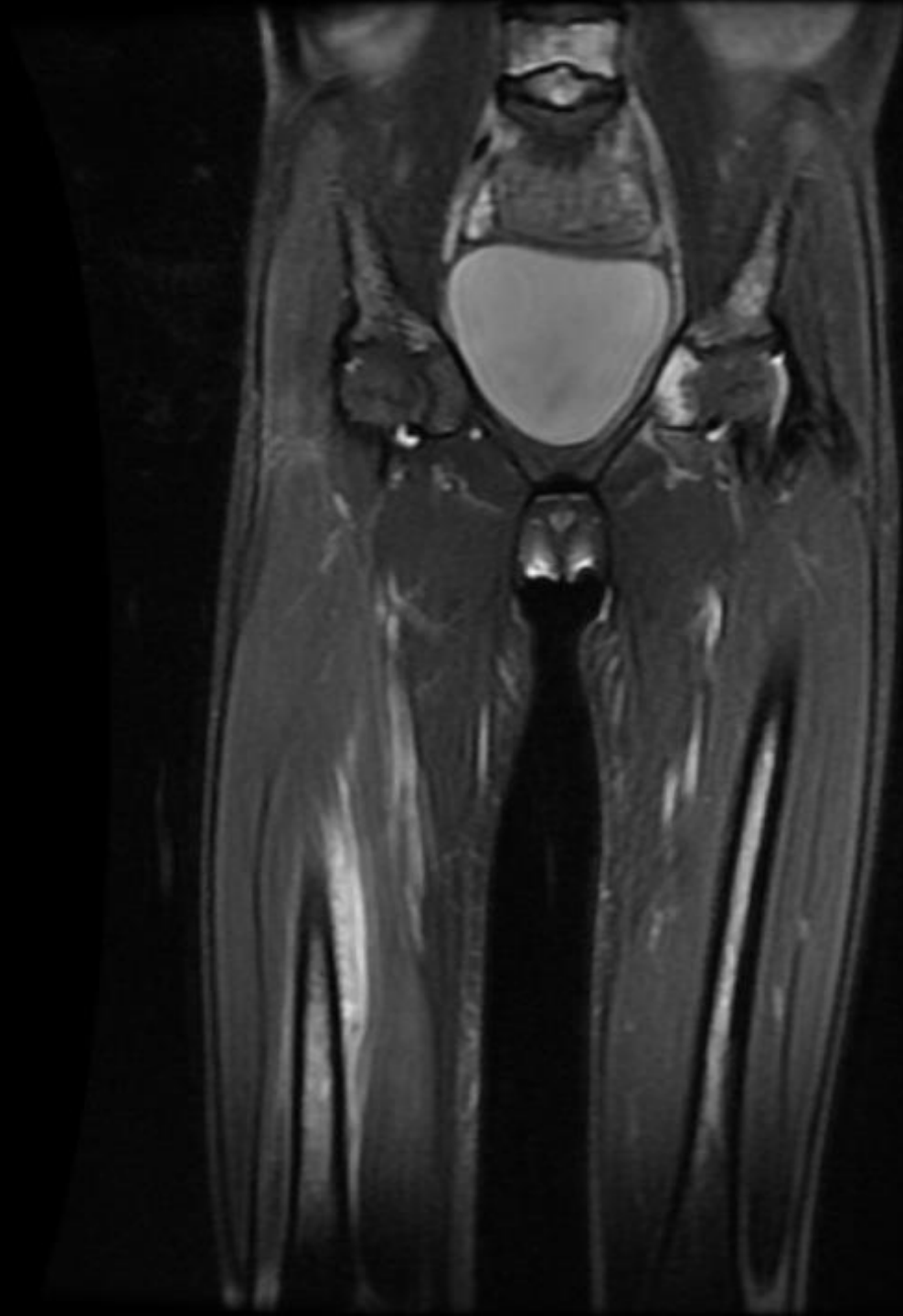
Cor T2 Fat Sat







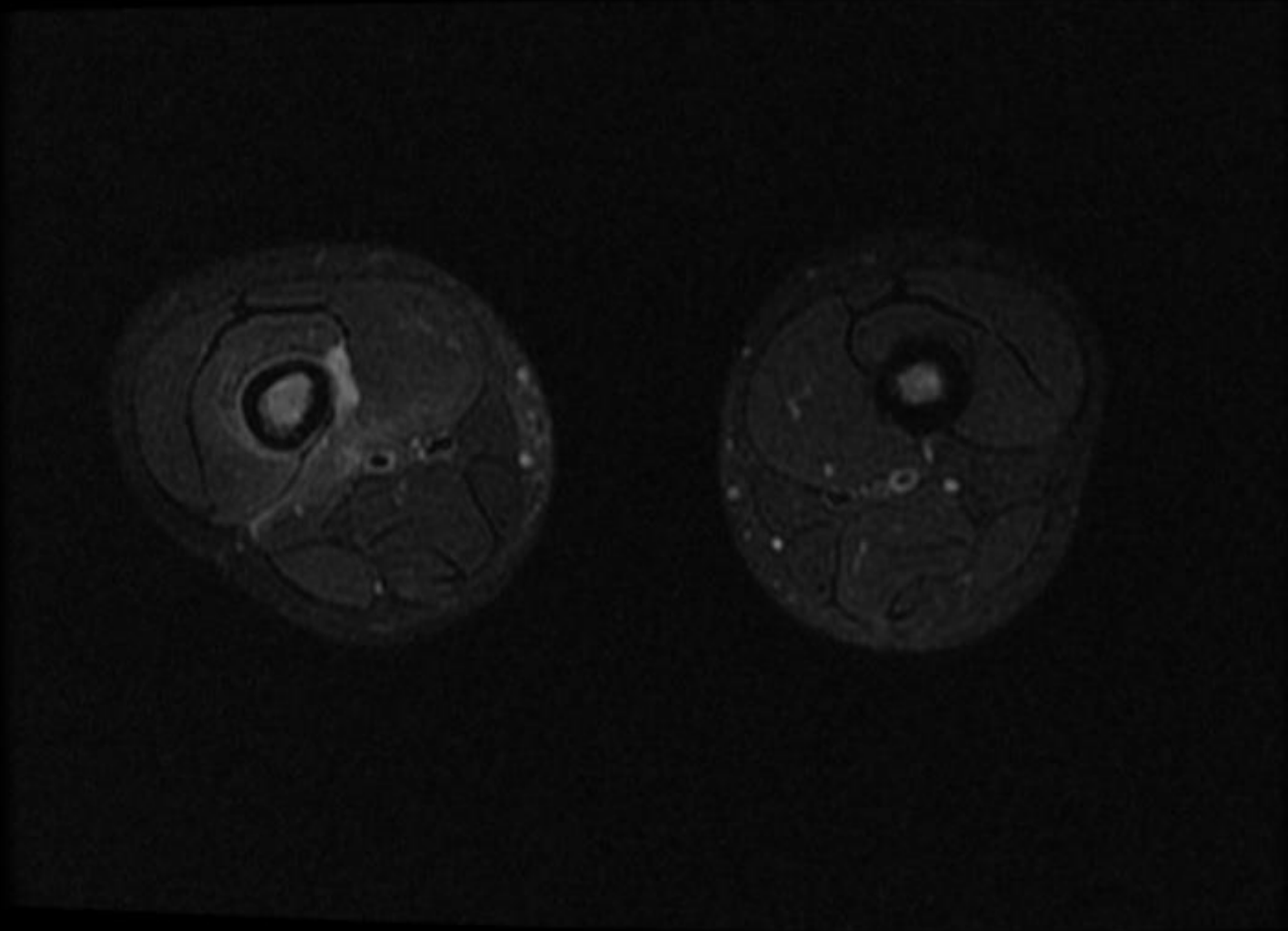


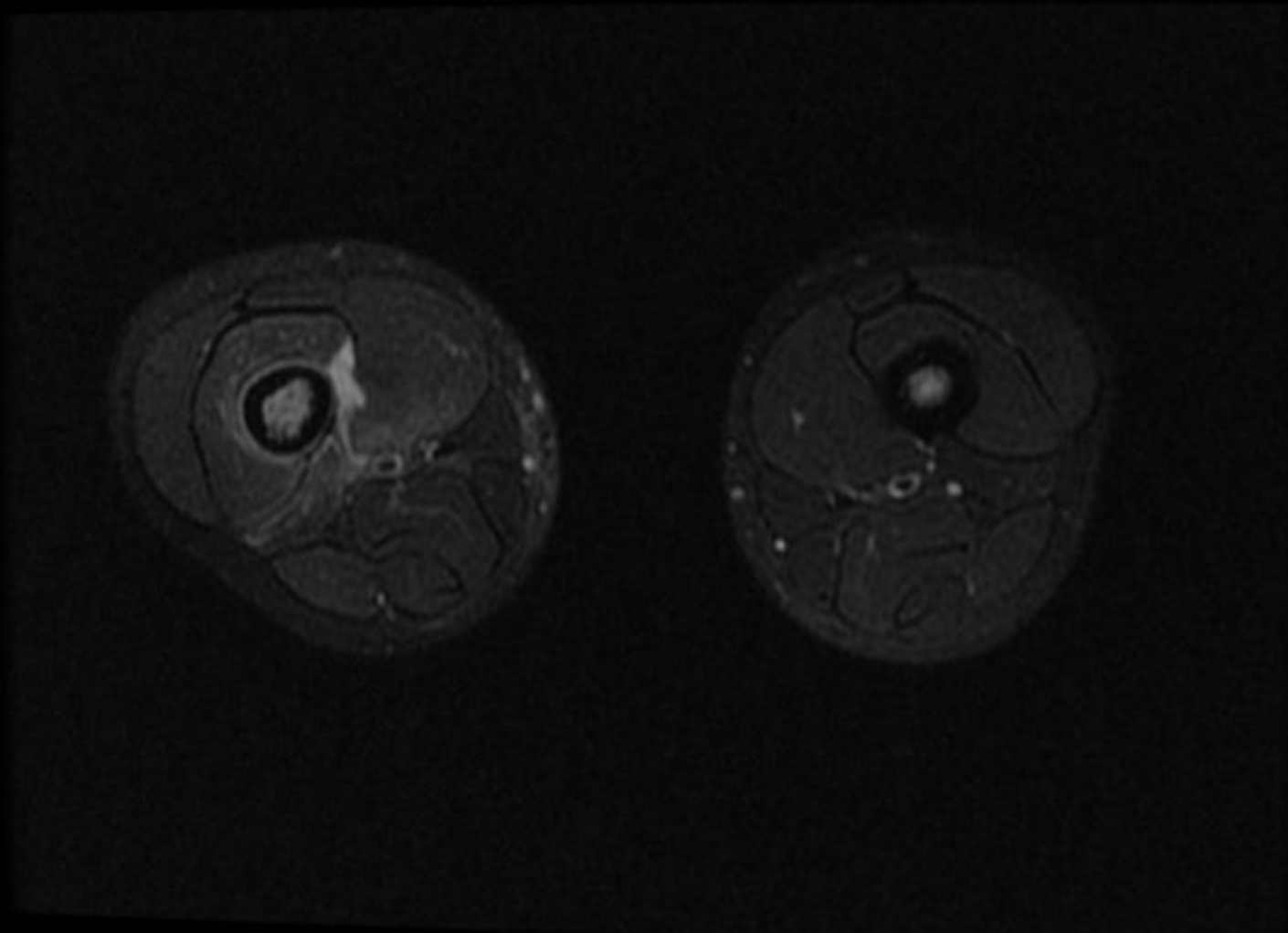


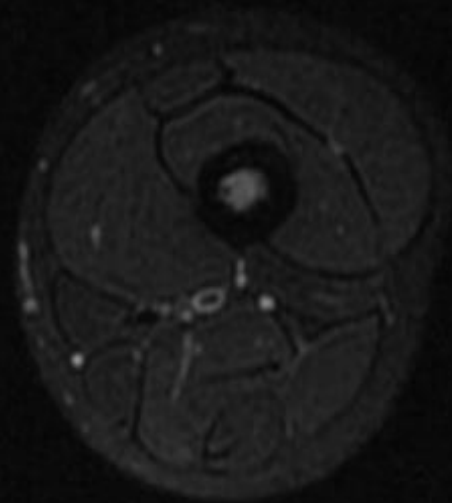
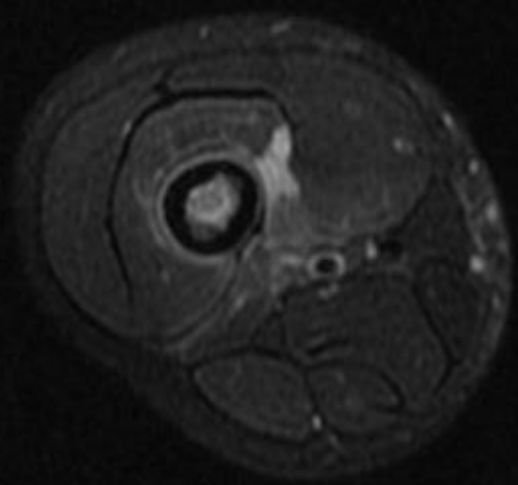


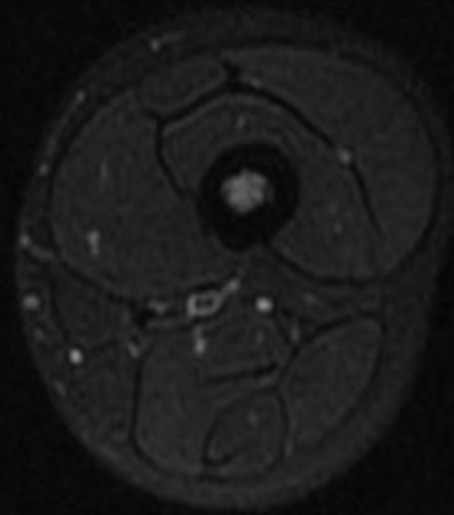
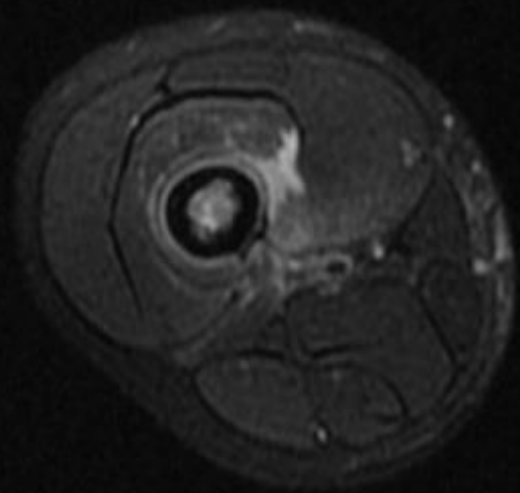


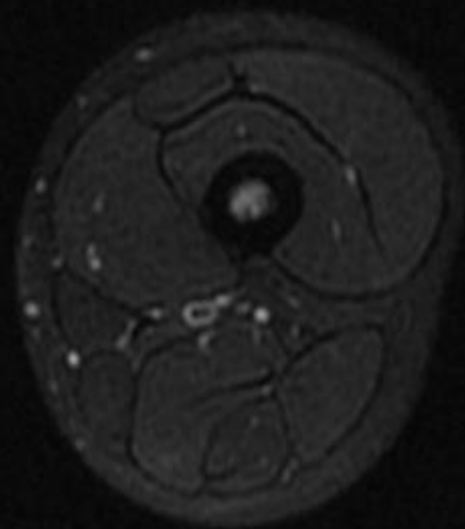
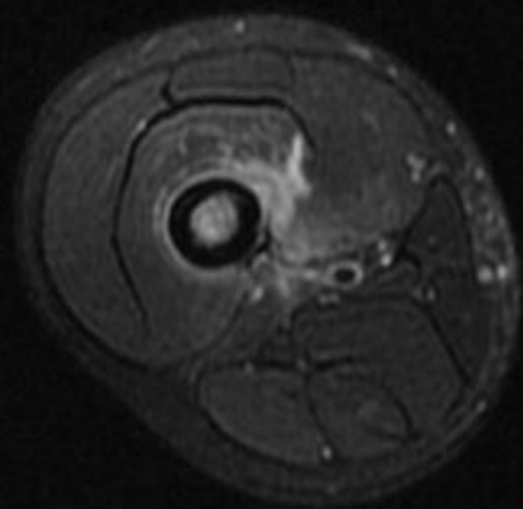
Ax T2 fat sat

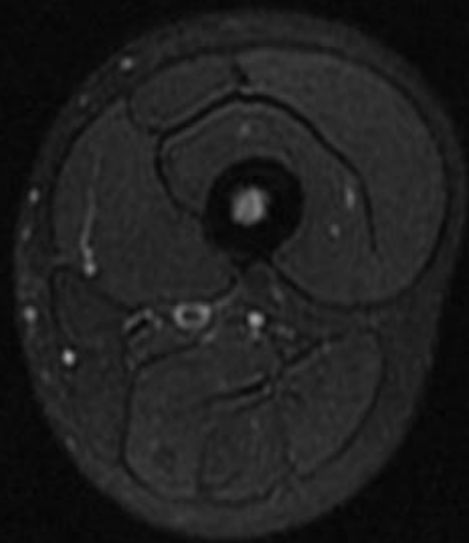
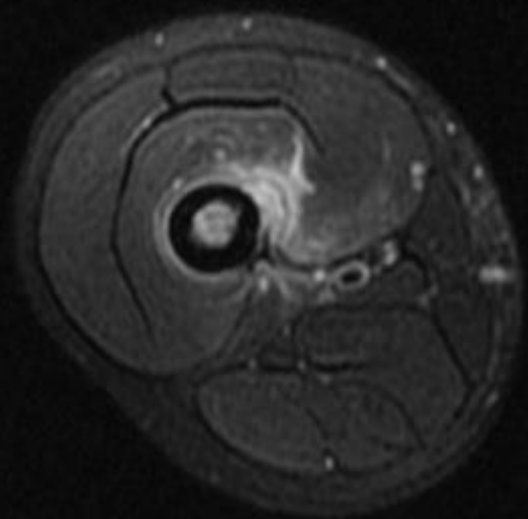


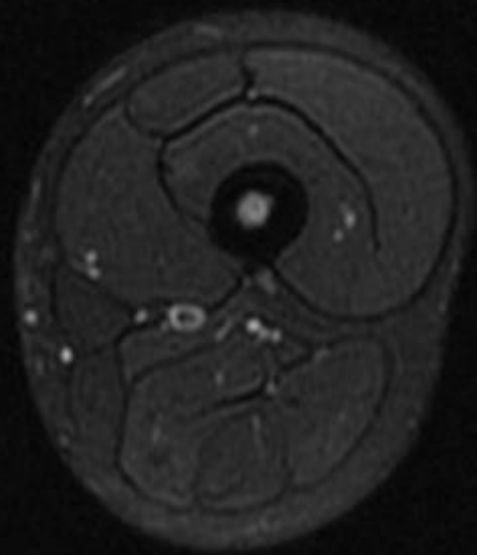
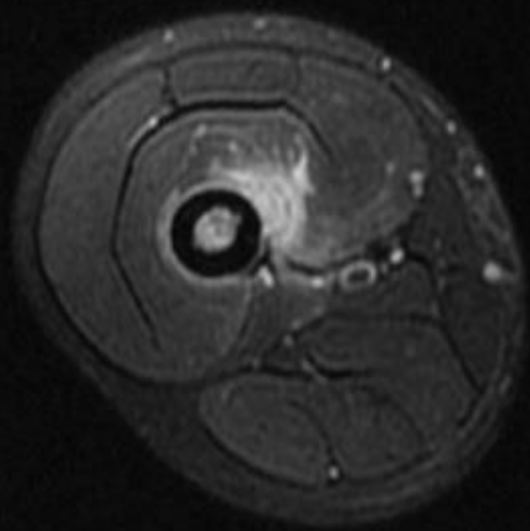


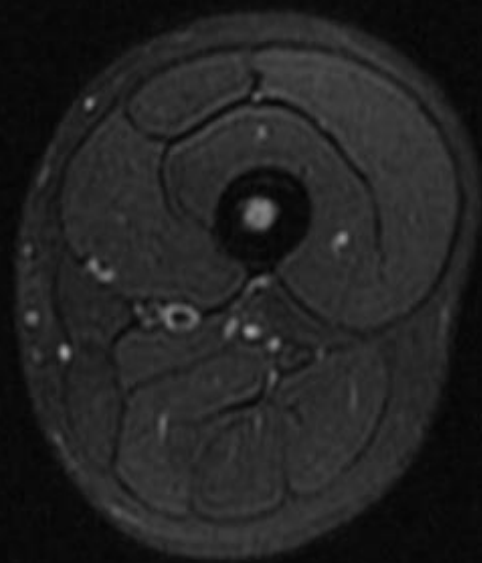
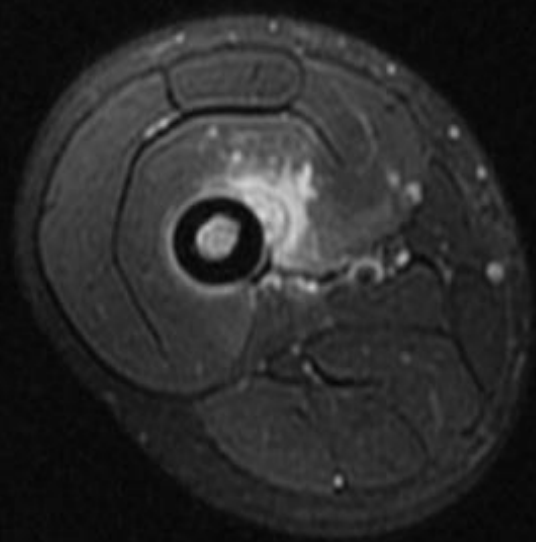


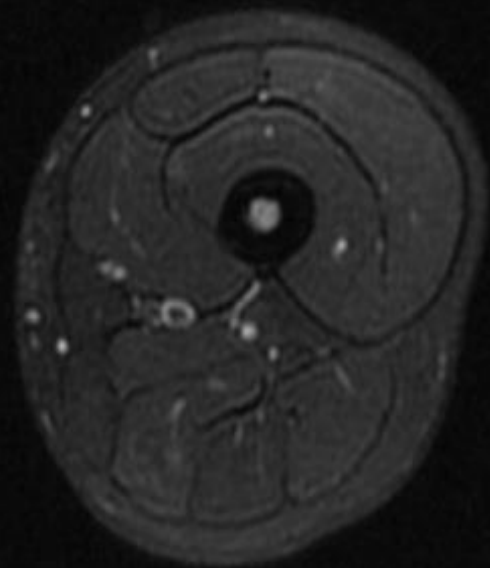
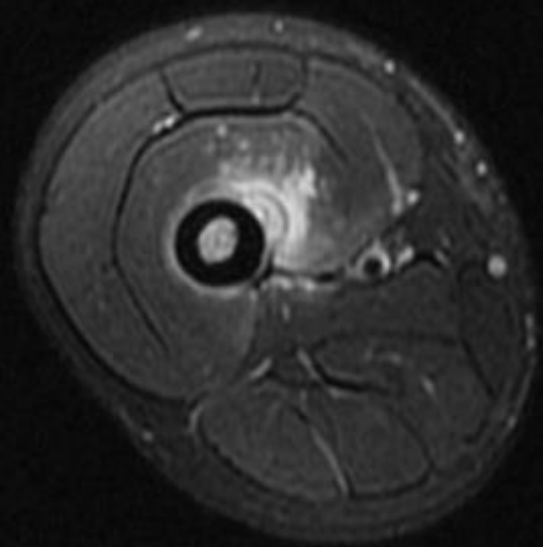


