2ο ΘΕΡΙΝΟ ΣΧΟΛΕΙΟ ΑΚΤΙΝΟΛΟΓΙΑΣ ΜΥΟΣΚΕΛΕΤΙΚΟΥ

"BACK TO BASICS"

29 ΙΟΥΝΙΟΥ
1 ΙΟΥΛΙΟΥ
2018
ΗΡΑΚΛΕΙΟ ΚΡΗΤΗΣ
Ibis Styles Heraklion Central

Deep gluteal syndrome:

Causes, Imaging and Imaging-guided treatment

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Outline

25 min

DQS

- Anatomy
- Definition

DQS etiologies

1. fibrous/fibrovascular bands
2. piriformis muscle syndrome (PMs)
3. ischiofemoral impingement syndrome (IFIs)
4. quadratus femoris muscle pathologies
5. hamstrings' pathology
6. obturator internus/gemellus syndrome

Imaging-guided treatment options

Definition

DGS: pain in the gluteal area due to extraspinal sciatic nerve entrapment by intrapelvic or subgluteal space pathologies

- Numerous definit
  syndrome …) => c
  - Limited reports
  - DD. Piriformis m
- High sensitivity o
  entrapment often remain underdiagnosed

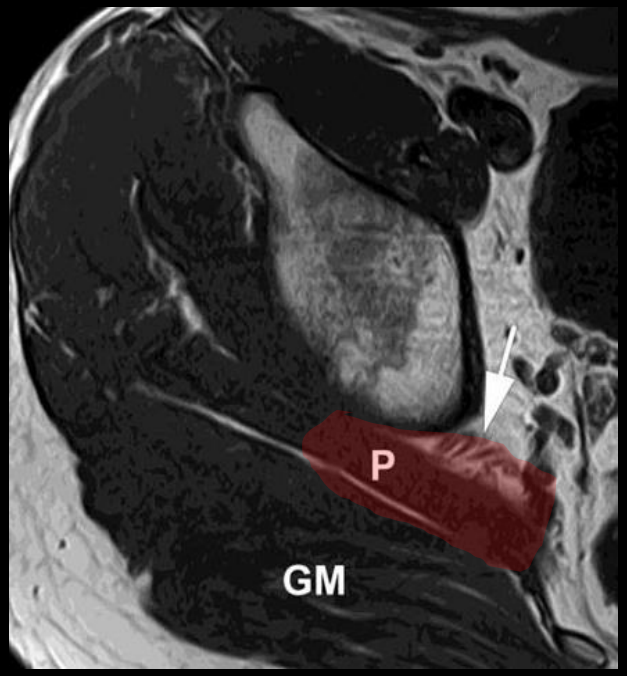
Etiologies

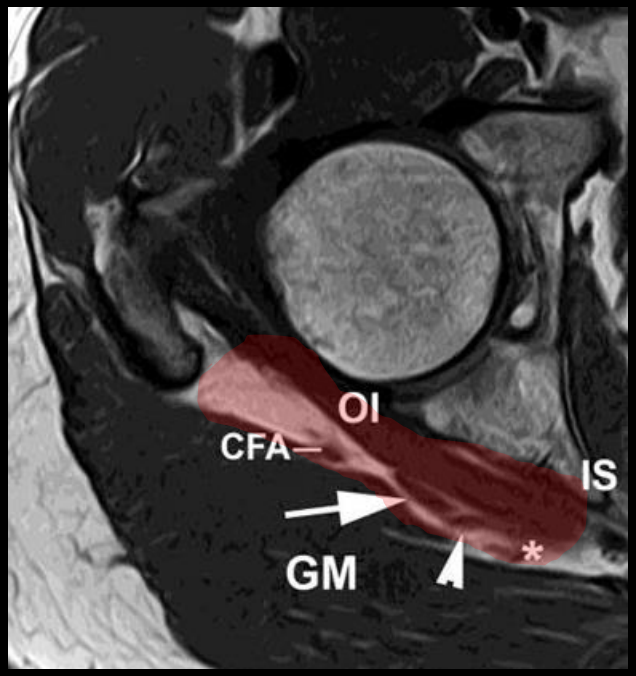
1. fibrous/fibrovascular bands
2. piriformis muscle syndrome (PMs)
3. ischiofemoral impingement syndrome (IFIs)
4. quadratus femoris muscle pathologies
5. hamstrings' conditions
6. obturator internus/gemellus syndrome
7. gluteal disorders