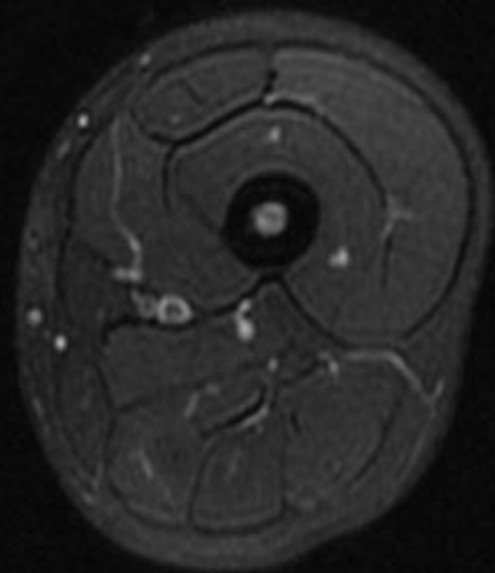
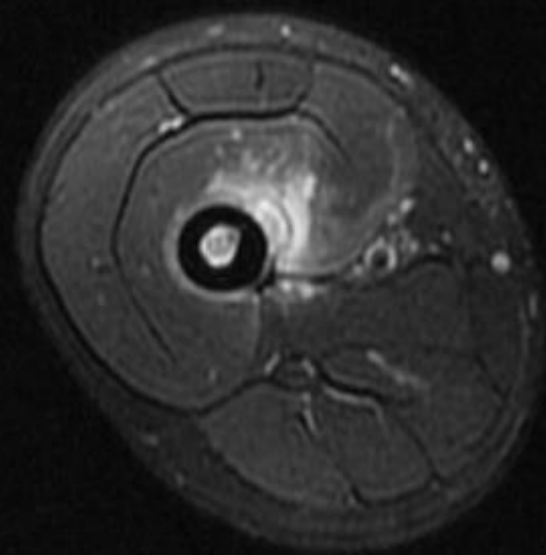


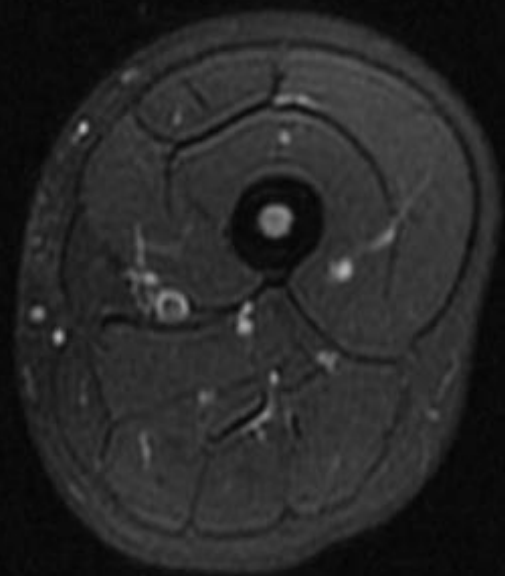
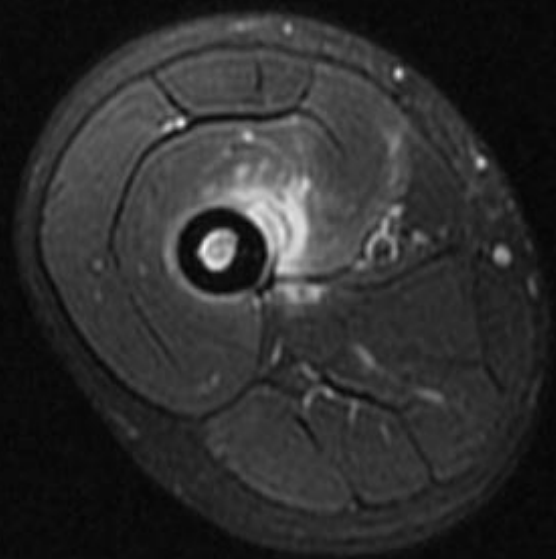


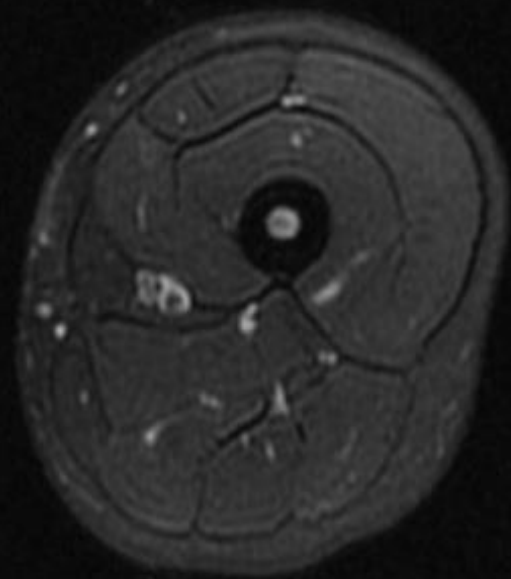
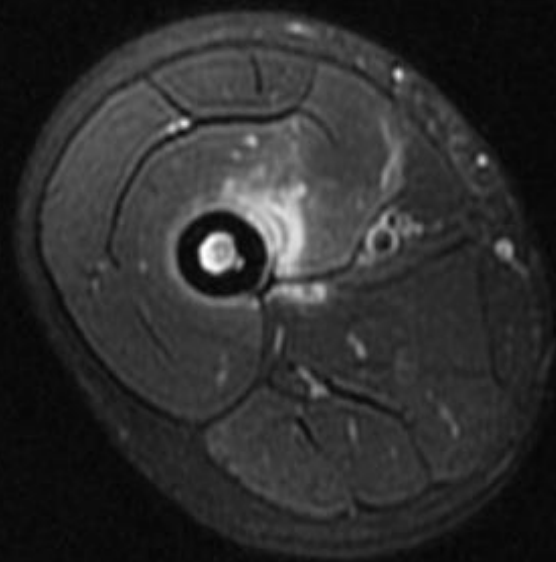


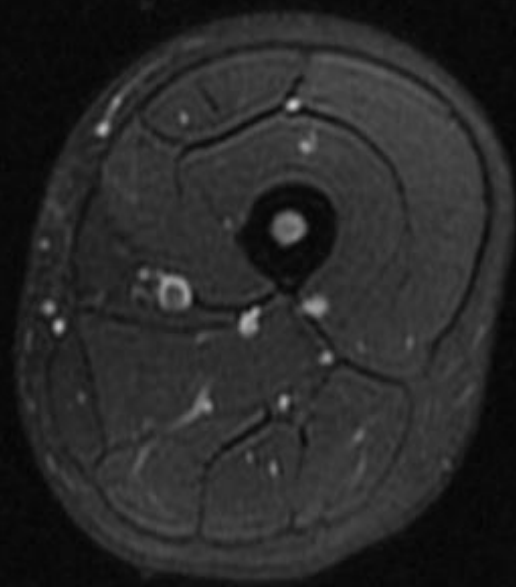
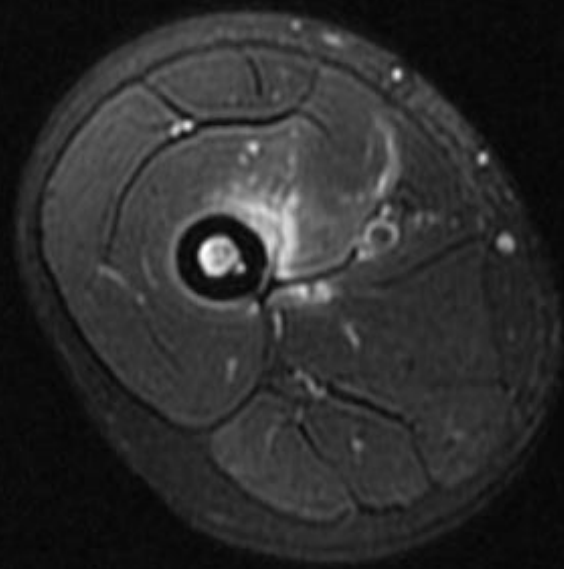


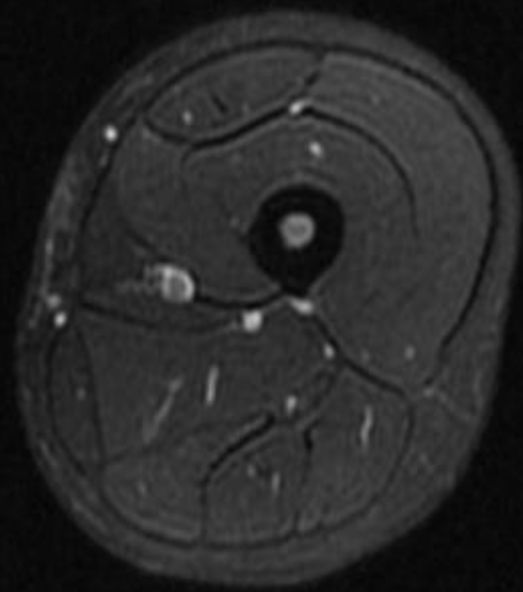
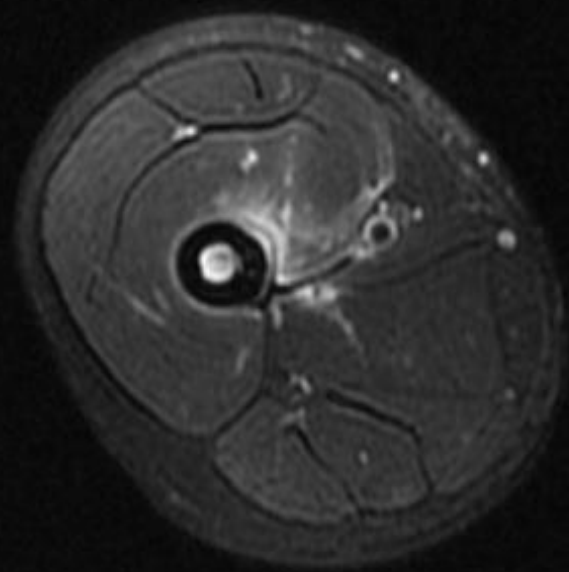


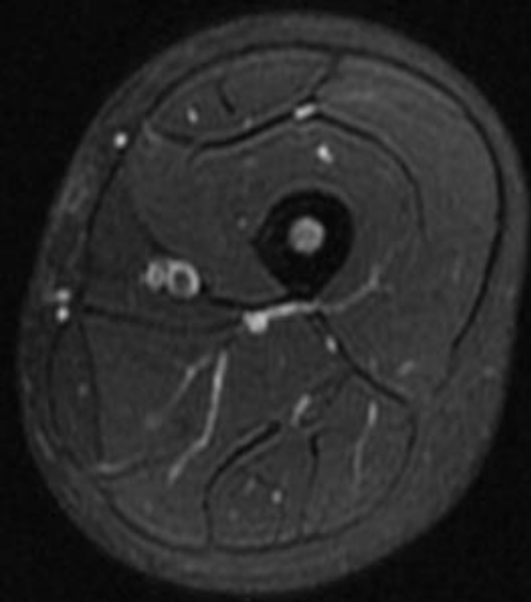
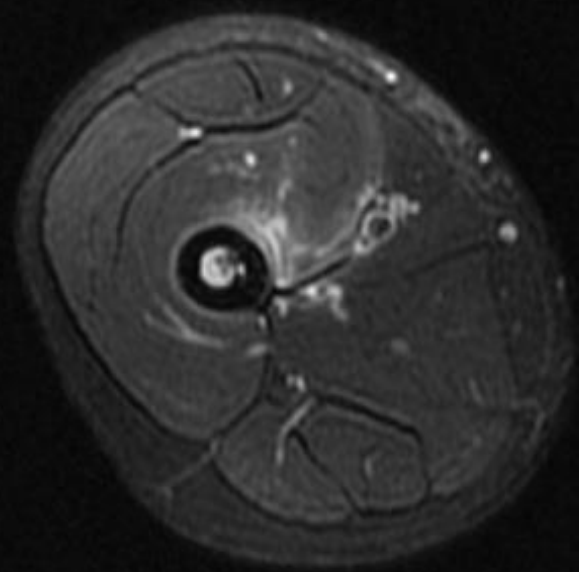


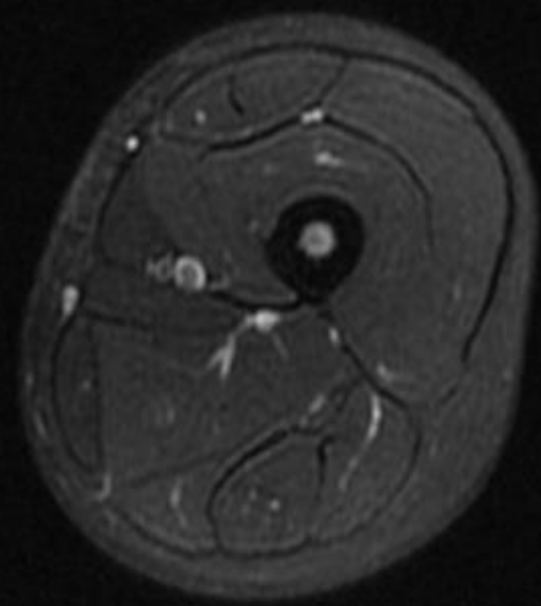
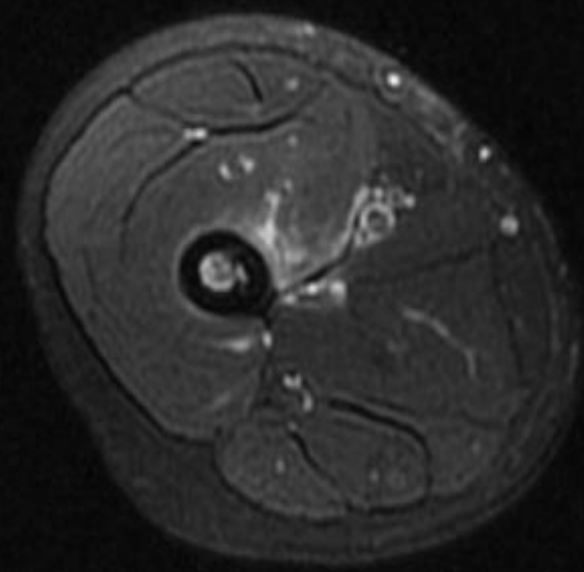


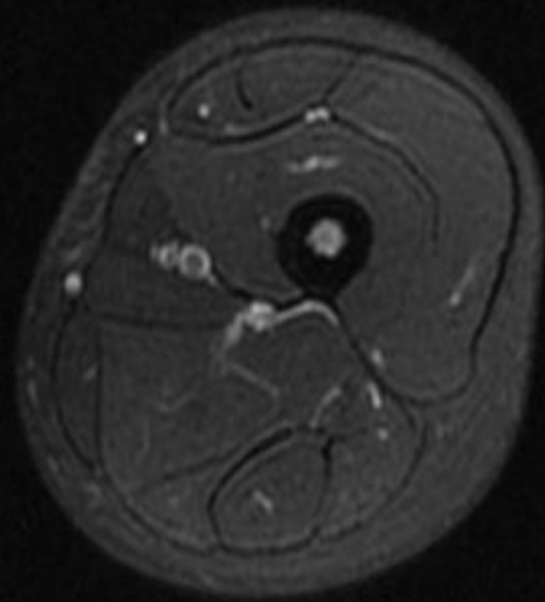
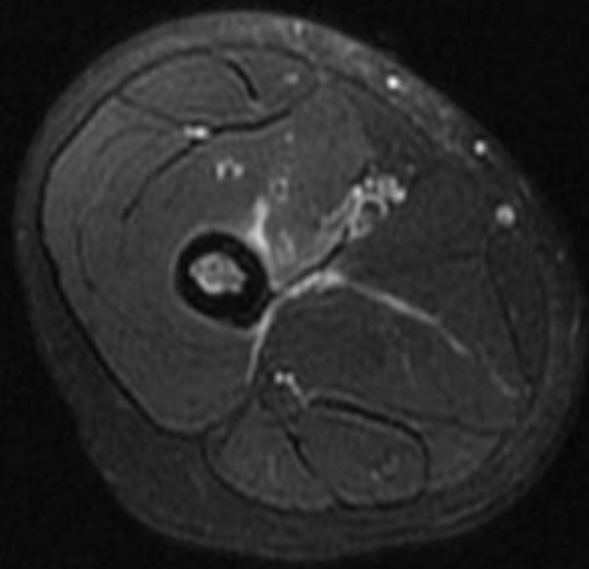






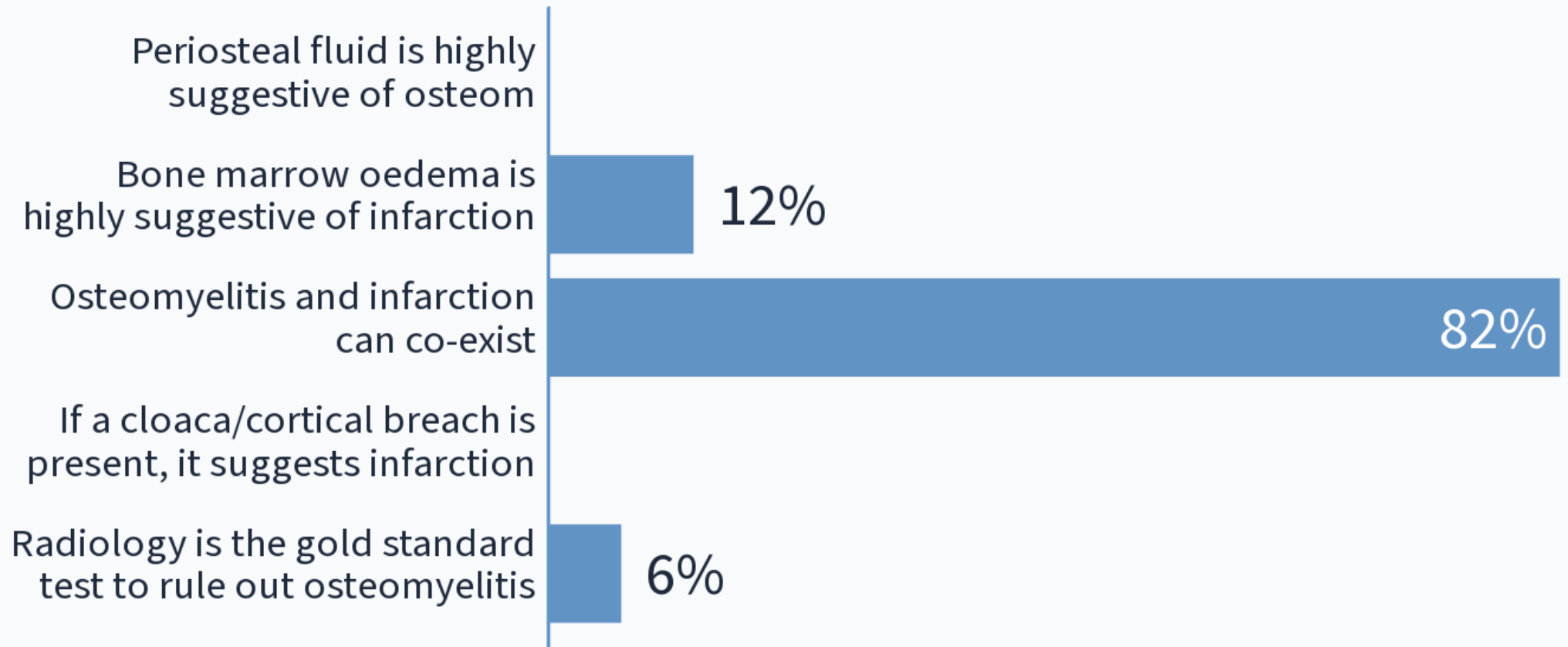






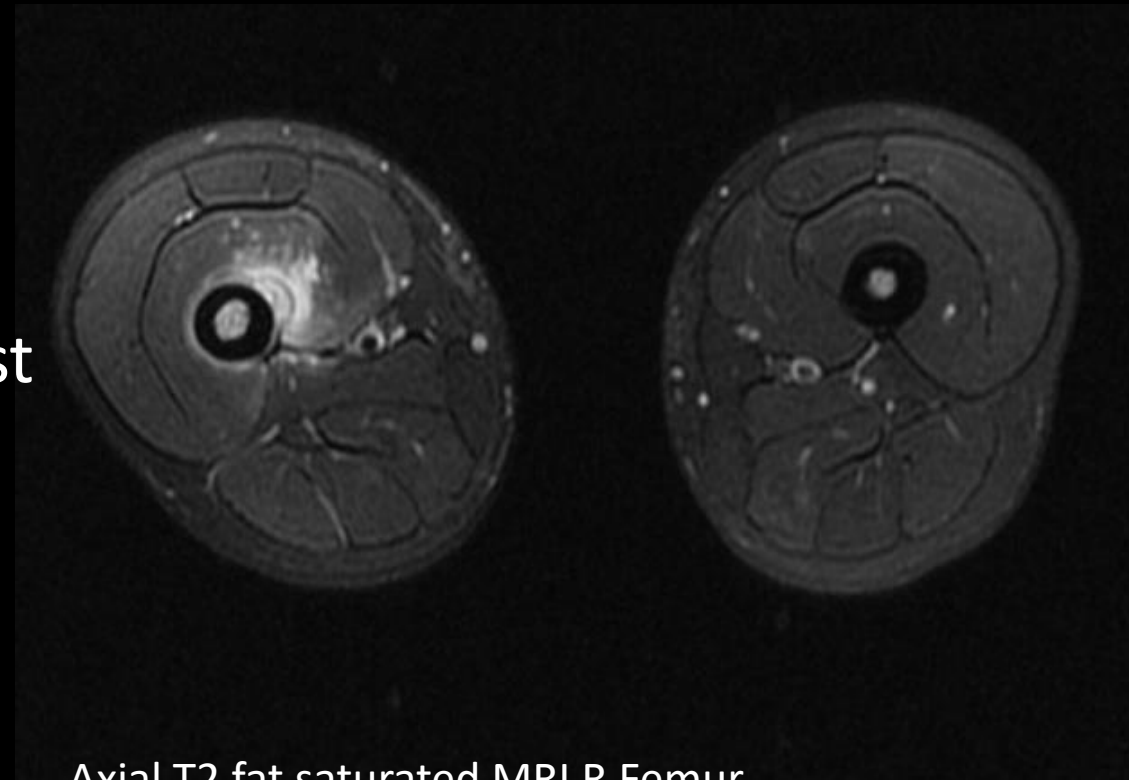
QUESTION 5

Child with Sickle Cell disease and acute leg pain Choose the single correct answer



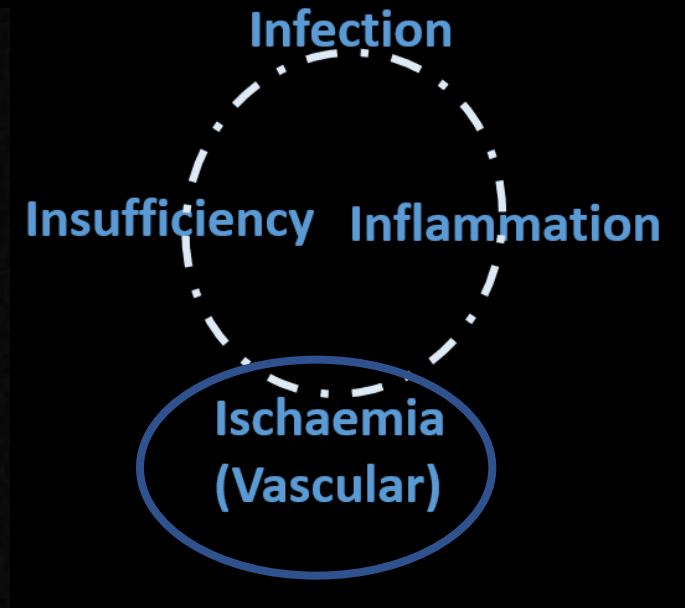
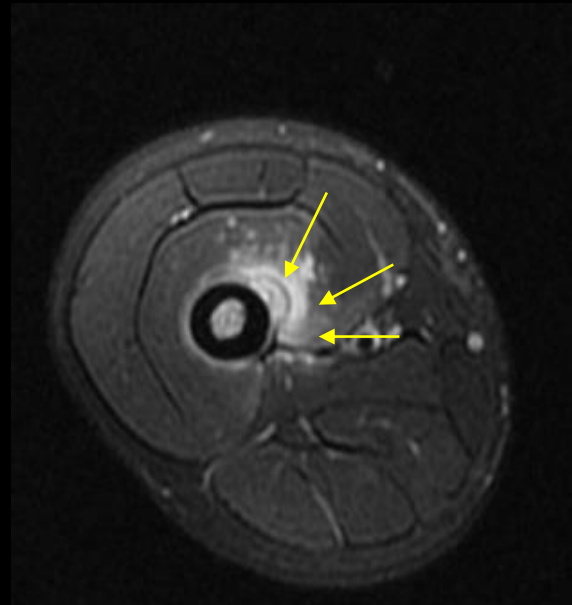
Q5 Child with Sickle Cell disease and acute leg pain Choose the single correct answer

- A. Periosteal fluid is highly suggestive of osteomyelitis
- B. Bone marrow oedema is highly suggestive of infarction
- C. Osteomyelitis and infarction can co-exist
- D. If a cloaca/cortical breach is present, it suggests infarction
- E. Radiology is the gold standard test to rule out osteomyelitis



Q5 Child with Sickle Cell disease and acute leg pain Choose the single correct answer

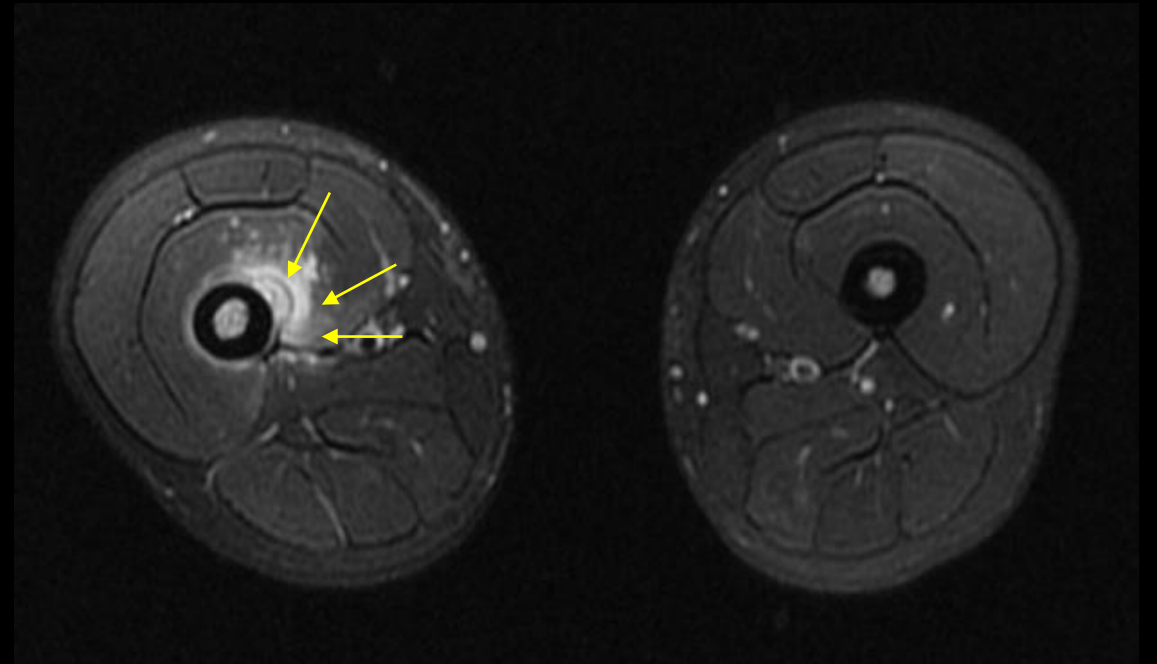
- A. Periosteal fluid is highly suggestive of osteomyelitis F
- B. Bone marrow oedema is highly suggestive of infarction F
- C. Osteomyelitis and infarction can co-exist T**
- D. If a cloaca/cortical breach is present, it suggests infarction F
- E. Radiology is the gold standard test to rule out osteomyelitis F



Axial T2 fat saturated MRI R Femur
Dx: Acute Infarction with bone marrow oedema and periosteal oedema, no infection

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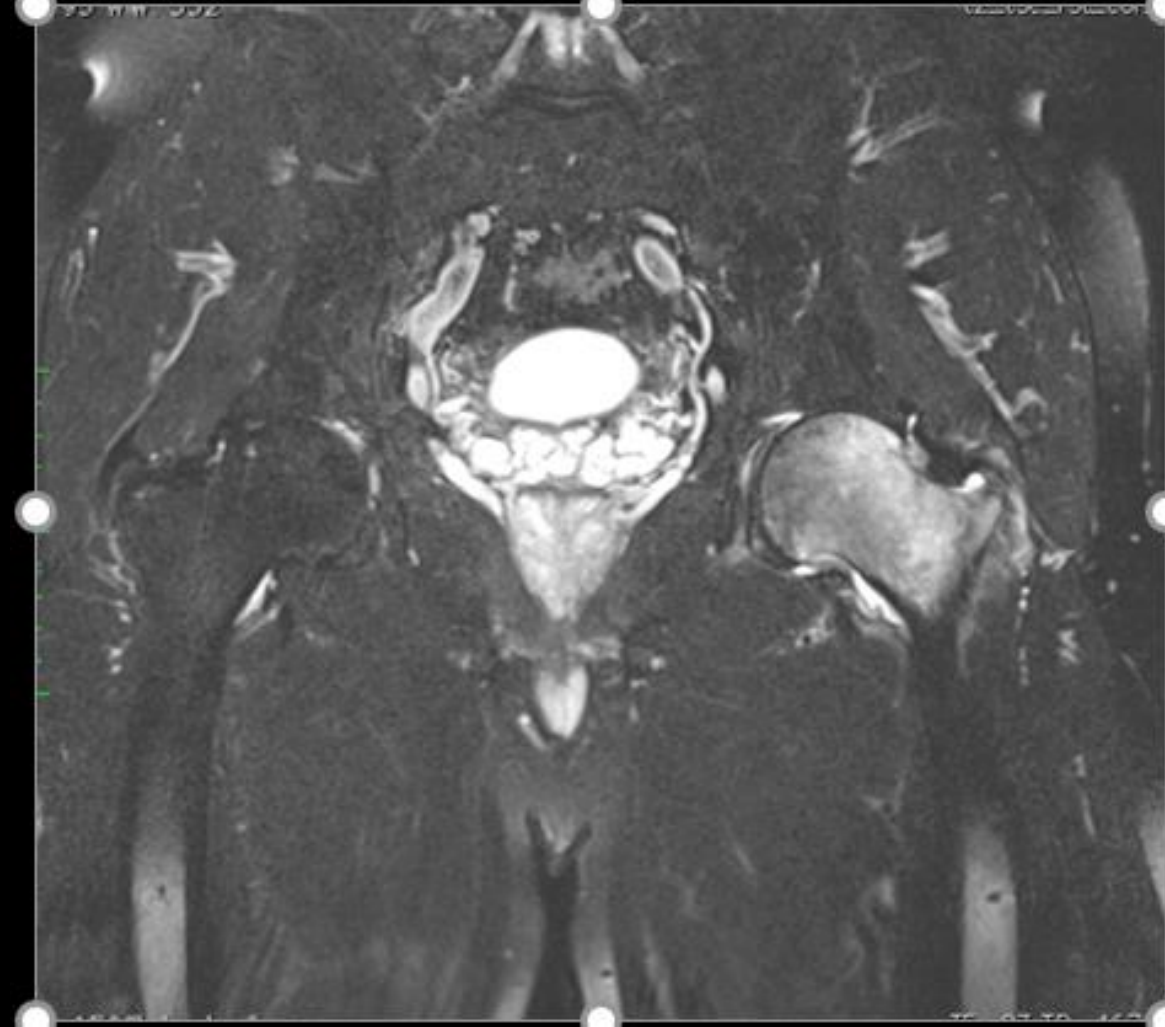
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- A. Periosteal fluid is highly suggestive of osteomyelitis F
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 - C. Osteomyelitis and infarction can co-exist T
 - D. Presence of cloaca/cortical breach suggests infarction F
 - E. Radiology is the gold standard test to rule out osteomyelitis F
- CAN OCCUR in BOTH INFARCTION AND INFECTION**
- HALLMARK OF INFECTION**
- NO GOLD- STANDARD – COMBINATION OF CLINICAL AND DIAGNOSTIC TESTS**

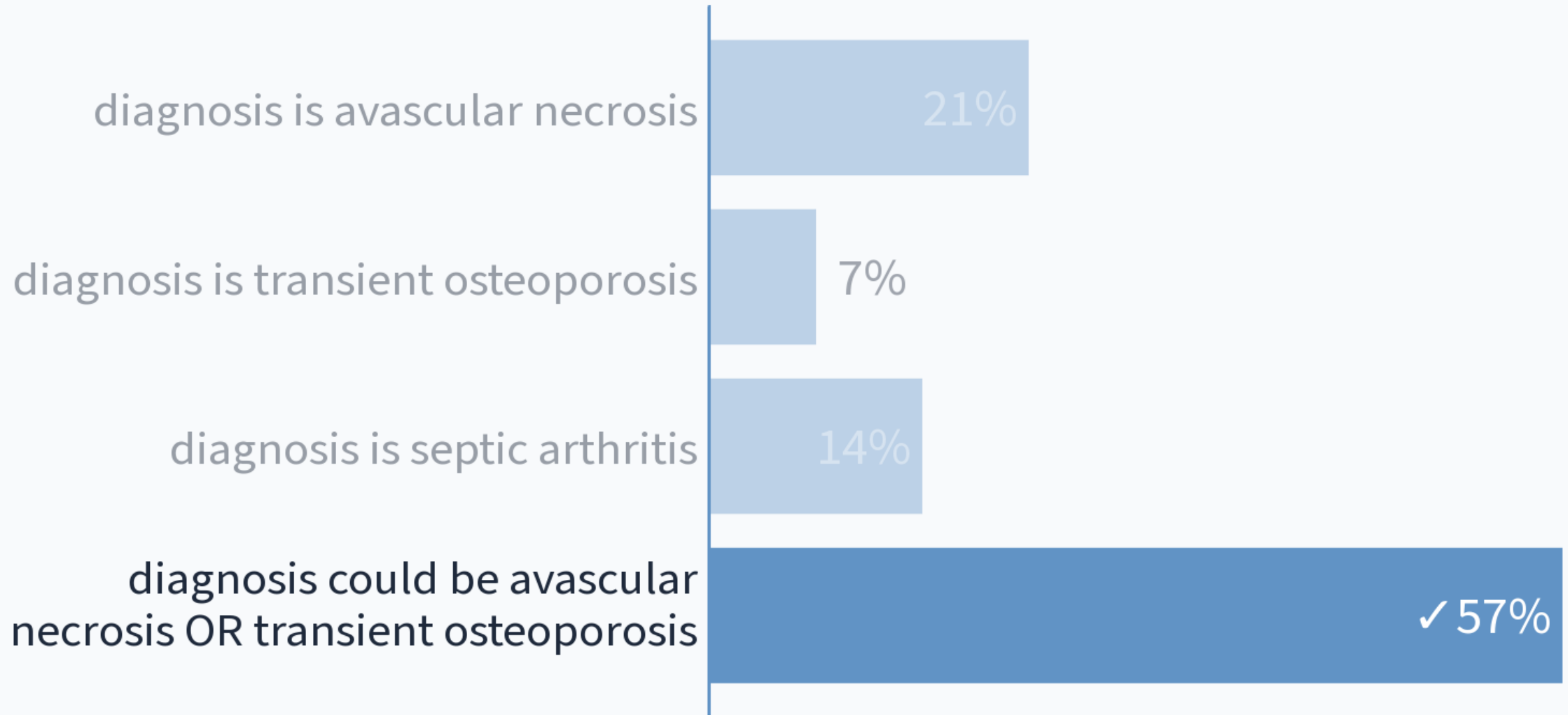
Preview Q6: Young adult with left hip pain. Select one correct answer

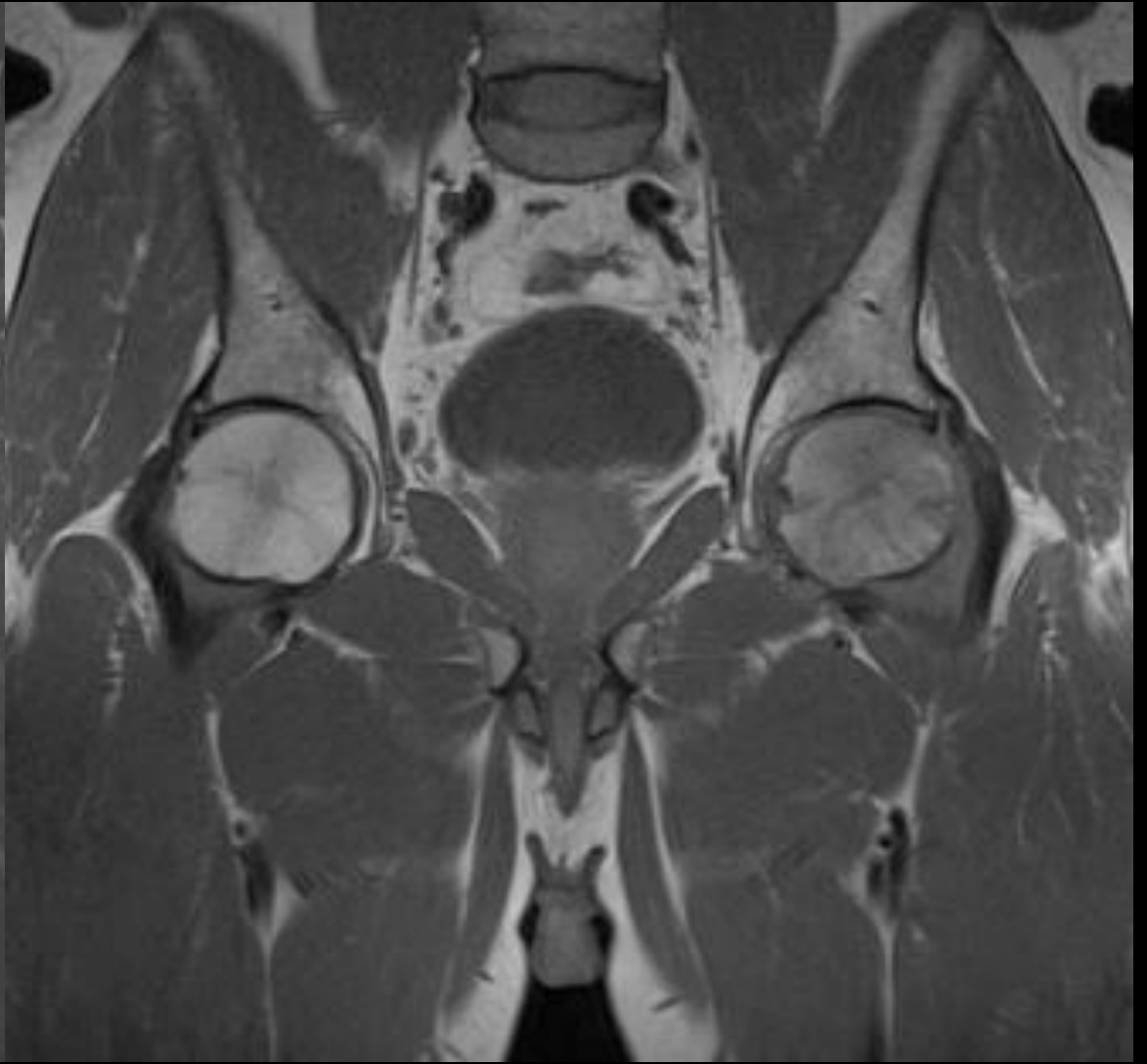
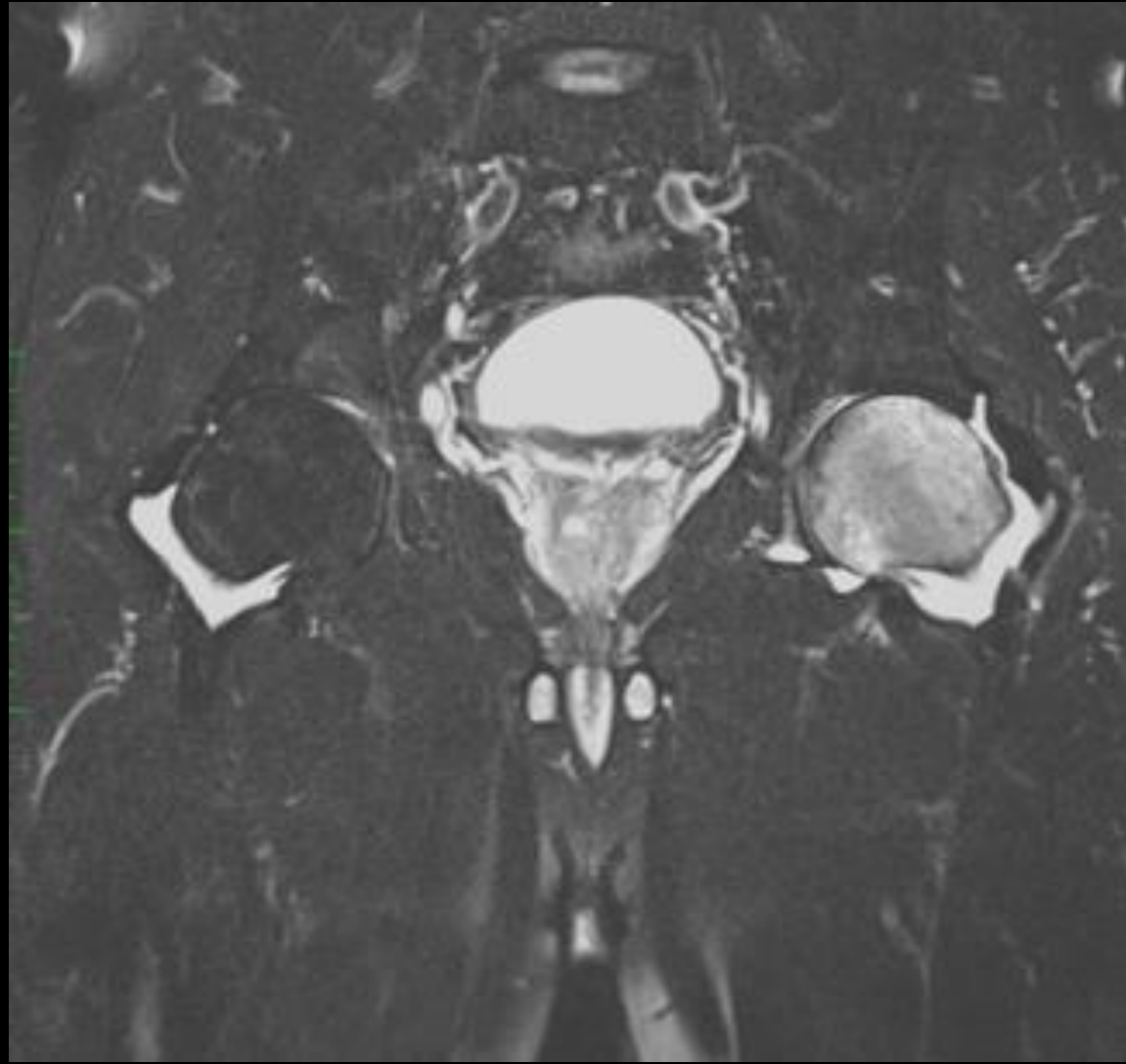
- A: diagnosis is avascular necrosis
- B: diagnosis is transient osteoporosis
- C: diagnosis is septic arthritis
- D: diagnosis could be avascular necrosis OR transient osteoporosis