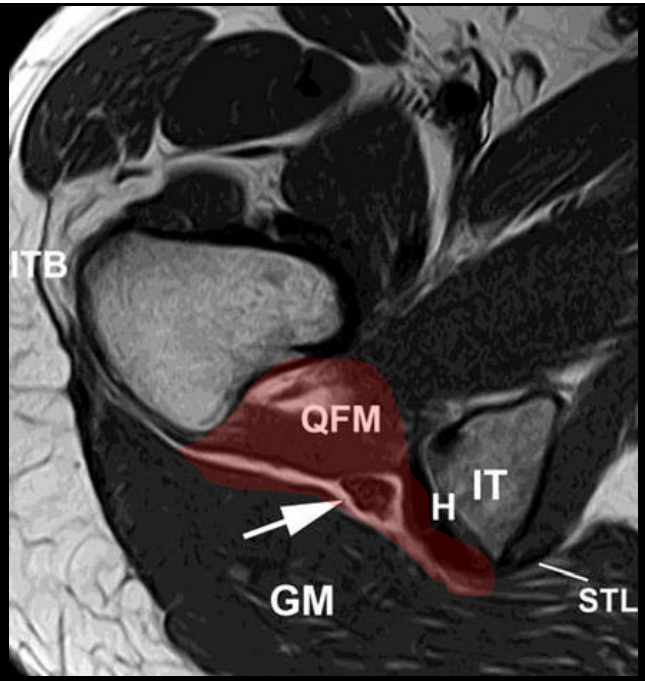
Hernando MF et al. Skeletal Radiol 2015;44:919-934