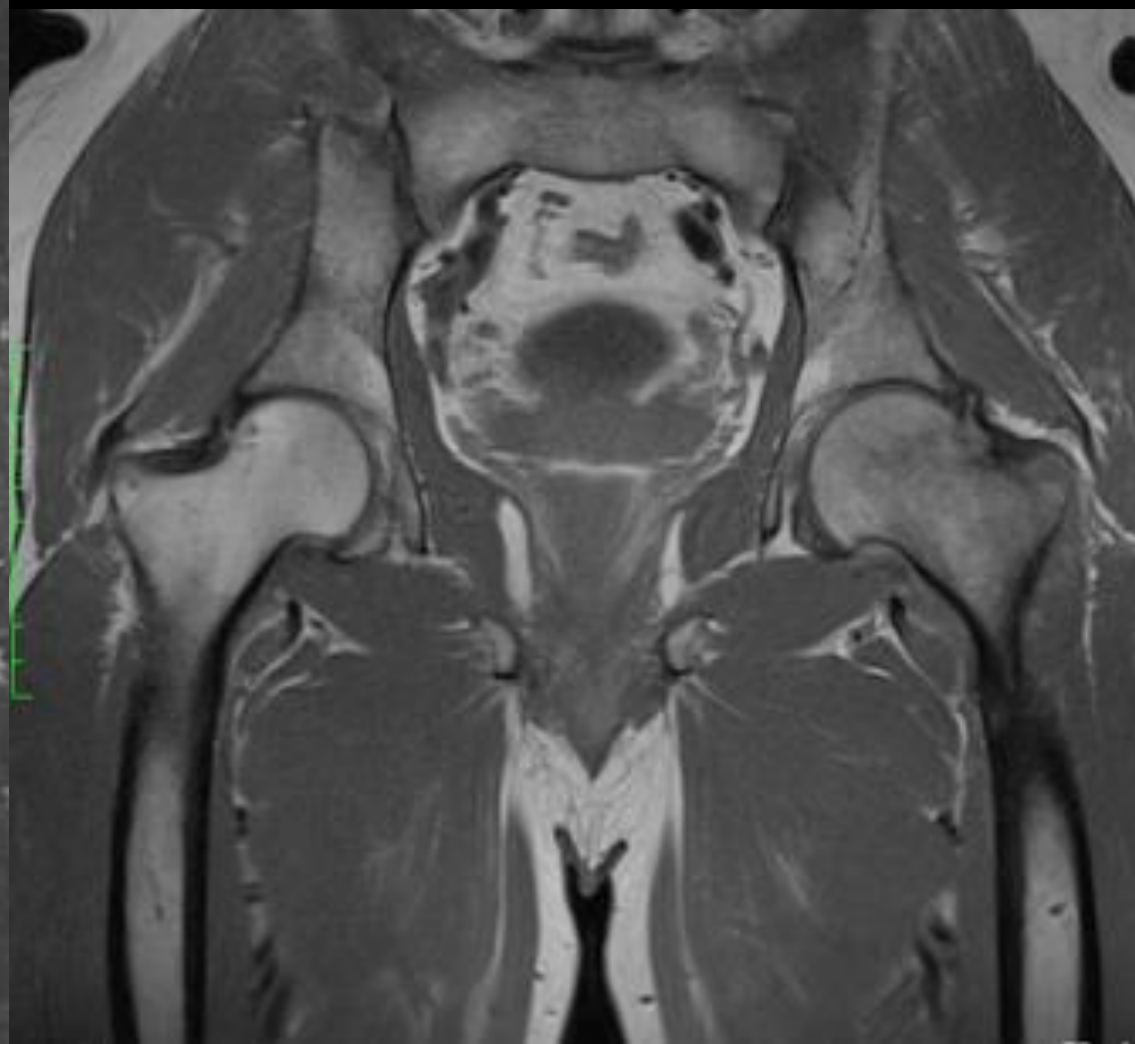
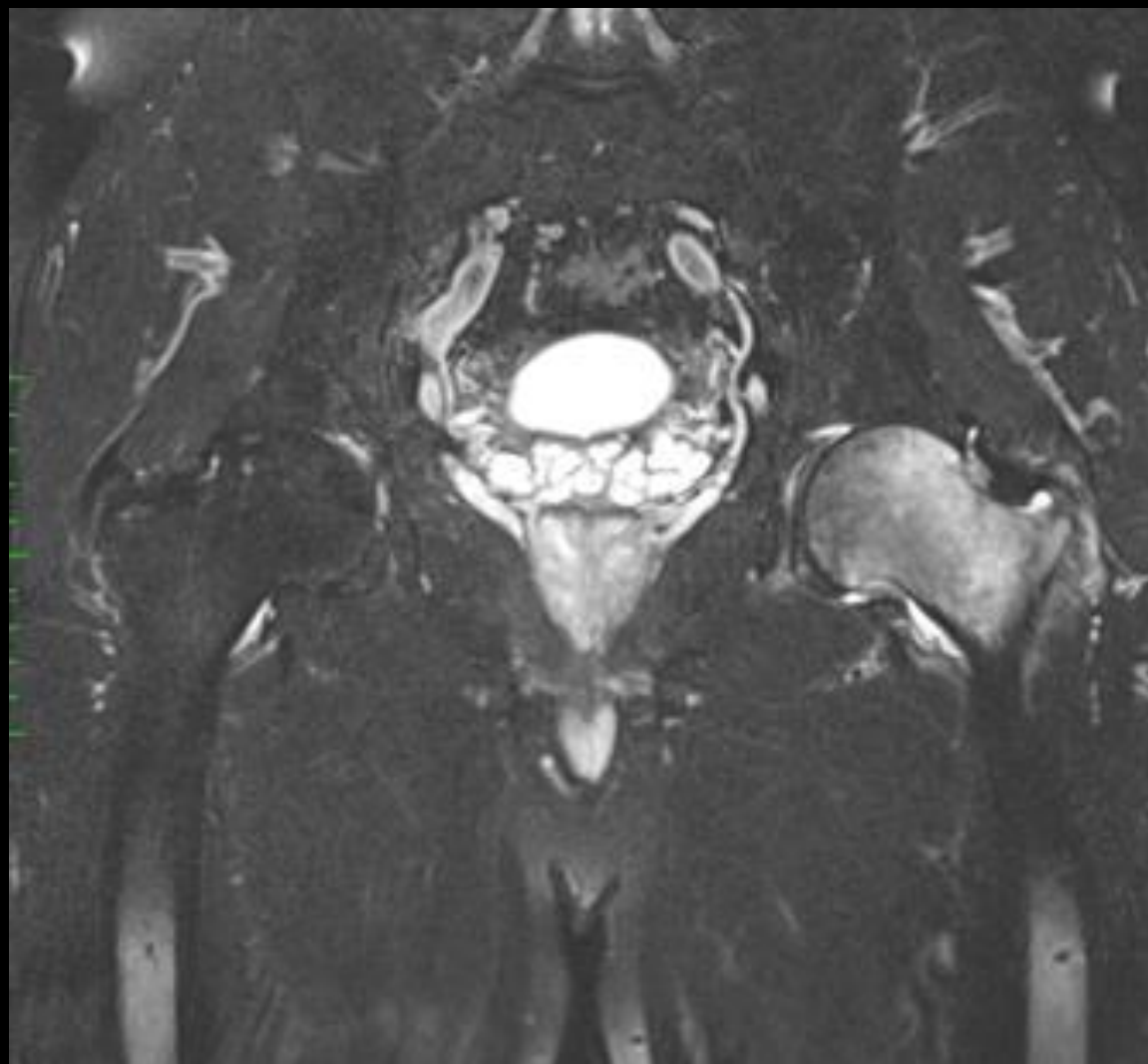


T2 fat sat coronal MRI

Young adult with left hip pain. Select one correct answer



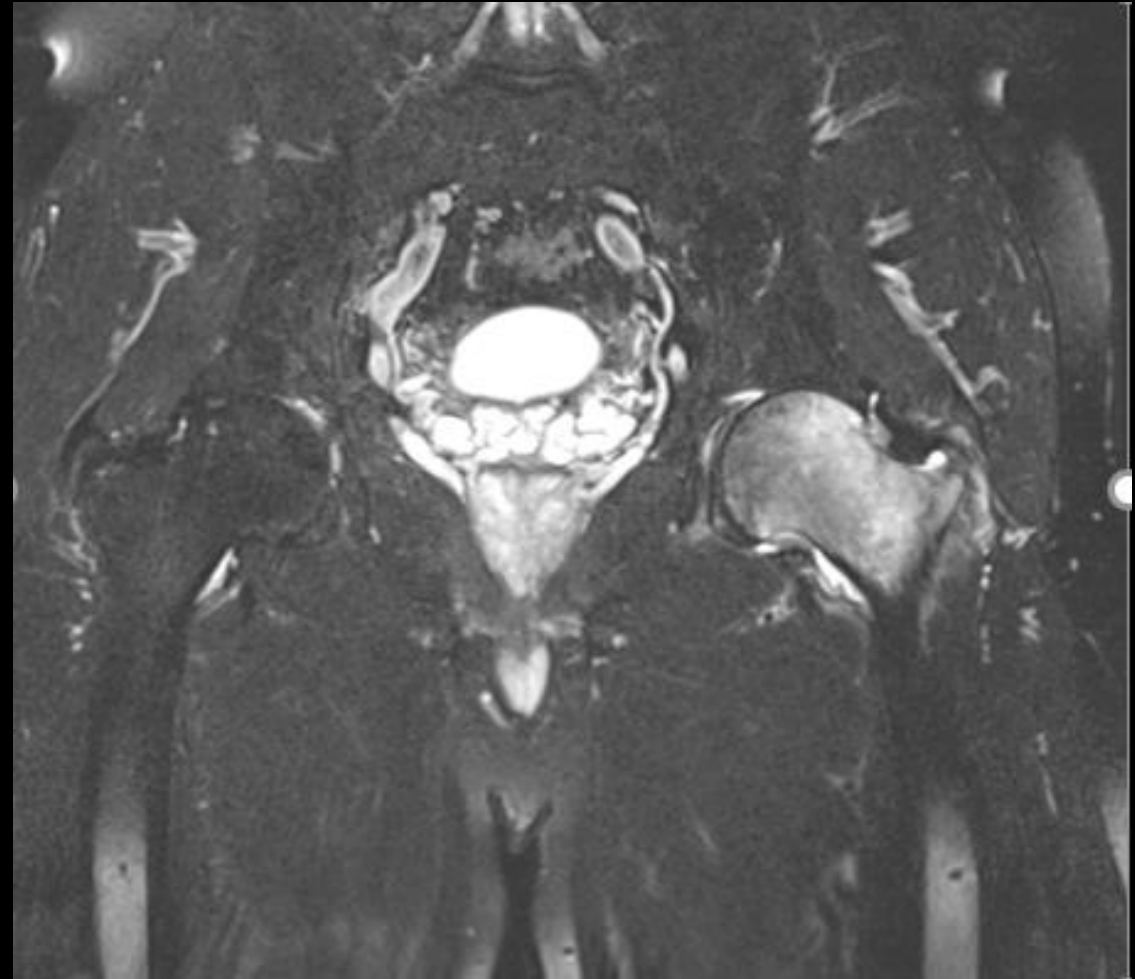




QUESTION 6

Preview Q6: Young adult with left hip pain. Select one correct answer

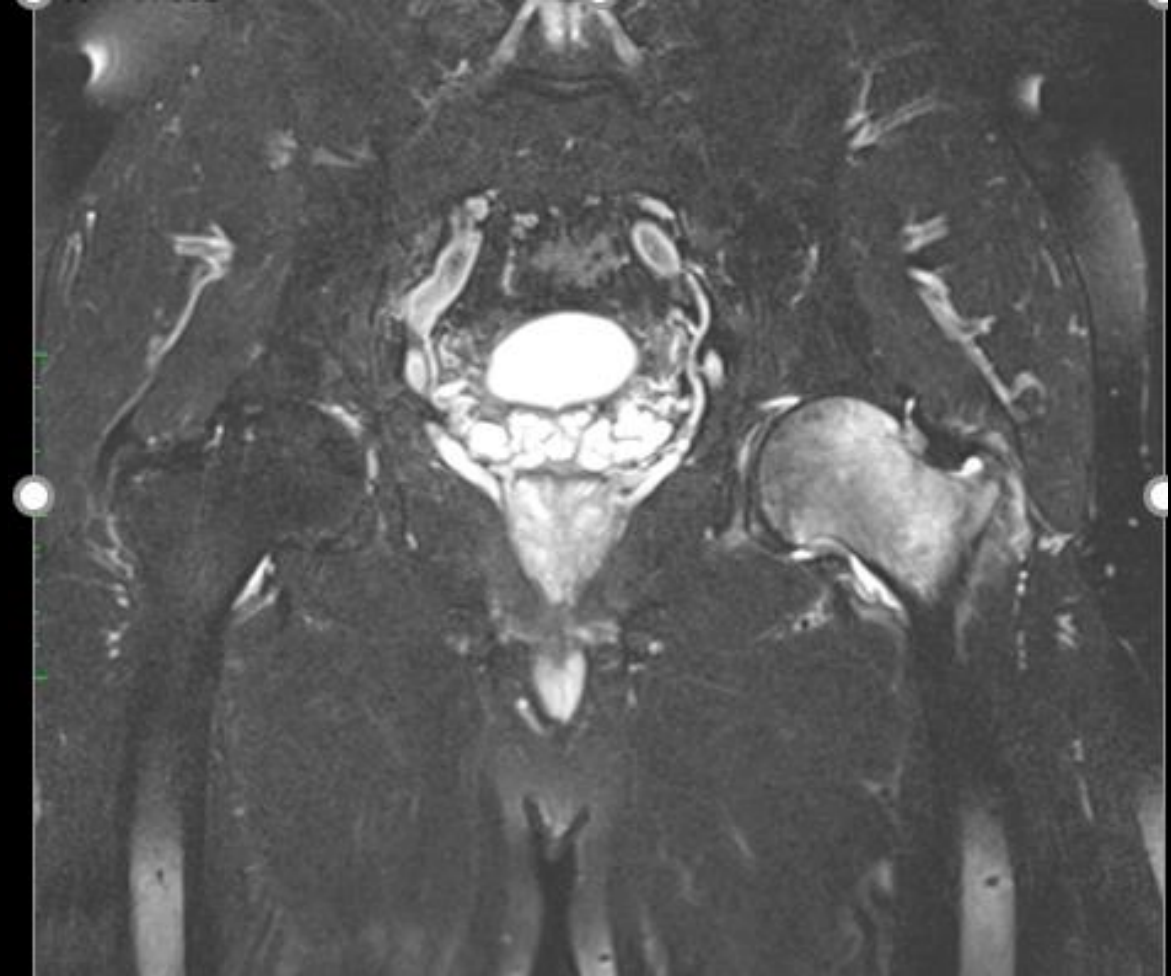
- A: diagnosis is avascular necrosis
- B: diagnosis is transient osteoporosis
- C: diagnosis is septic arthritis
- D: diagnosis could be avascular necrosis OR transient osteoporosis



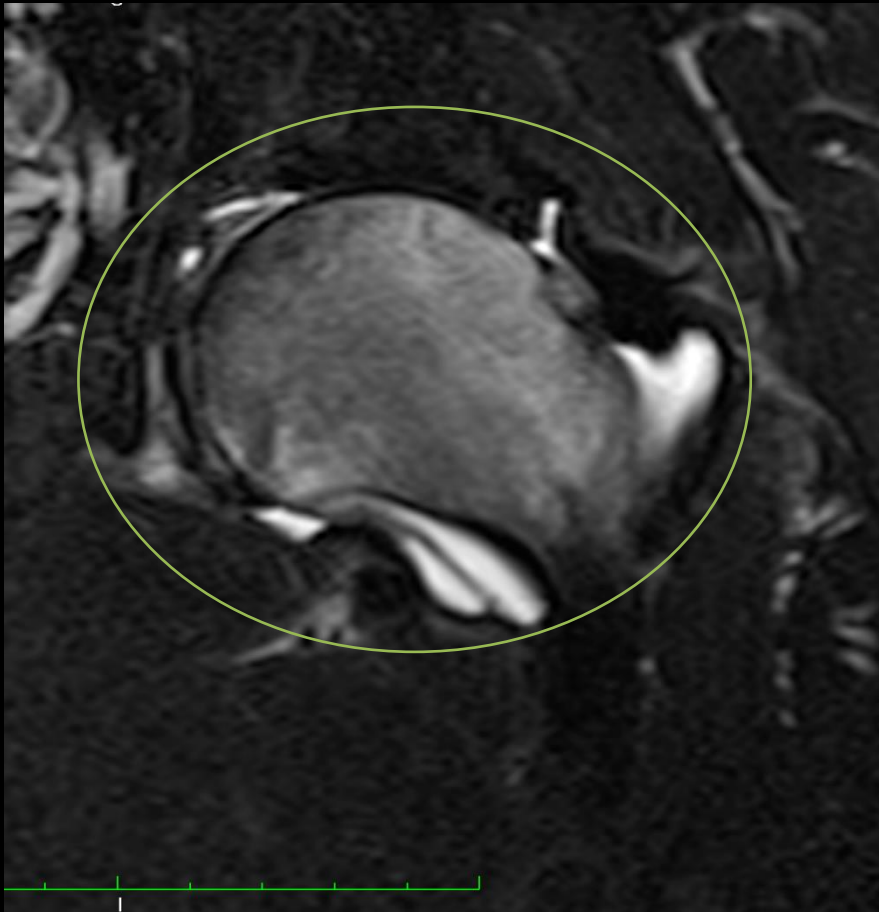
T2 fat sat coronal MRI

Preview Q6: Young adult with left hip pain. Select one correct answer

- A: diagnosis is avascular necrosis
- B: diagnosis is transient osteoporosis
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- D: diagnosis could be avascular necrosis OR transient osteoporosis**

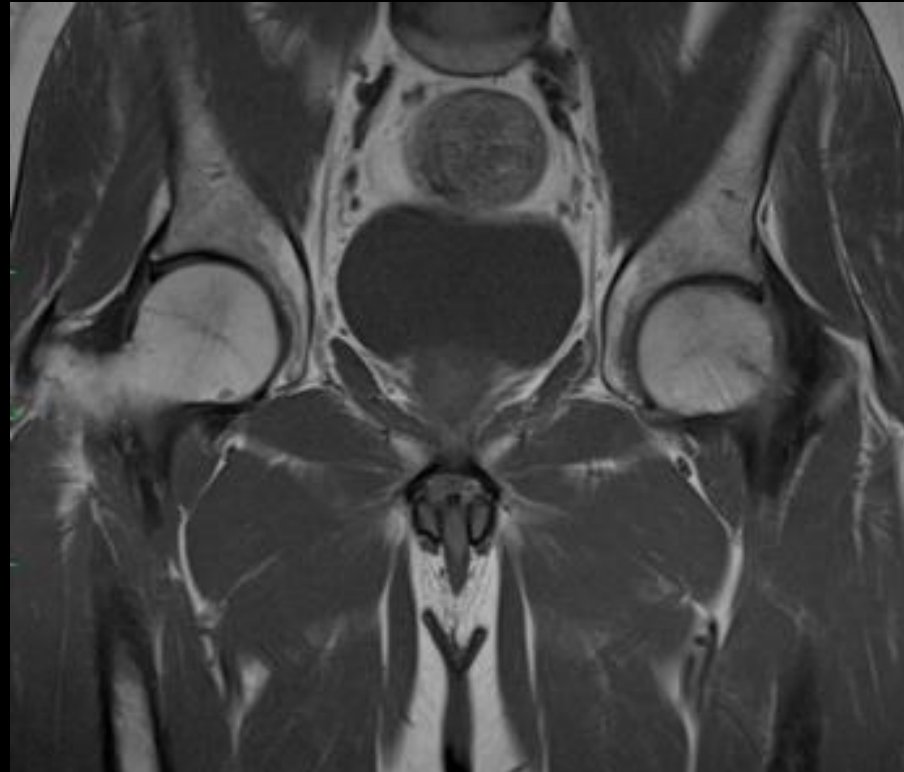
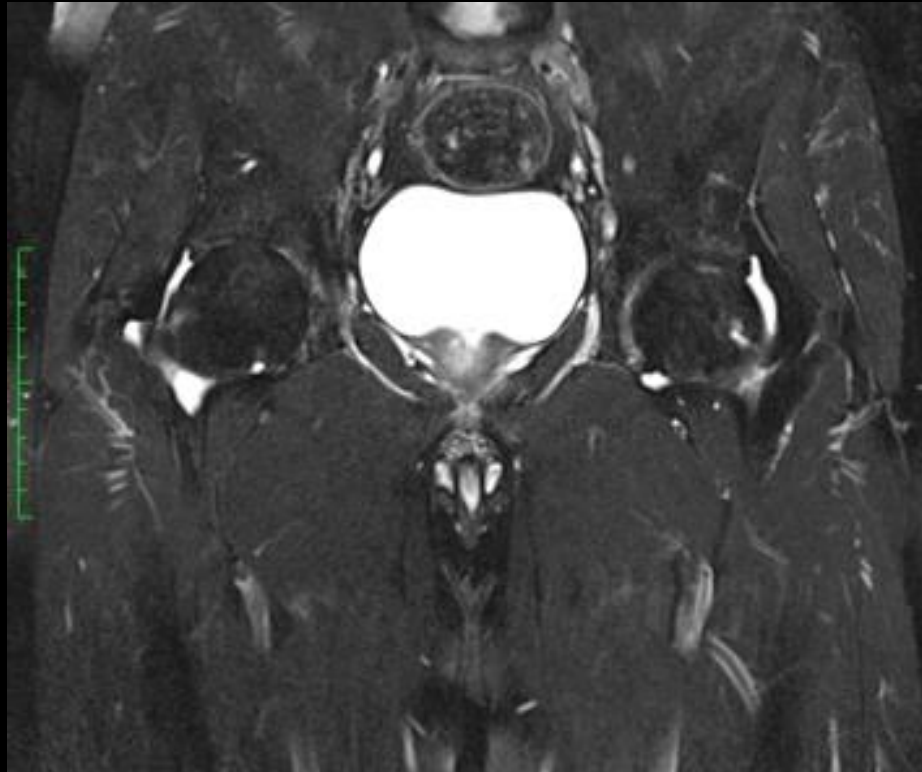


T2 fat sat coronal MRI

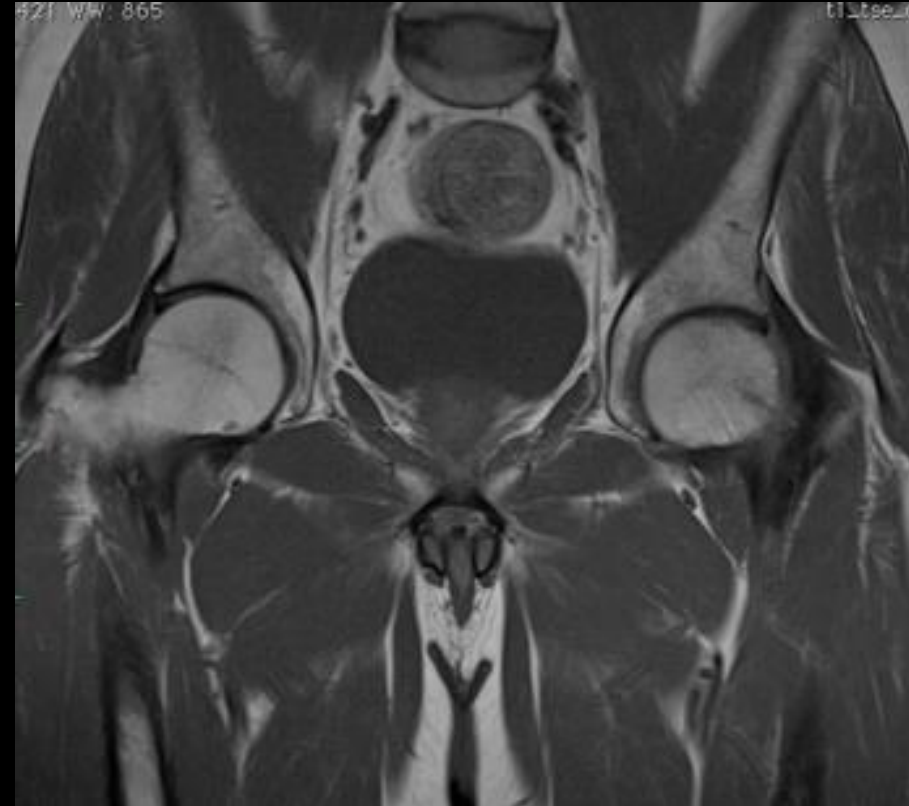
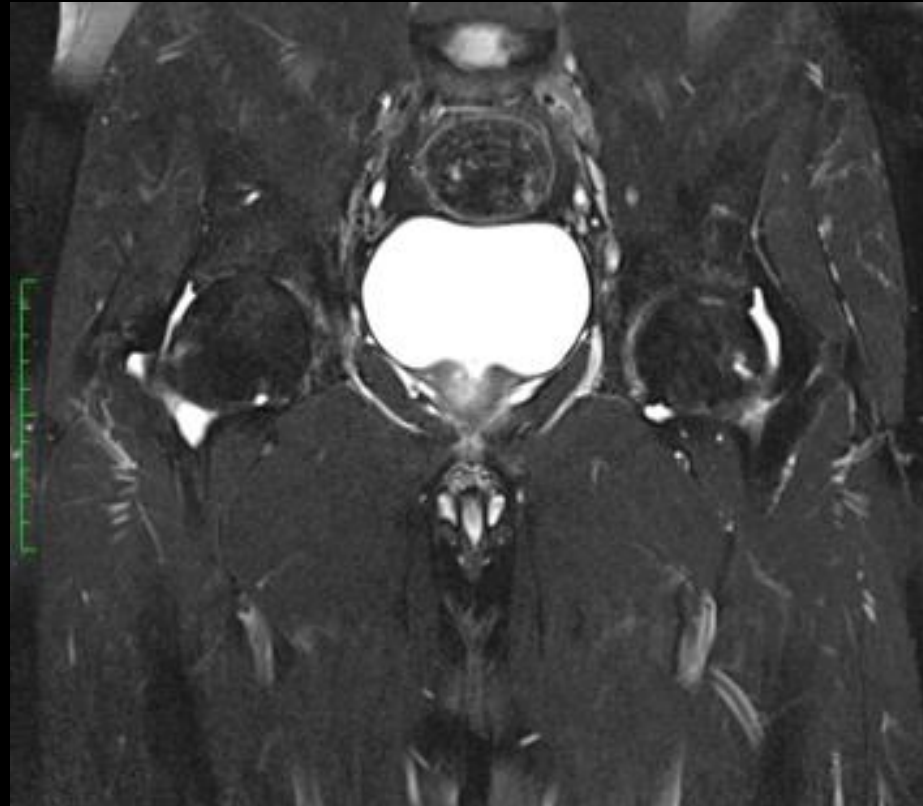


First MRI : BME Left femoral head + Joint effusion. Oedema limited to the femur. NO acetabular involvement.
NO DEFINITIVE SUBCHONDRAL FRACTURE

3 mths later: near complete resolution of
bone marrow oedema

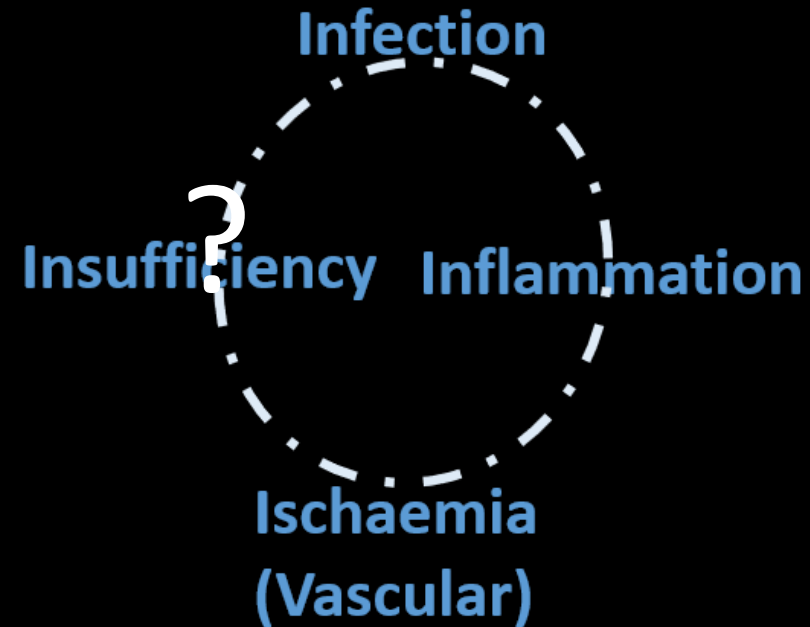


Diagnosis: Transient Osteoporosis of the Hip



Transient Osteoporosis of the Hip

- CAUSE
- Idiopathic
- ??? Subchondral fracture



Bone Marrow Oedema Syndromes

Transient osteoporosis of the hip

Transient regional osteoporosis (TRO)

Regional migratory osteoporosis (migrating TRO)

Bone Marrow Oedema Syndromes

- Transient regional osteoporosis (TRO)



Regional migratory osteoporosis (migrating TRO)



Maybe related

Avascular Necrosis

** Kim YM, Oh HC, Kim HJ. The pattern of BME on MRI in osteonecrosis of the femoral head.*

J Bone J Surg Br 2000

Bone Marrow Oedema Syndromes

Transient regional osteoporosis (TRO)



Regional migratory osteoporosis (migrating TRO)

REVERSIBLE



Avascular Necrosis

Bone Marrow Oedema Syndromes

Transient regional osteoporosis (TRO)



Regional migratory osteoporosis (migrating TRO)

REVERSIBLE

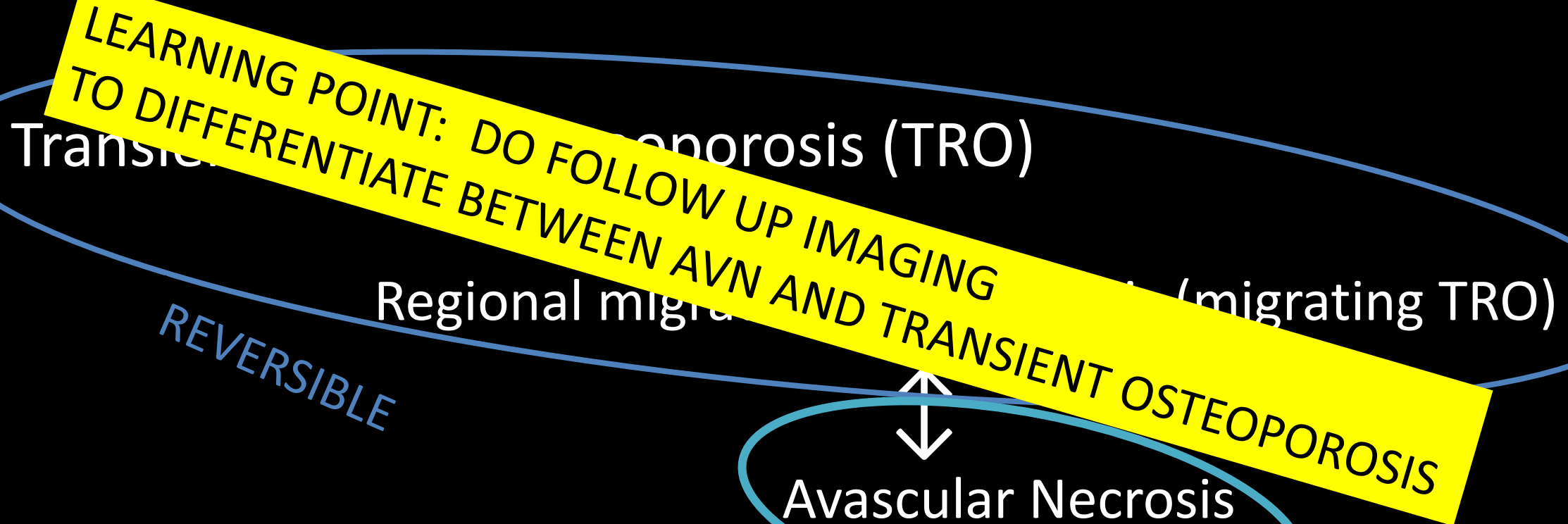


Avascular Necrosis

IRREVERSIBLE

* Kim YM, Oh HC, Kim HJ. The pattern of BME on MRI in osteonecrosis of the femoral head. J Bone J Surg Br 2000

Bone Marrow Oedema Syndromes



* Kim YM, Oh HC, Kim HJ. The pattern of BME on MRI in osteonecrosis of the femoral head. J Bone J Surg Br 2000

fall, left hip pain, unable to weight bear



NORMAL

Clinician calls you : “There is high suspicion of fracture despite the negative X-ray”

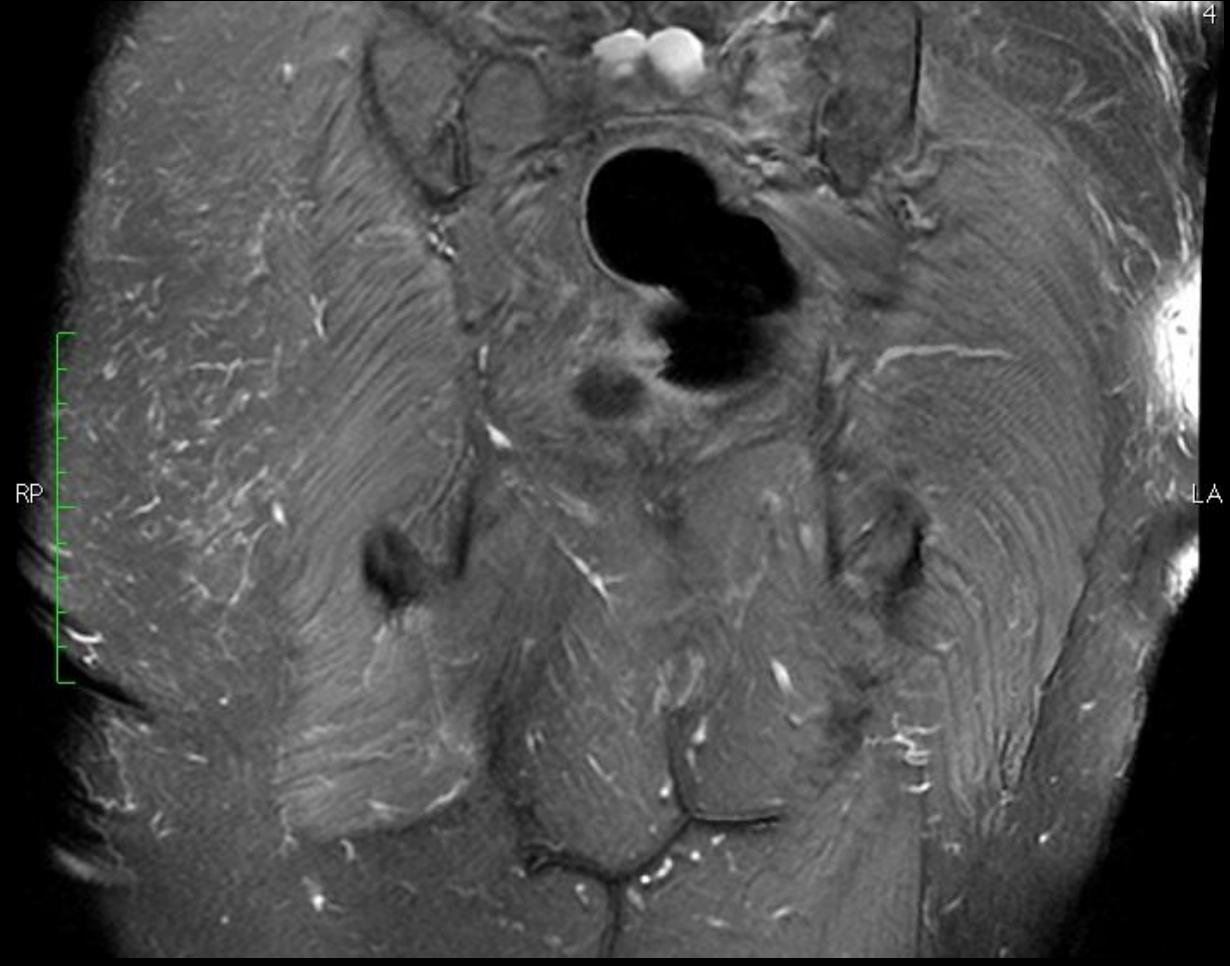
What do you recommend next?

What do you recommend next

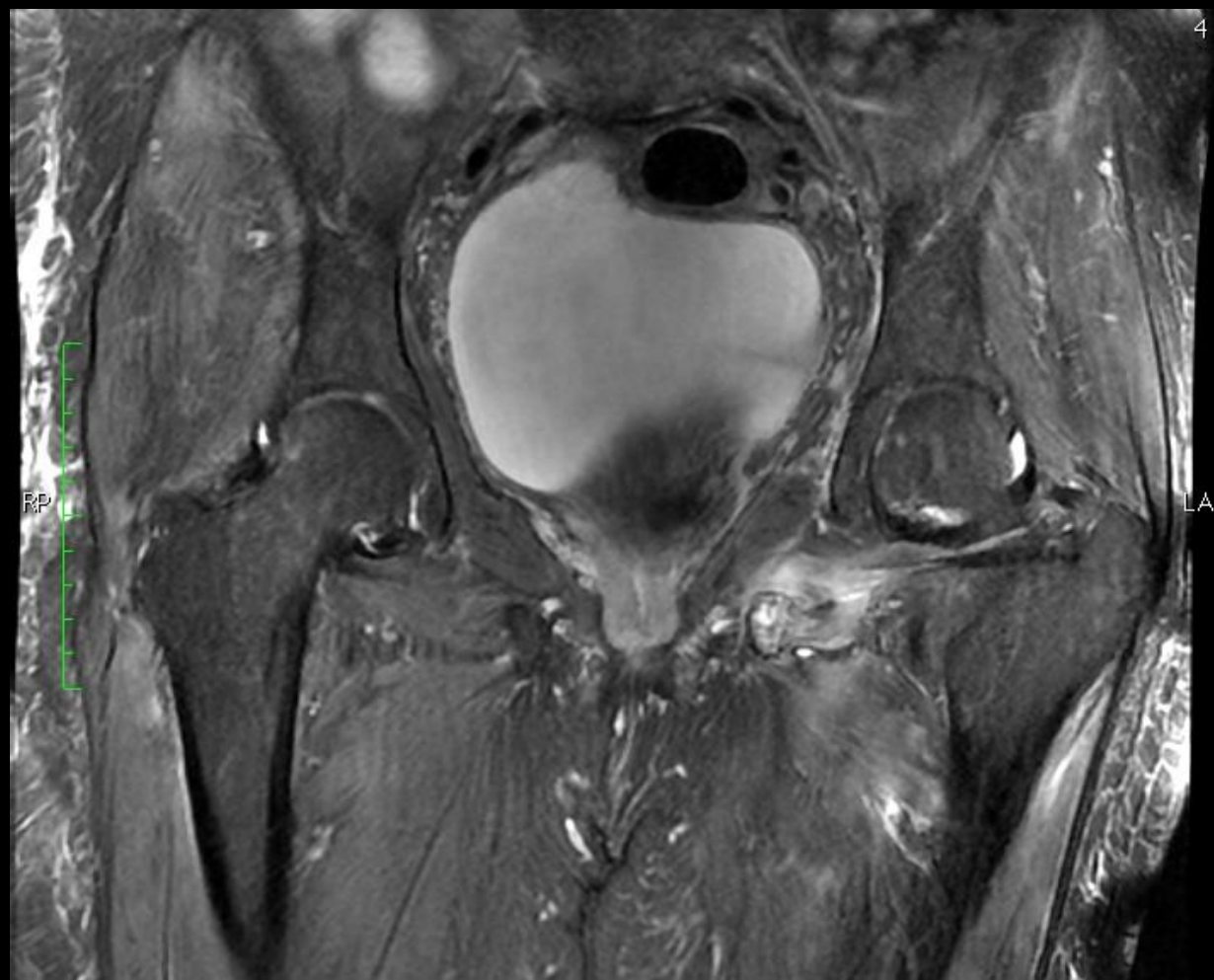
1.1 Imaging options in occult hip fracture

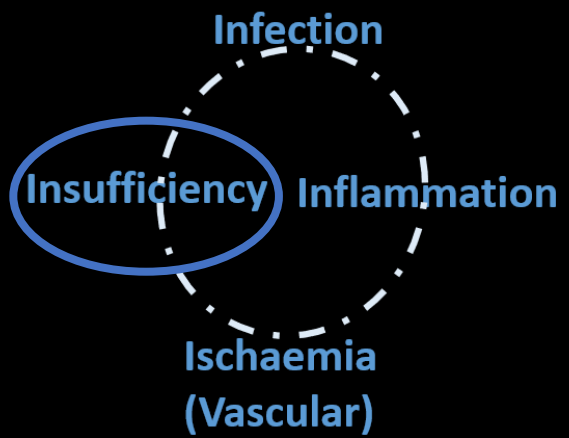
- 1.1.1 Offer magnetic resonance imaging (MRI) if hip fracture is suspected despite negative X-rays of the hip of an adequate standard. If MRI is not available within 24 hours or is contraindicated, consider computed tomography (CT). [2011, amended 2014]

“LIMITED MRI” Pelvis :
COR T1 , STIR (10 min)

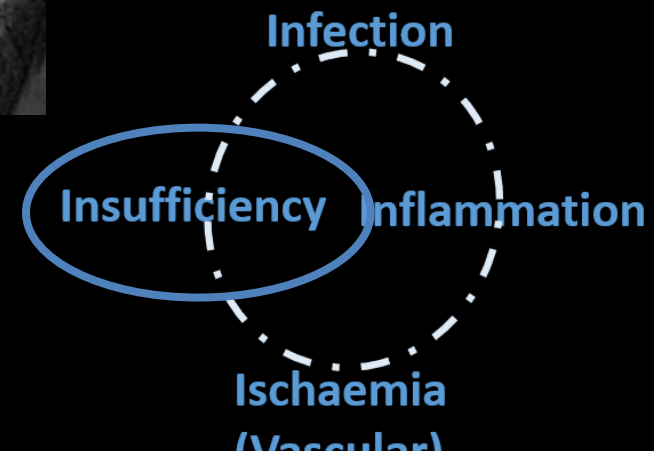
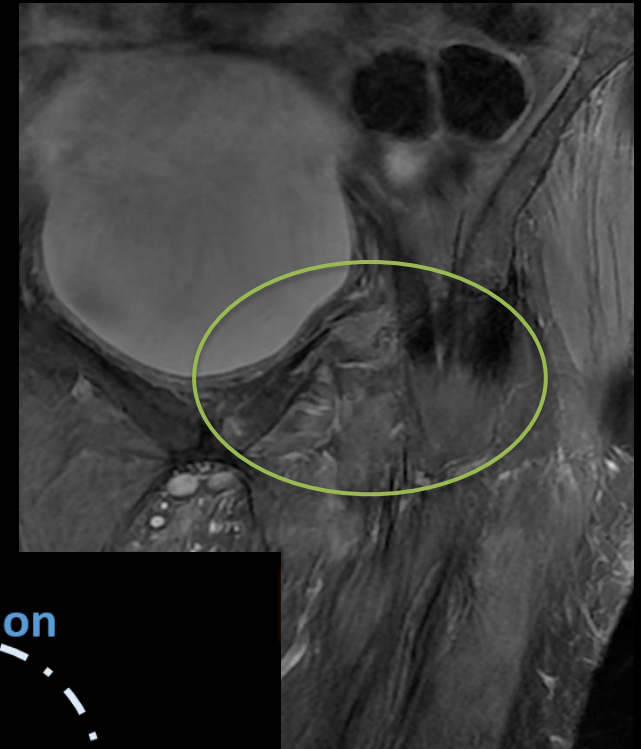
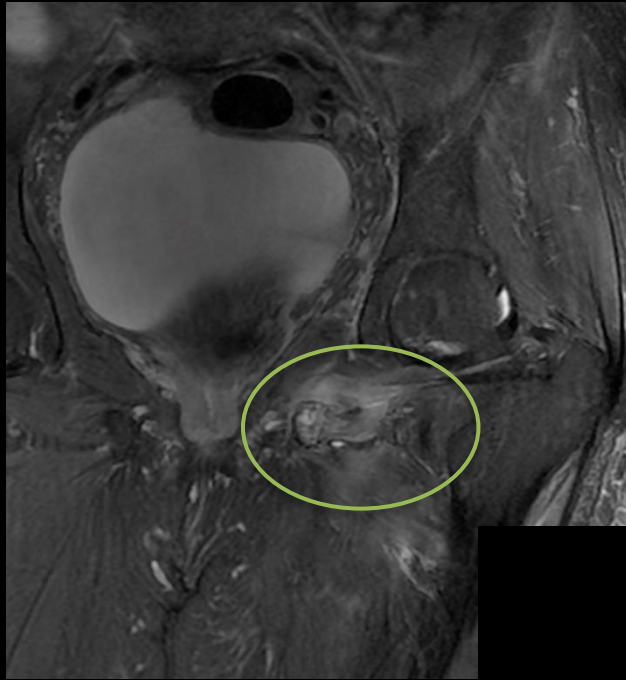
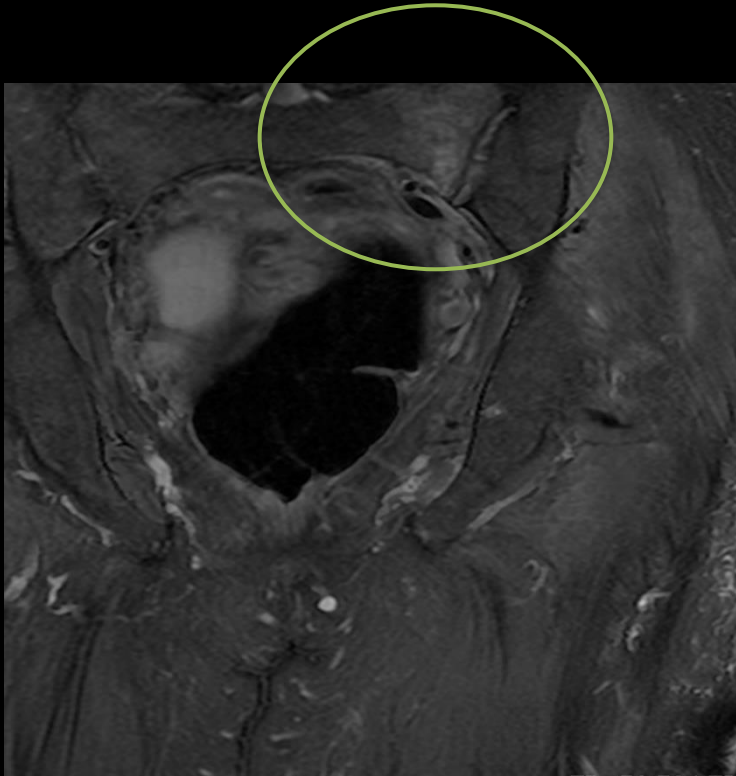








Insufficiency Fractures

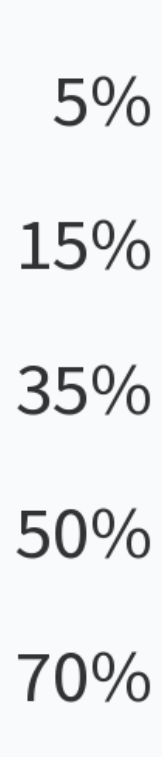


When poll is active, respond at pollev.com/edick900

Text **EDICK900** to **07480 781235** once to join

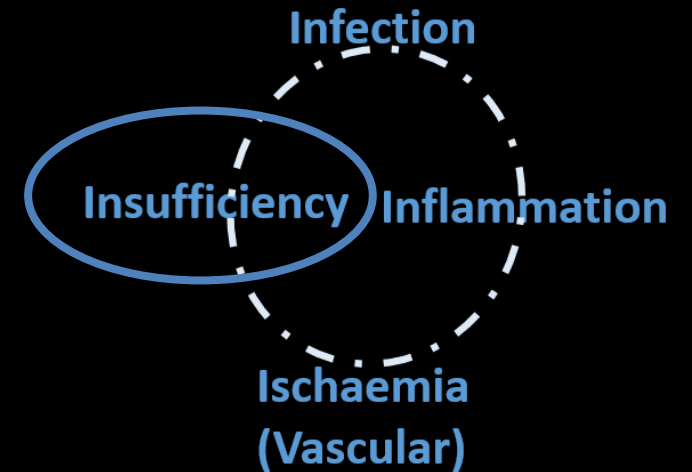


What proportion of pelvic insufficiency are seen on Xray alone?