Subgluteal space

Anatomy







Cellular/fatty tissue space

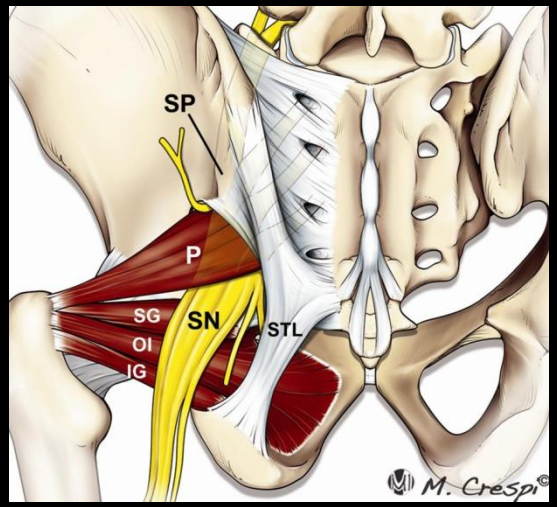
Borders

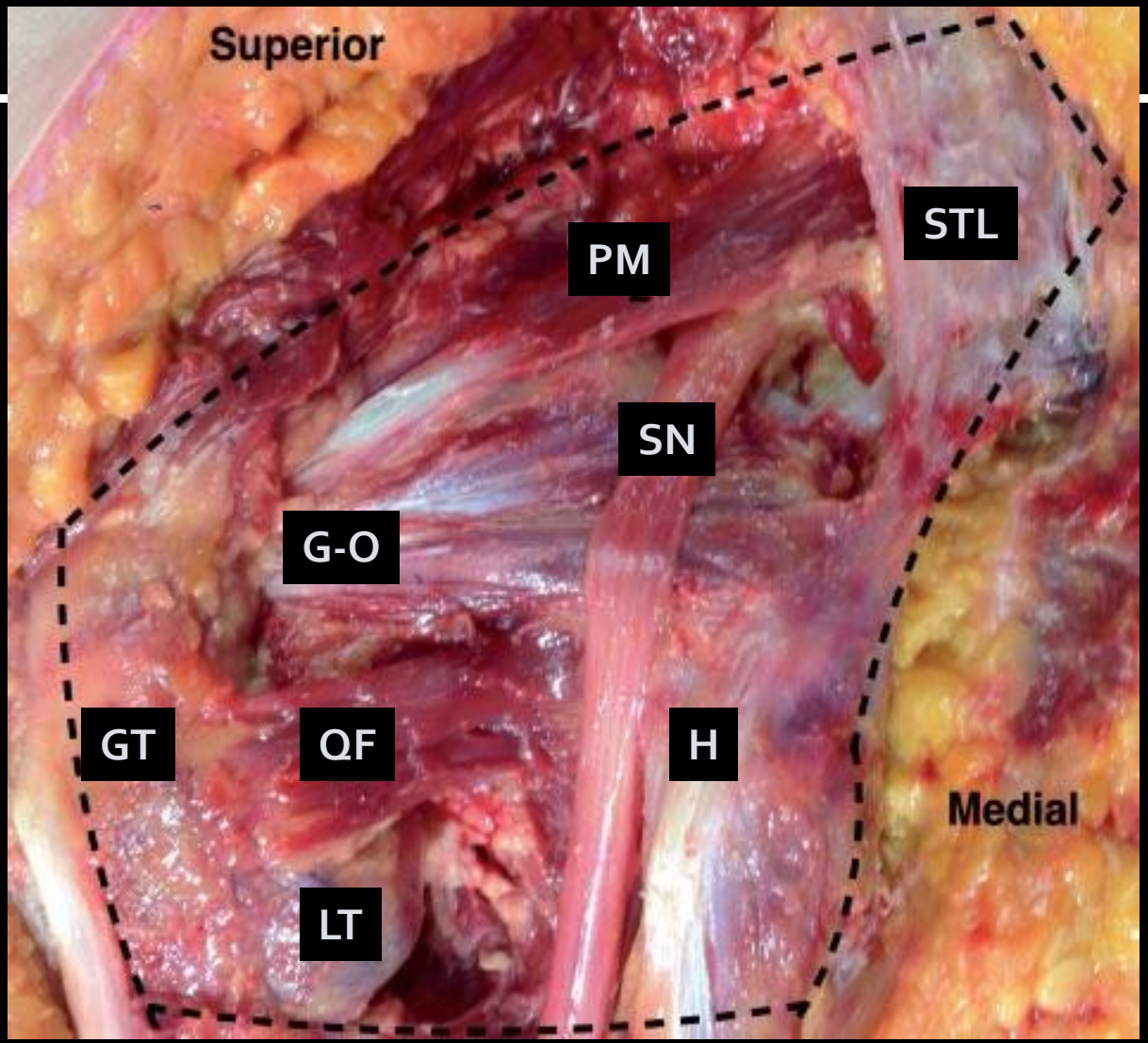
- **Superior:** inferior margin of the sciatic notch
- **Inferior:** origin of hamstrings
- **Posterior:** gluteus maximus muscle
- **Anterior:** posterior acetabulum, hip joint capsule, proximal femur
- **Lateral:** lateral fusion of middle/deep gluteal aponeurosis
- **Medial:** sacrotuberous ligament

Hernando MF et al. Skeletal Radiol 2015;44:919-934

Subgluteal space

Anatomy





Martin HD et al. Knee Surg Sports Traumatol Arthrosc. 2014;22:882-8

DGS etiology

1. Fibrous and fibrovascular bands

- Frequently missed diagnosis !
  - endoscopic hip procedures
  - anatomy

Diminish sciatic nerve mobility during hip and knee movements:
ischemic neuropathy

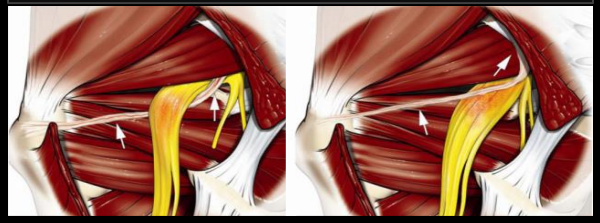
Macroscopic structure
- fibrovascular
- pure fibrous
- pure vascular

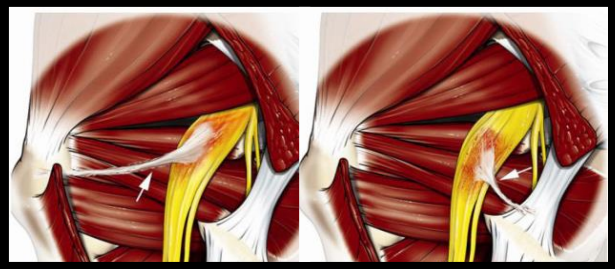
Location
- proximal
- middle
- distal

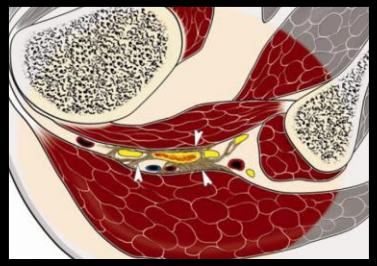
Martin HD et al. Arthroscopy 2011;27:172-81
Martin HD et al. Knee Surg Sports Traumatol Arthrosc. 2014;22:882-8