Insufficiency Fractures

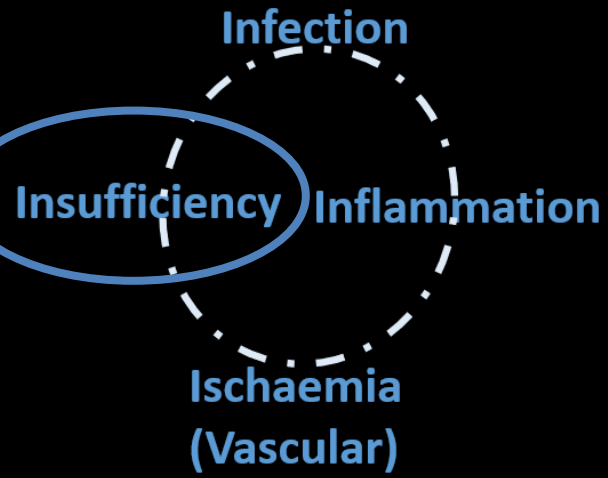
- Plain X-ray detects 15% of fractures
- CT detects 69% of #s
- MRI detects 99% of #s
- 70% pts had more than 1 fracture
- 90 % pts w pubic insufficiency # had another \neq
- CT – Medullary sclerosis/Cortical disruption



Keen runner Heel pain ? Plantar fasciitis ? Achilles tendonitis



r Heel pain ? Plantar fasciitis ? Achilles tendonitis



What is a MSK Emergency?

Infection

Insufficiency Inflammation

Ischaemia
(Vascular)

Non-Traumatic

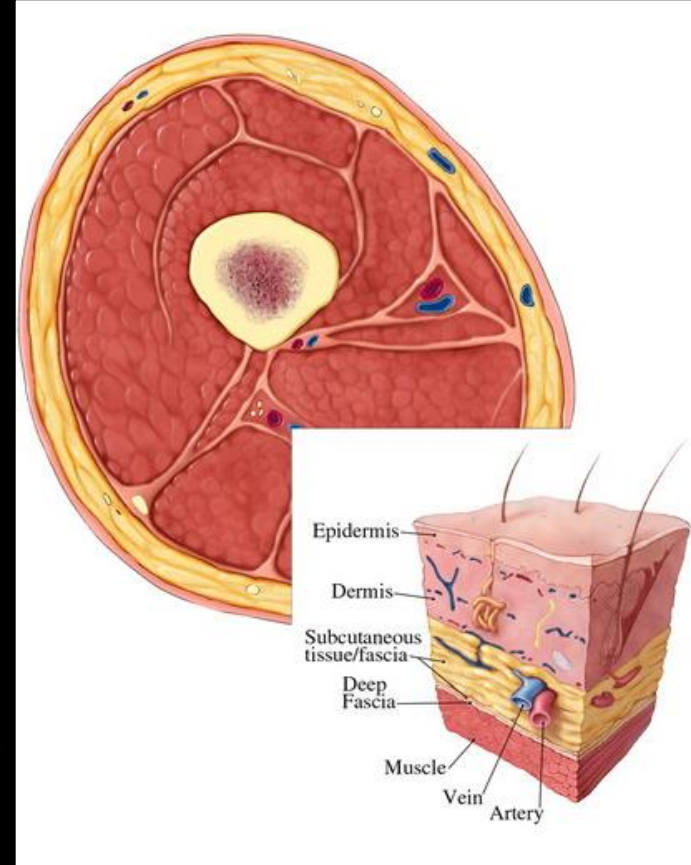
Subcutaneous

Fascia

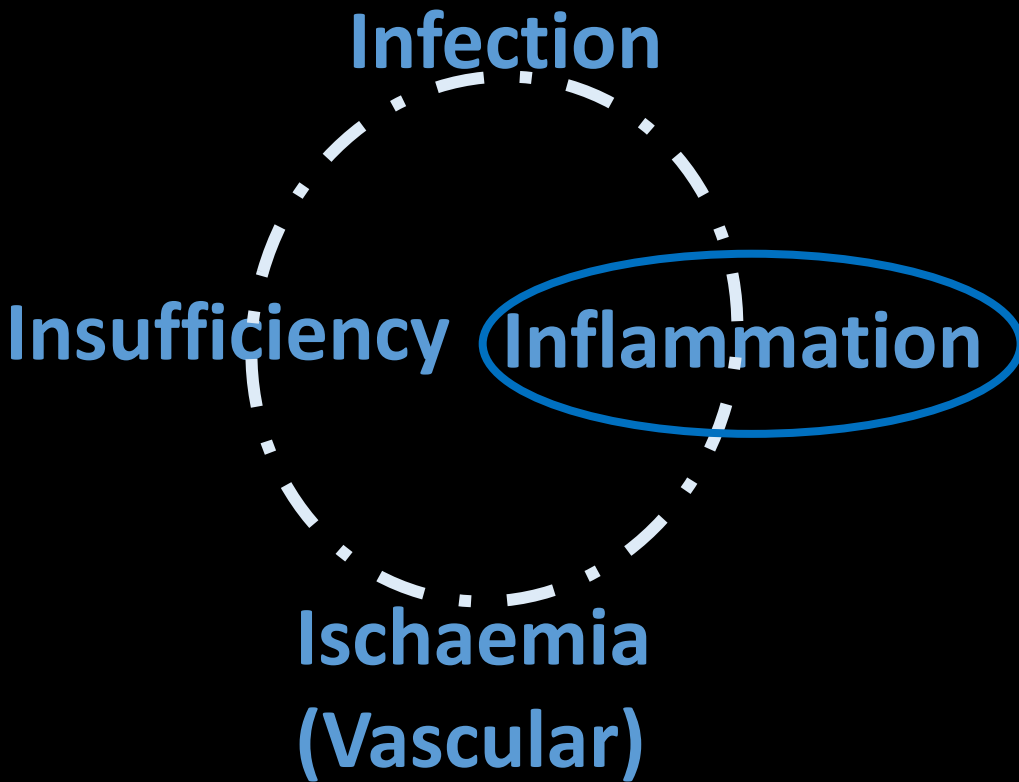
Muscle

Bone

Joint



What is a MSK Emergency?



Non-Traumatic

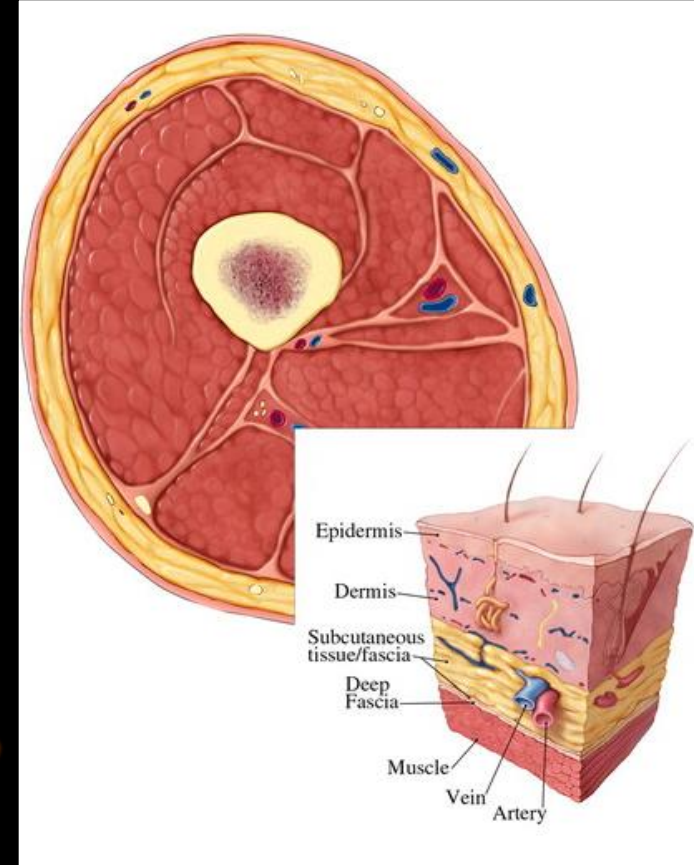
Subcutaneous

Fascia

Muscle

Bone

Joint



QUESTION 7

Q7 Elderly man, Acutely tender wrist, Choose one correct answer

- A. Aspiration would not be useful
- B. In pseudogout (CPPD) the crystal is calcium pyrophosphate
- C. calcification of the TFCC and joint capsule is irrelevant
- D. Gout never presents acutely
- E. Pseudogout never presents acutely



Elderly man, Acutely tender wrist, Choose one correct answer

Elderly man, Acutely tender wrist, Choose one correct answer

6%

In pseudogout (CPPD) the crystal is calcium pyrophosphate

94%

calcification of the TFCC and joint capsule is irrelevant

Gout never presents acutely

Pseudogout never presents acutely

Q7 Elderly man, Acutely tender wrist, Choose one correct answer

- A. Aspiration would not be useful F
- B. In pseudogout (CPPD) the crystal is calcium pyrophosphate T
- C. calcification of the TFCC and joint capsule is irrelevant F
- D. Gout never presents acutely F
- E. Pseudogout never presents acutely F



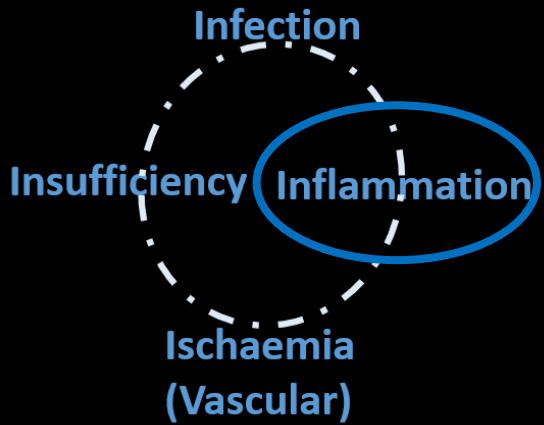
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TFCC and capsule calcification





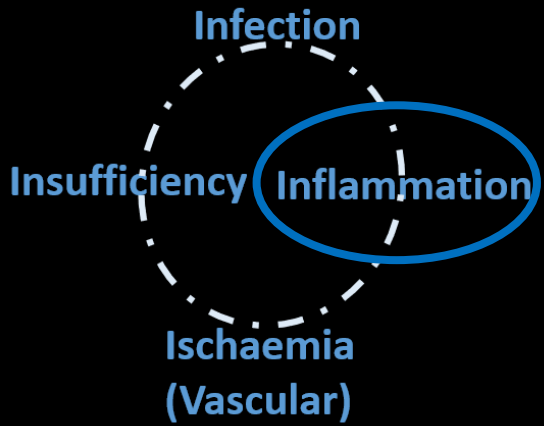
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TFCC and capsule calcification

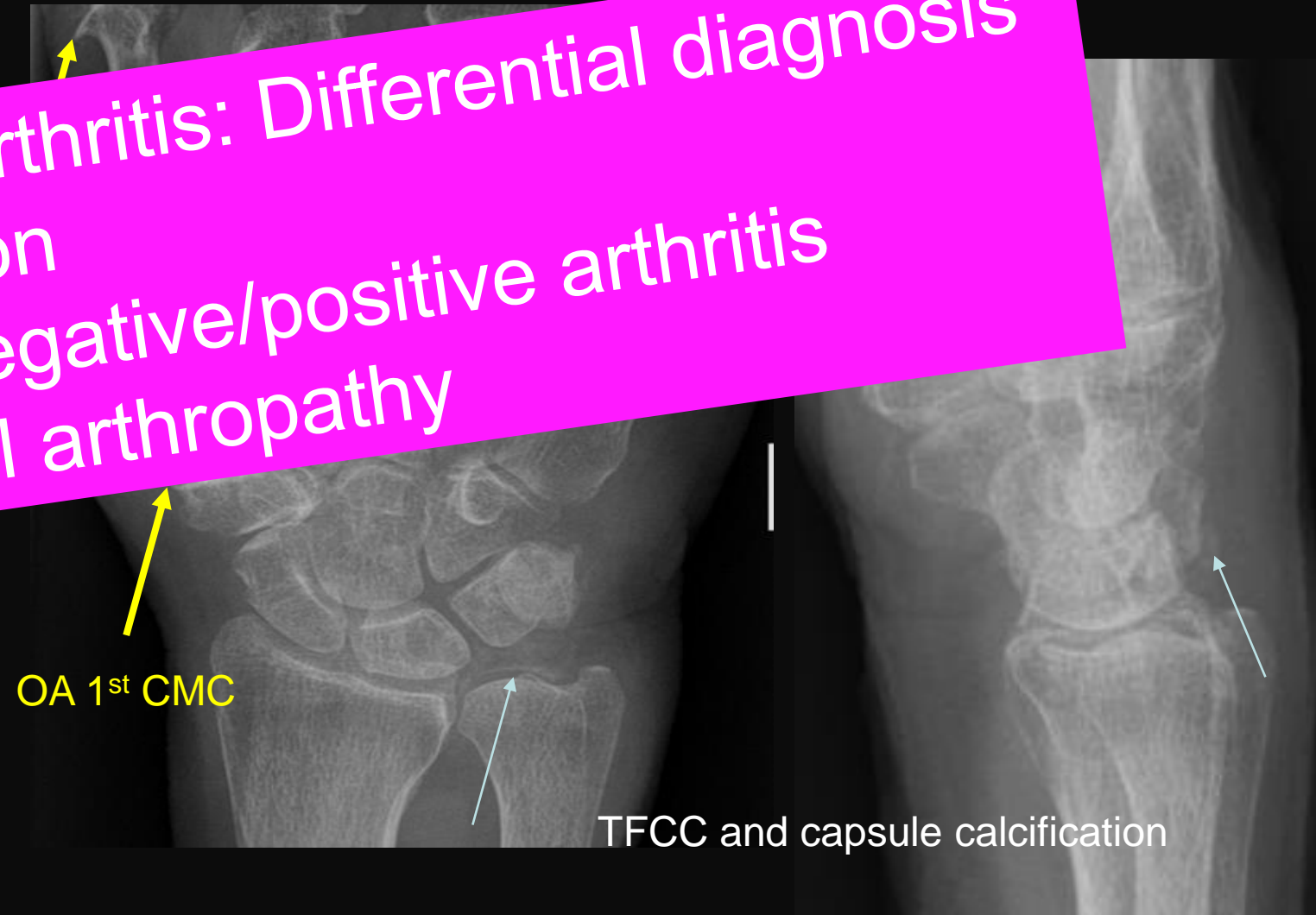


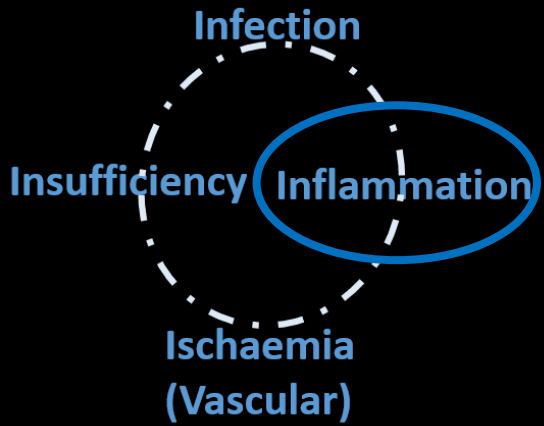
Q7 Elderly man, Acutely tender wrist,
Choose one correct answer

ould not be

Acute arthritis: Differential diagnosis
 -infection
 -seronegative/positive arthritis
 -crystal arthropathy

- B. In pseudogout (crystal is calcium pyrophosphate) F
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- D. Gout never presents acutely F
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Q7 Elderly man, Acutely tender wrist,
Choose one correct answer

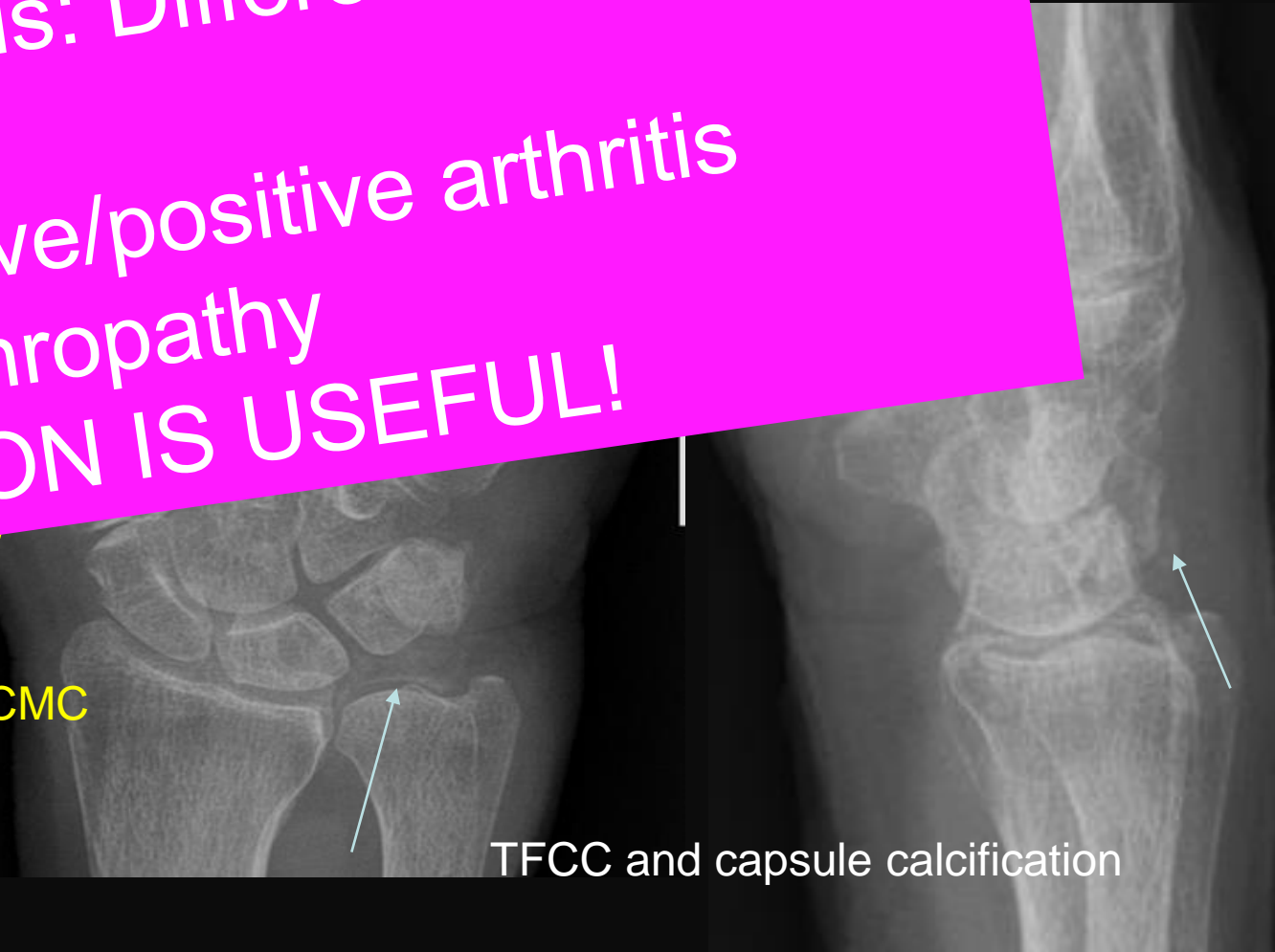
could not be

Acute arthritis: Differential diagnosis
 -infection
 -seronegative/positive arthritis
 -crystal arthropathy
ASPIRATION IS USEFUL!