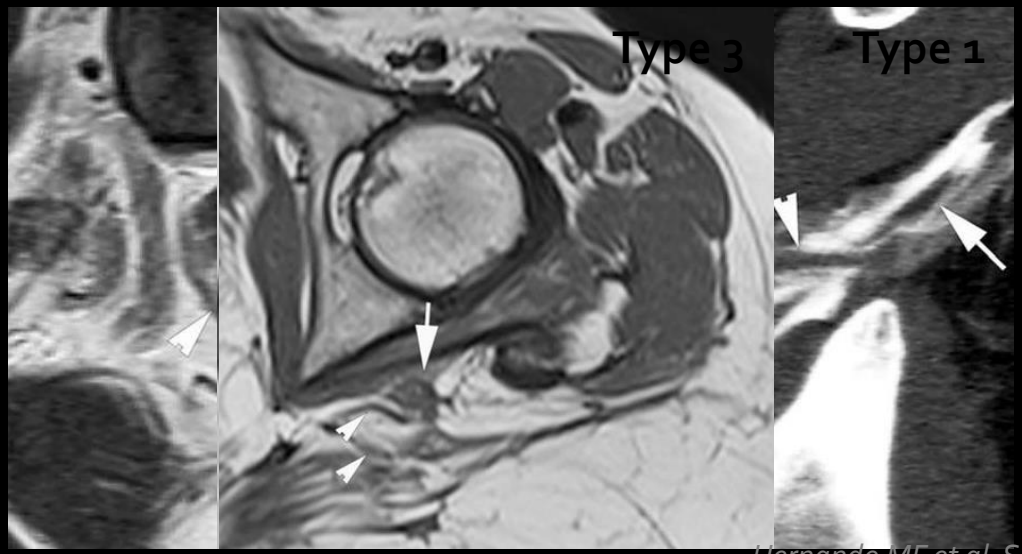
Fibrous and fibrovascular bands
Pathogenic mechanism

Compressive	**Adhesive**	**Undefined distribution**
Compress the nerve Origin: GT Insertions: variable	Ancor nerve on single site Origin: GT, sacrospinous ligament	Ancor nerve at multiple sites







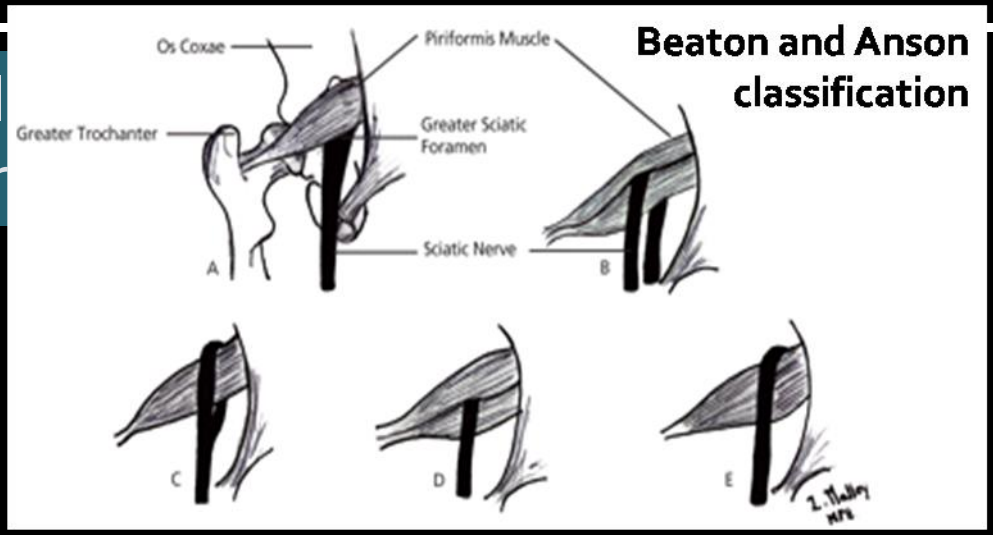


Hernando MF et al. Skeletal Radiol 2015;44:919-934
Martin HD et al. Knee Surg Sports Traumatol Arthrosc. 2014;22:882-8