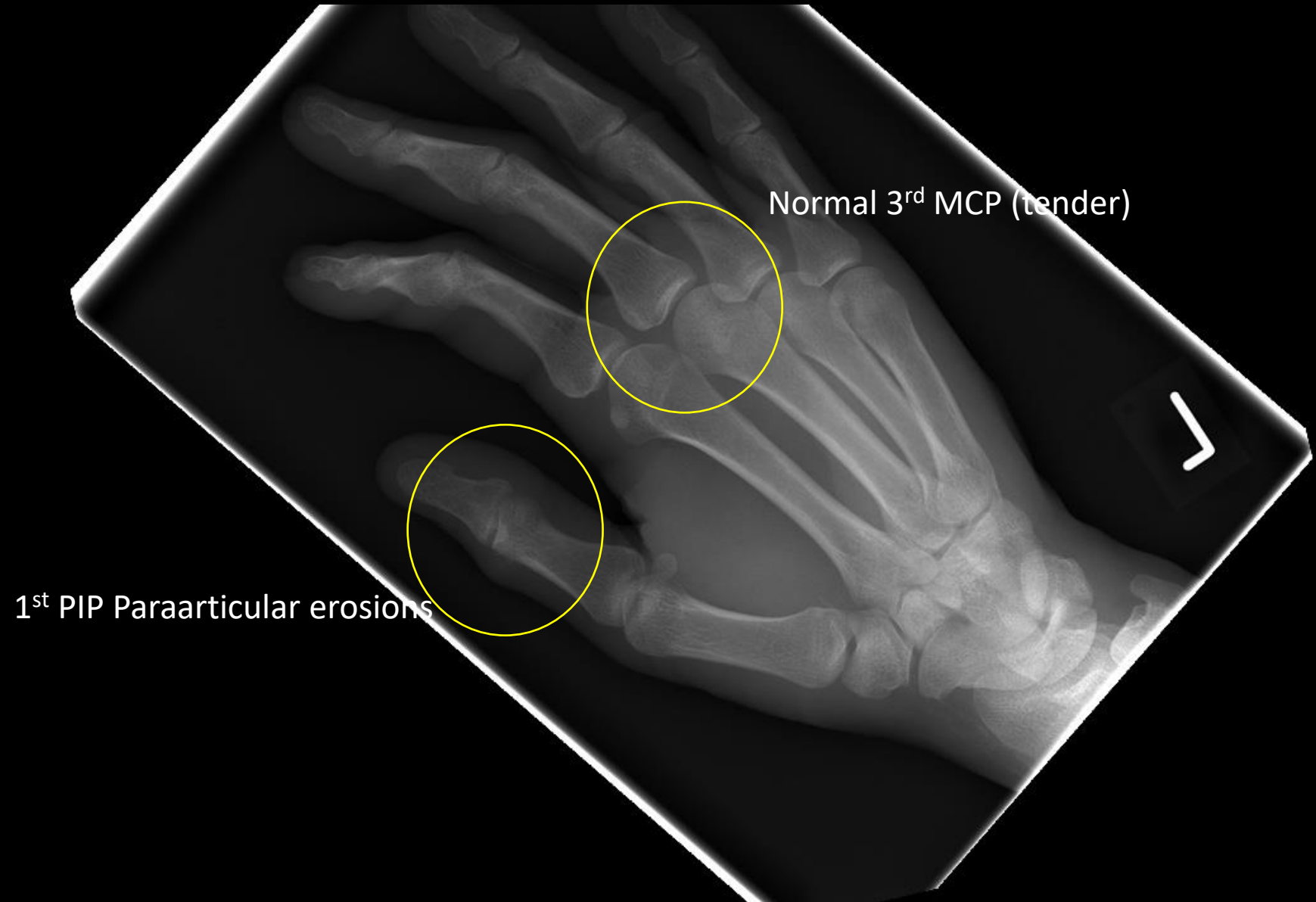
- B. In pseudogout (crystal is calcium pyrophosphate) F
- C. calcification of the and joint capsule irrelevant F
- D. Gout never presents acutely F
- E. Pseudogout never presents acutely F