DGS etiology

2. Piriformis muscle syndrome

Sciatic nerve irritation at the l
pirifor



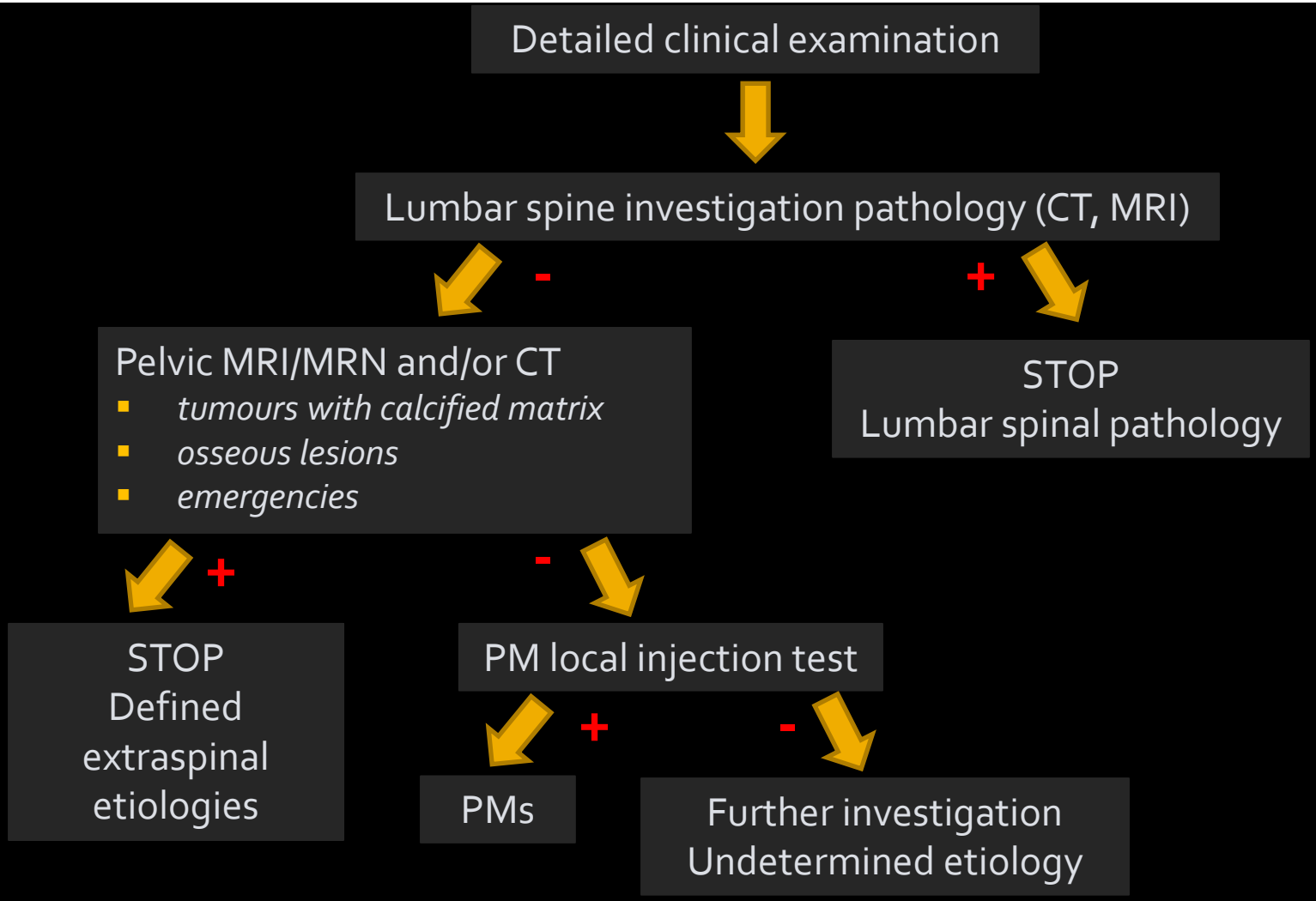
- Underdiagnosed
- Low clinical suspicion

- Primary/secondary causes
  - Primary: all intrinsic PM pathology
    - SN-PM anatomical variations
    - PM myositis, trauma, enlargement
  - Secondary: conditions related to sciatic neuropathy at the greater sciatic foramen
    - space occupying lesions (neoplastic, traumatic, infectious…)
    - inflammatory changes

Vassalou EE et al. Eur Radiol 2018;28:447-458
Hernando MF et al. Skeletal Radiol 2015;44:919-934
Windisch G et al. Surg Radiol Anat 2007;29:37-45