OA 1st CMC

TFCC and capsule calcification



Gout

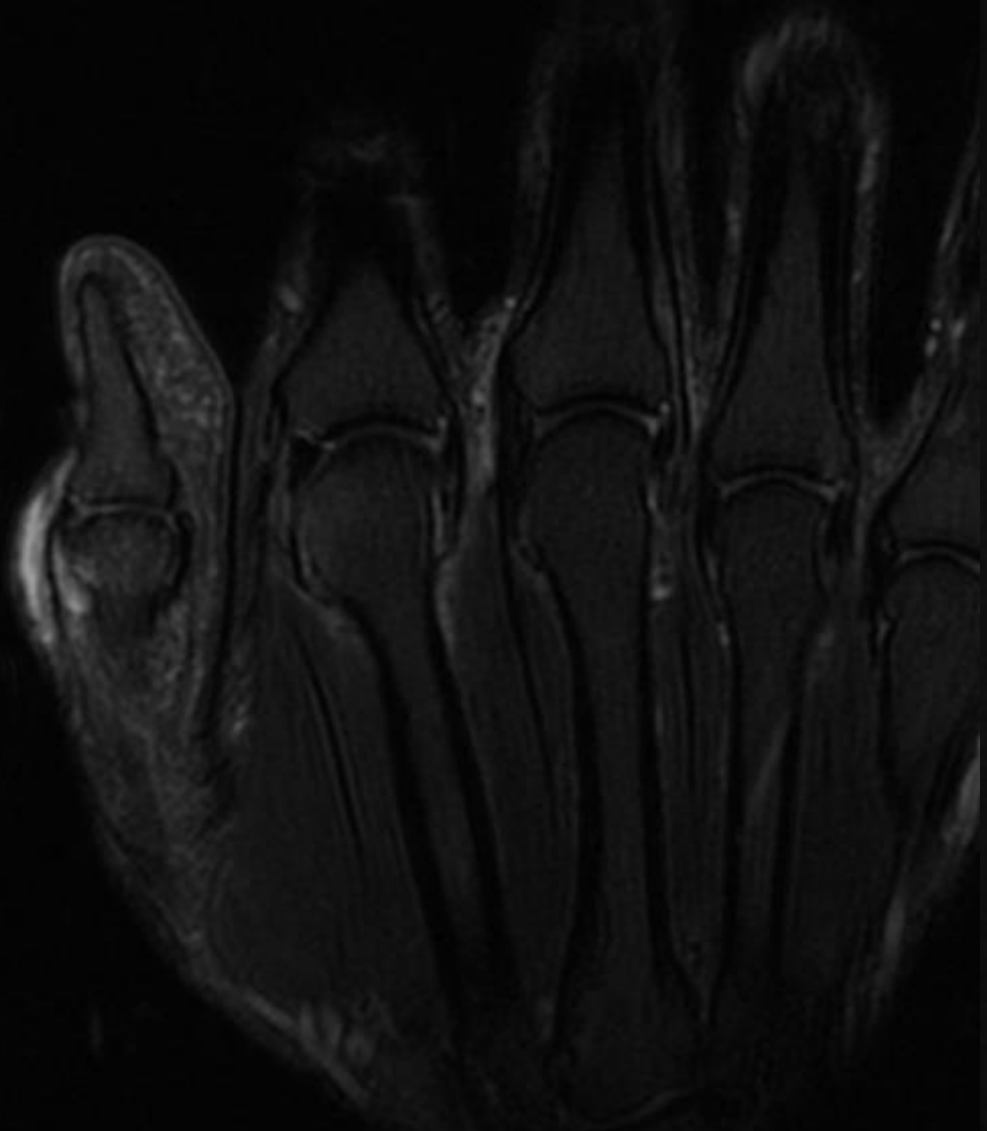


1st PIP paraarticular erosion



T2 fat sat

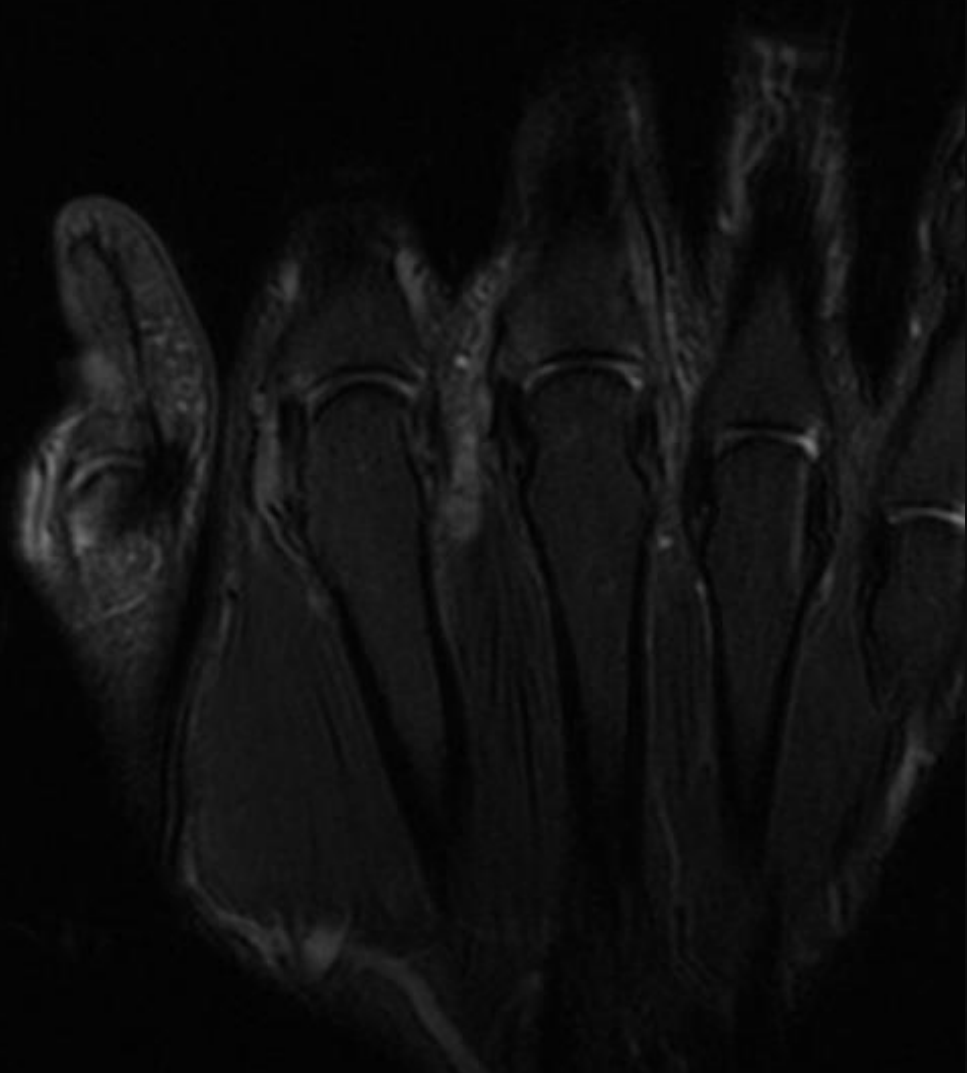
Post gad fat sat



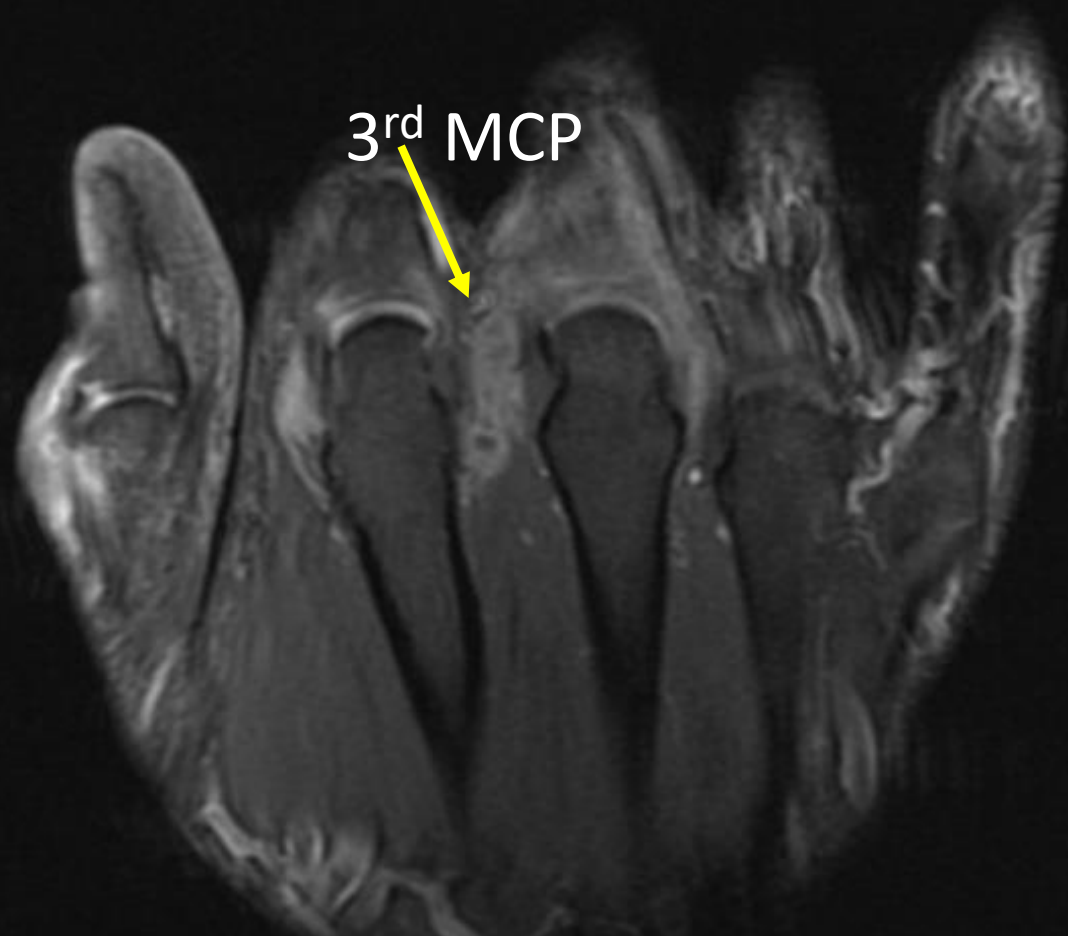
T2 fat sat



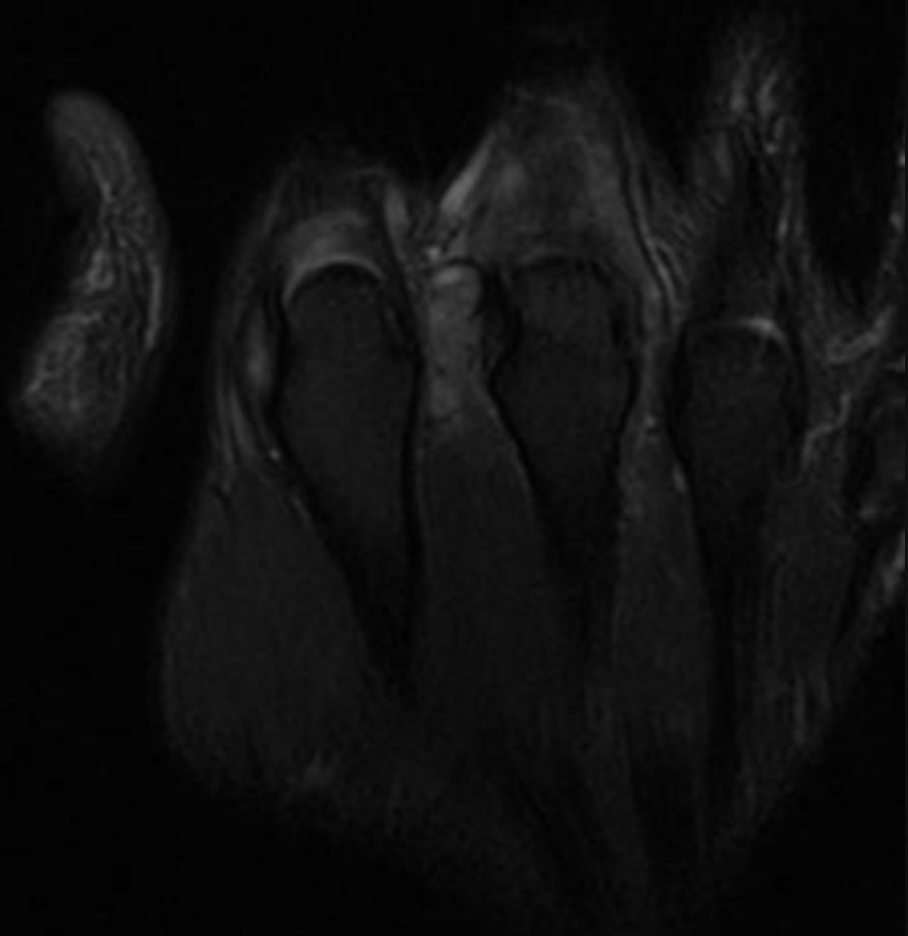
Post gad fat sat



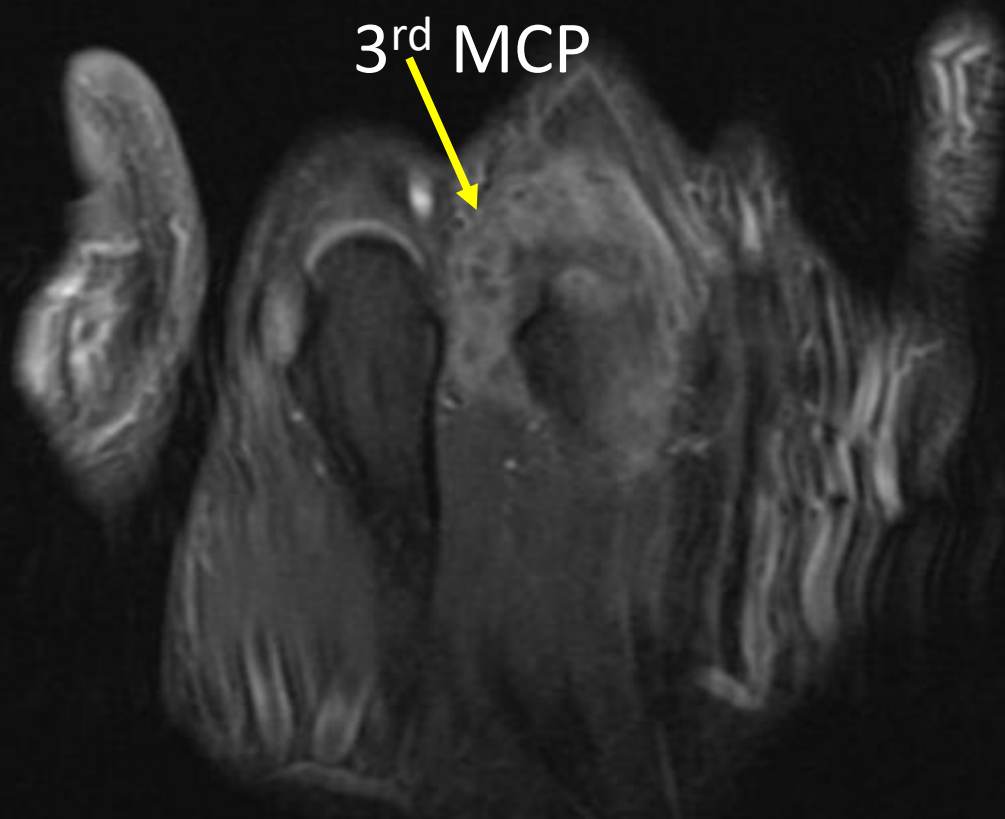
T2 fat sat



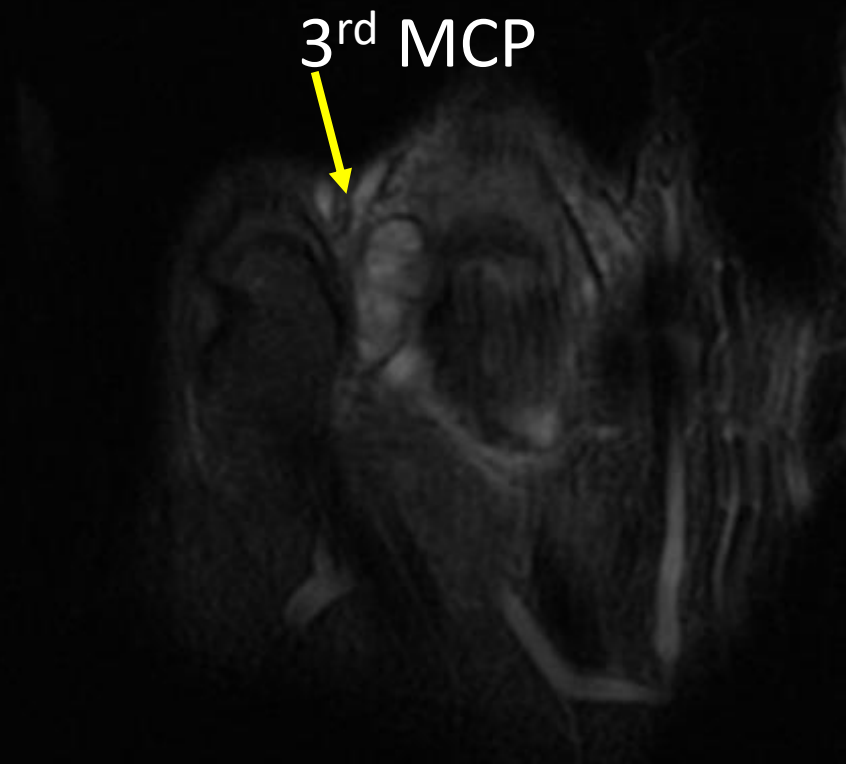
3rd MCP
Post gad fat sat



T2 fat sat

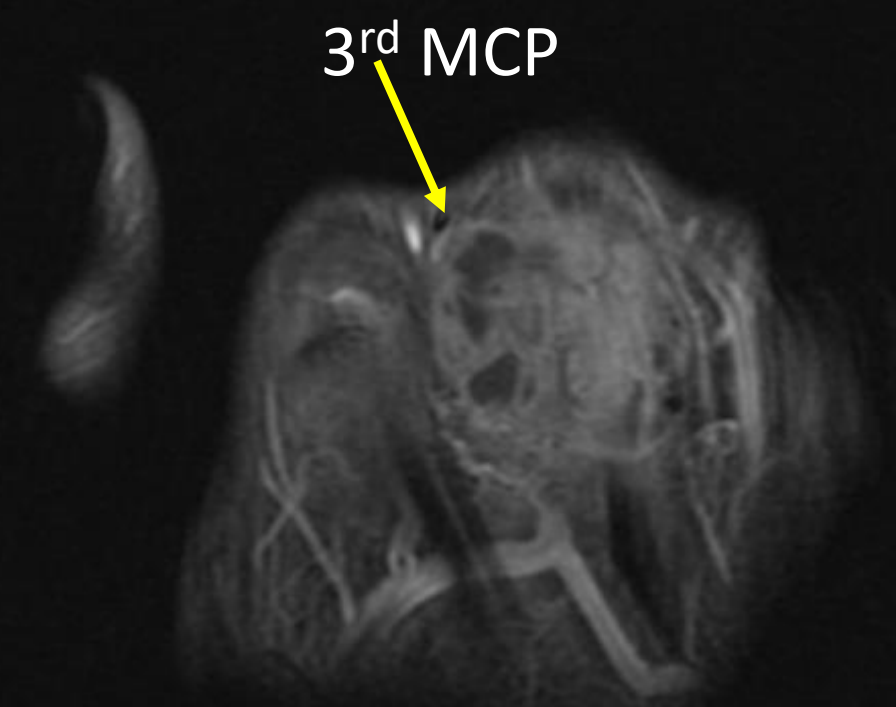


3rd MCP
Post gad fat sat



3rd MCP

T2 fat sat



3rd MCP

Post gad fat sat

3rd MCP



T2 fat sat

3rd MCP



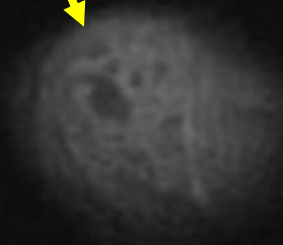
Post gad fat sat

3rd MCP

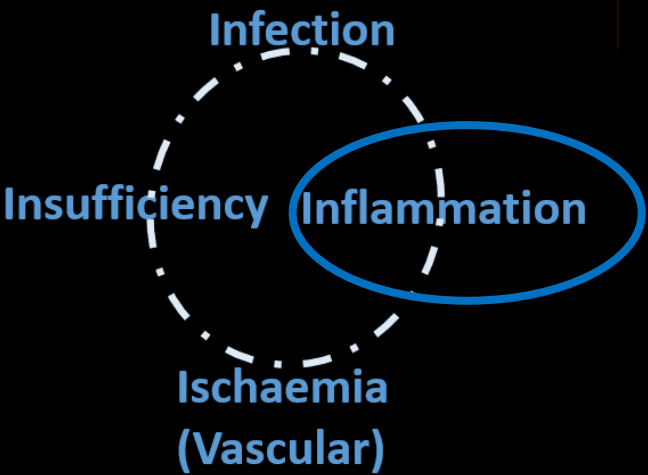


T2 fat sat

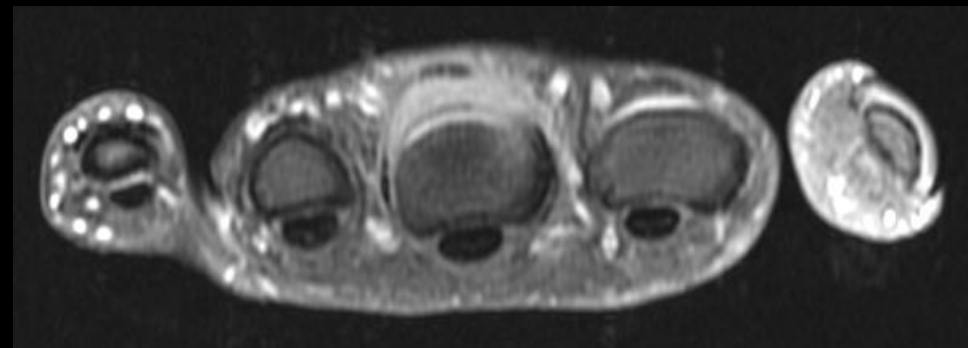
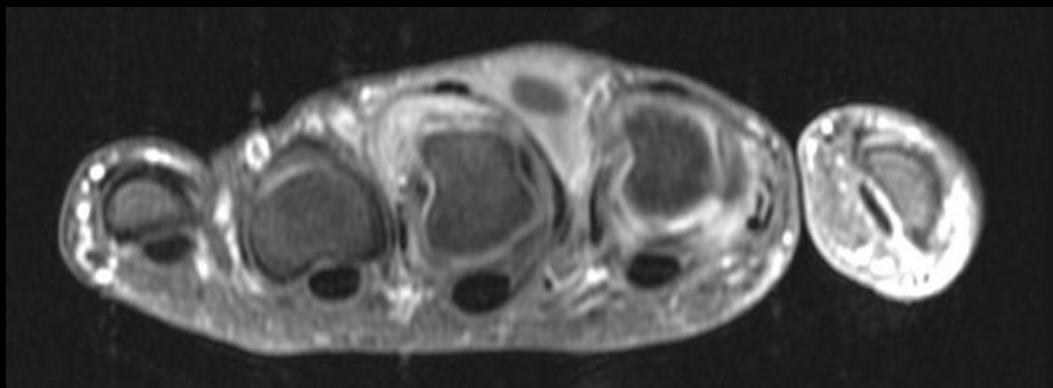
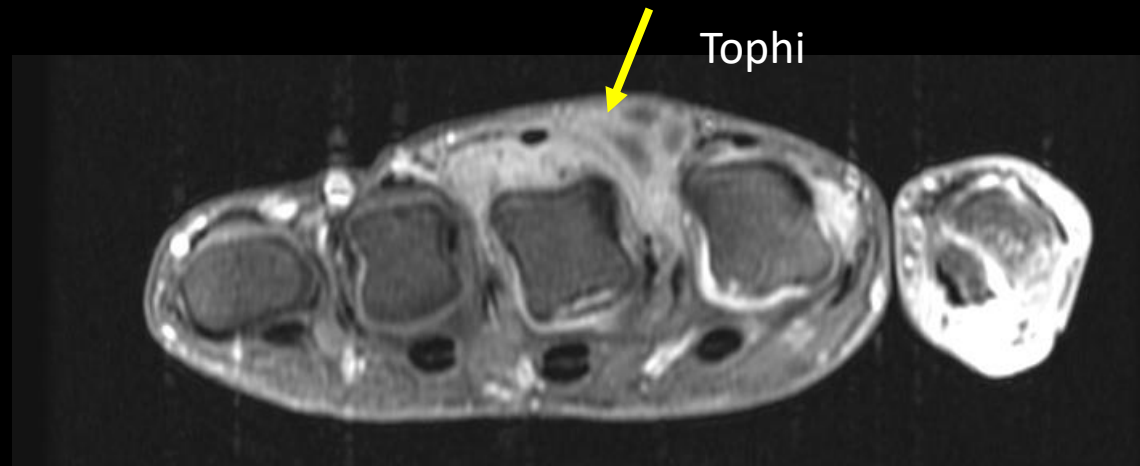
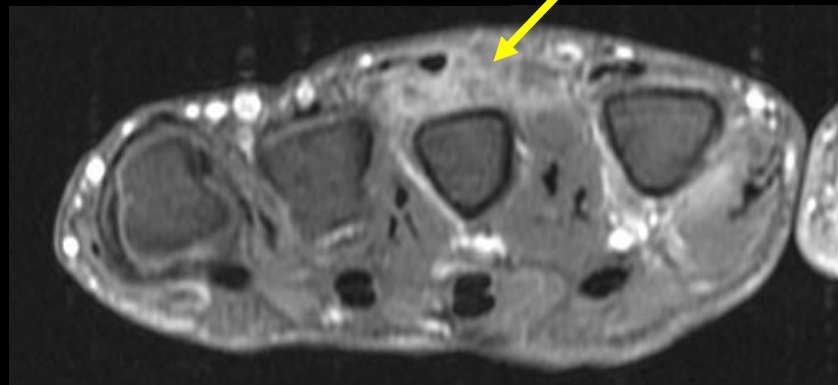
3rd MCP



Post gad fat sat



Acute tophaceous gout around 3rd MCP and extensor tendon



Post gadolinium

Acute erosion

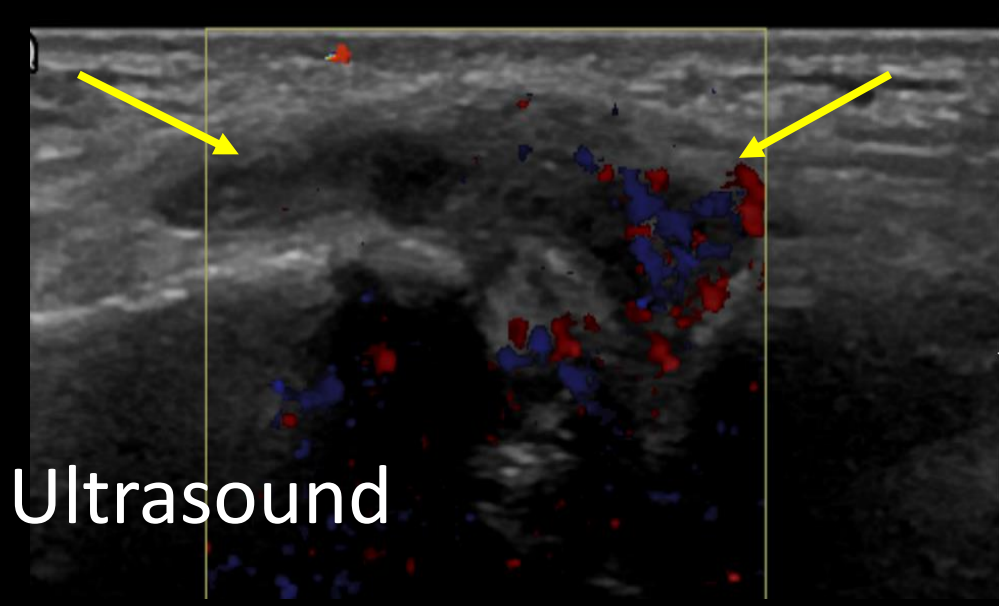
- Pain 5th MTP joint, right foot
- Recent migrant fr Africa

1st Xray



2 yrs later





MRI



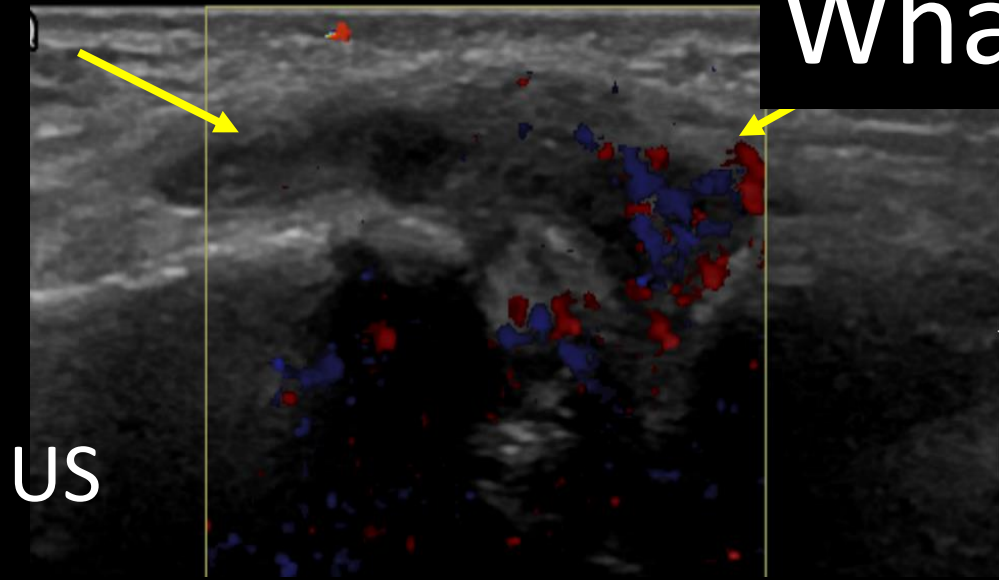
Synovitis,
Neovascularity
Erosive arthropathy

QUESTION 8

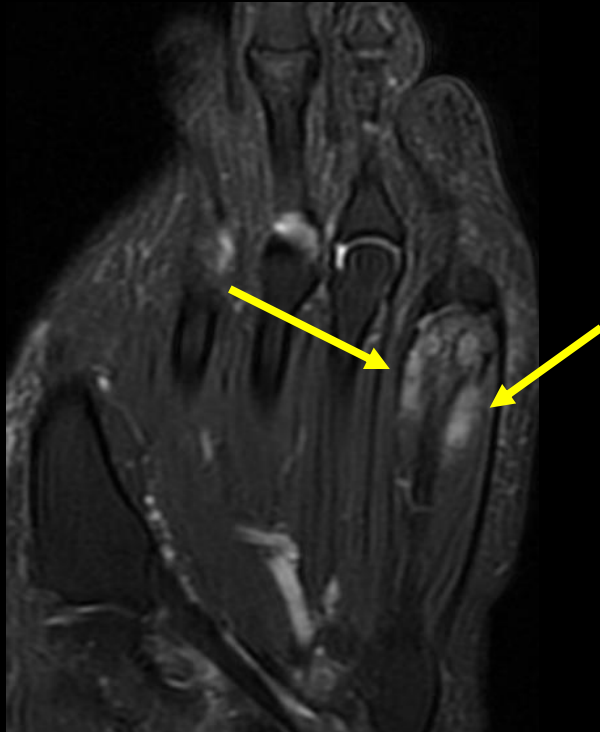
- Free voting

What is the diagnosis

What is the diagnosis? Free text

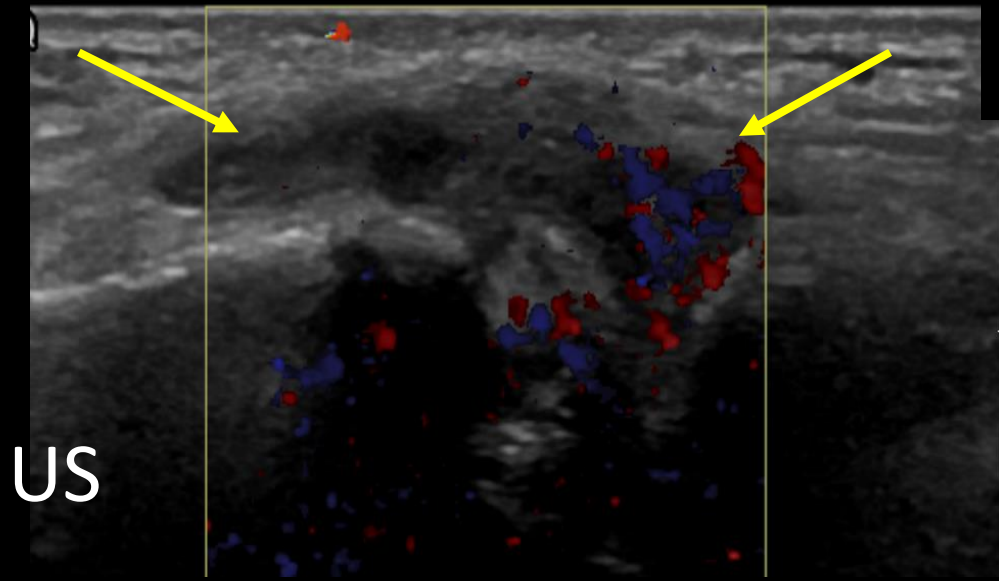


MRI

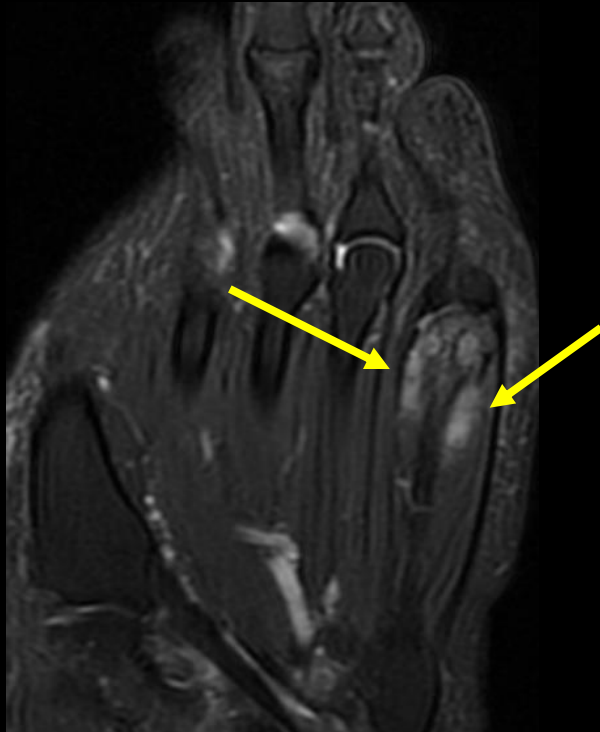


Synovitis,
Neovascularity
Erosive arthropathy

What is the diagnosis? TB

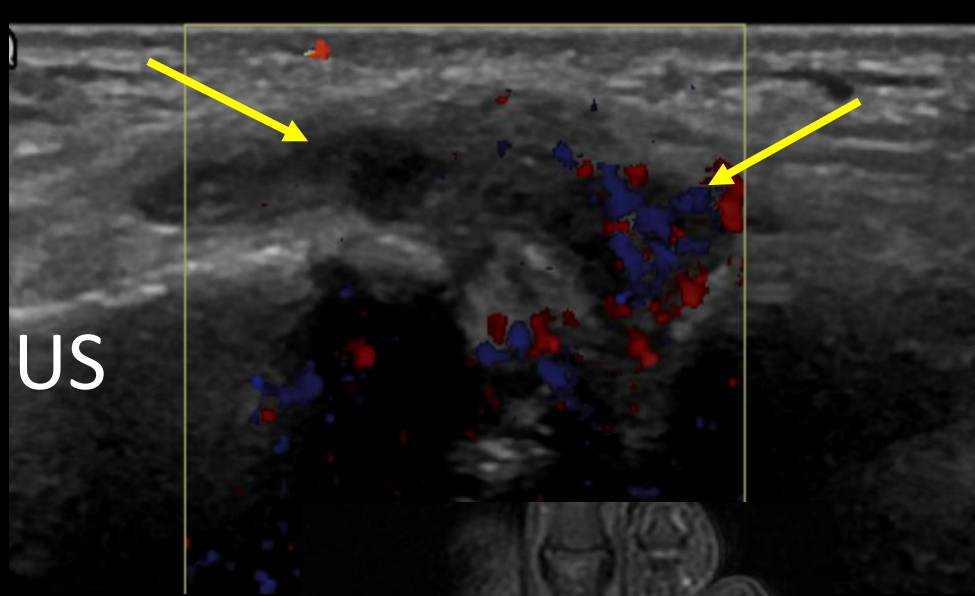


MRI

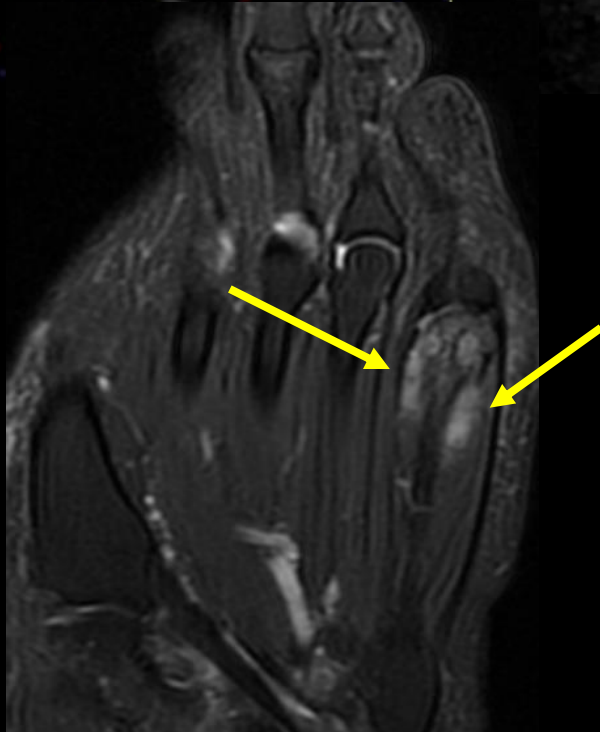


Synovitis,
Neovascularity
Erosive arthropathy

What is the diagnosis? TB



MRI



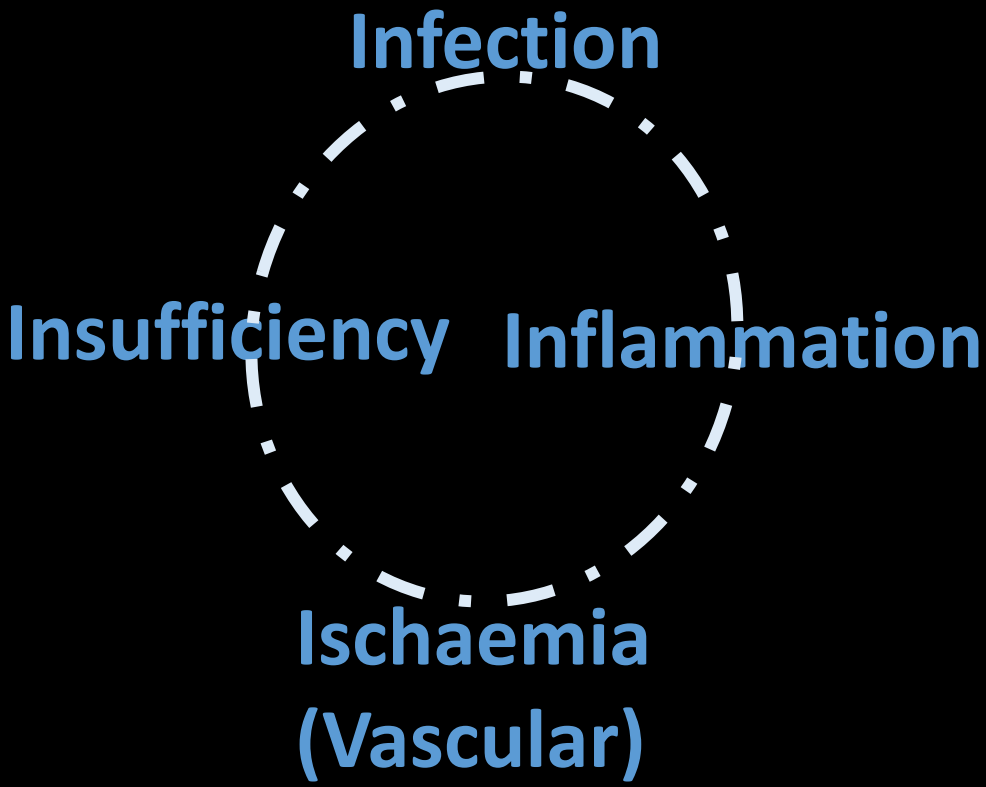
Insufficiency Inflammation

Ischaemia
(Vascular)

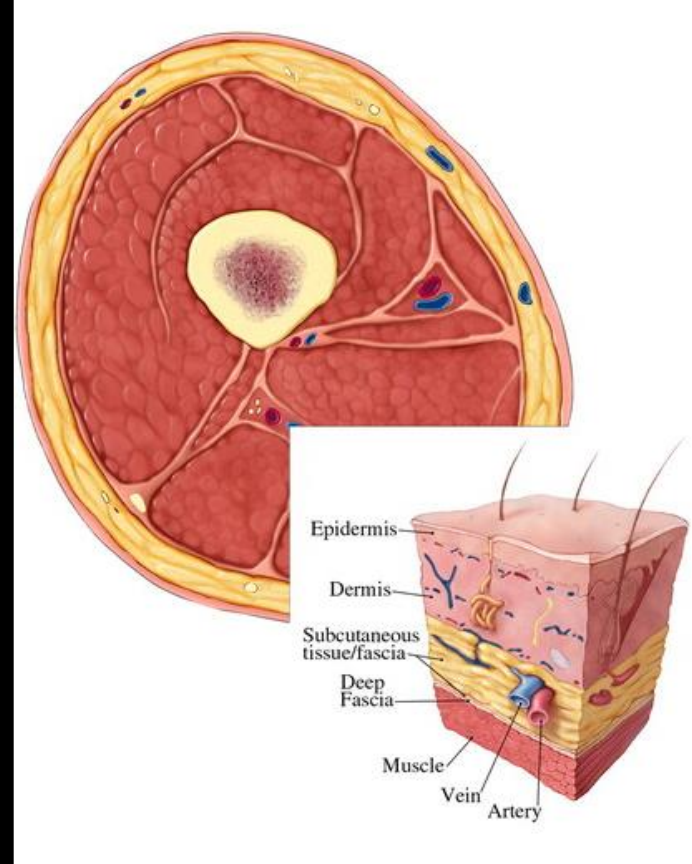
Synovitis,
Neovascularity
Erosive arthropathy

Infection

Summary: MSK Emergencies



- Non-Traumatic
- Subcutaneous
- Fascia
- Muscle
- Bone
- Joint



Remember to call





Thank You

Dr Marcela de la Hoz Polo

Dr Dimitri Amiras

Dr Syed Babar

Dr Miny Walker

Dr Lisa Meacock

Dr Anne Kinderlerer

Dr Afshin Alavi

Prof Wady Gedroyc

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Mr Nadeem Mushtaq

Mr Peter Rosenfeld

Dr Anish Raithatha

Dr Amandeep Sandhu

Dr Susan Hesni