Piriformis muscle syndrome

Proposed diagnostic algorithm

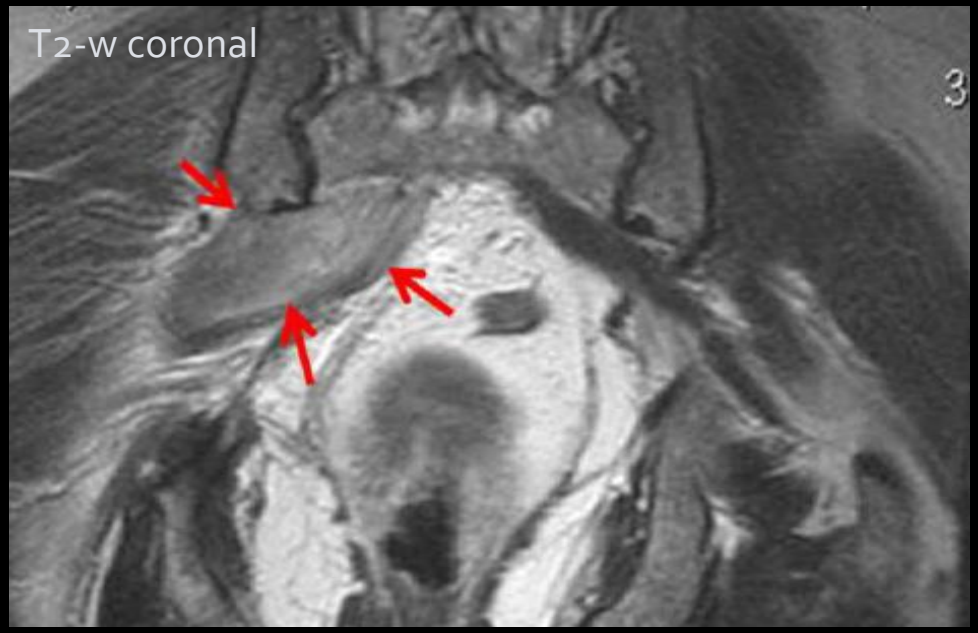


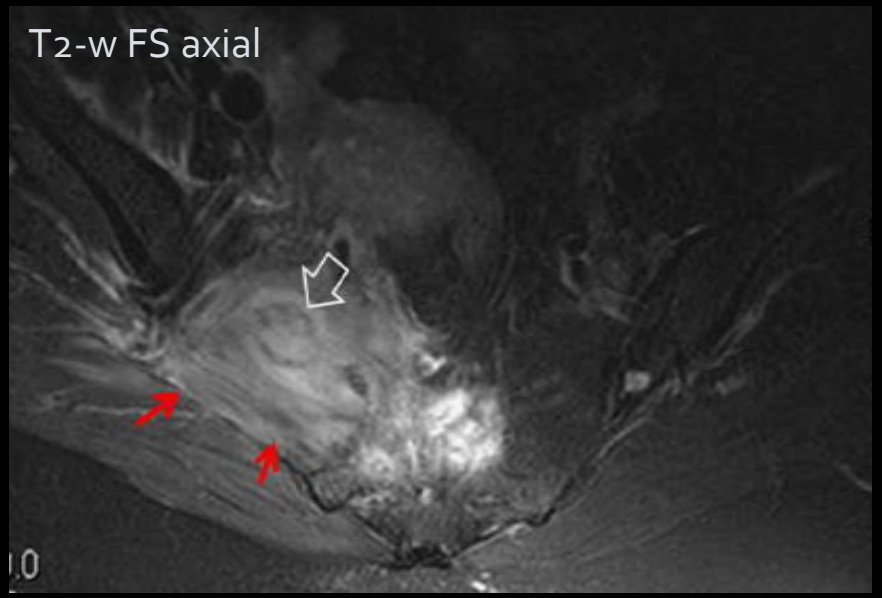
Vassalou EE et al. Eur Radiol 2018;28:447-458
Vassalou EE et al. Eur Radiol 2018; in press

Piriformis muscle syndrome
MRI

- Role
  - 64% of patients: identify underlying pathologies related to PMs
  - 46% of patients: reveal unsuspected underlying medical condition, alter treatment planning
- Findings
  - PM enlargement
  - PM signal alterations
  - Sciatic neuropathy
  - Underlying etiologies

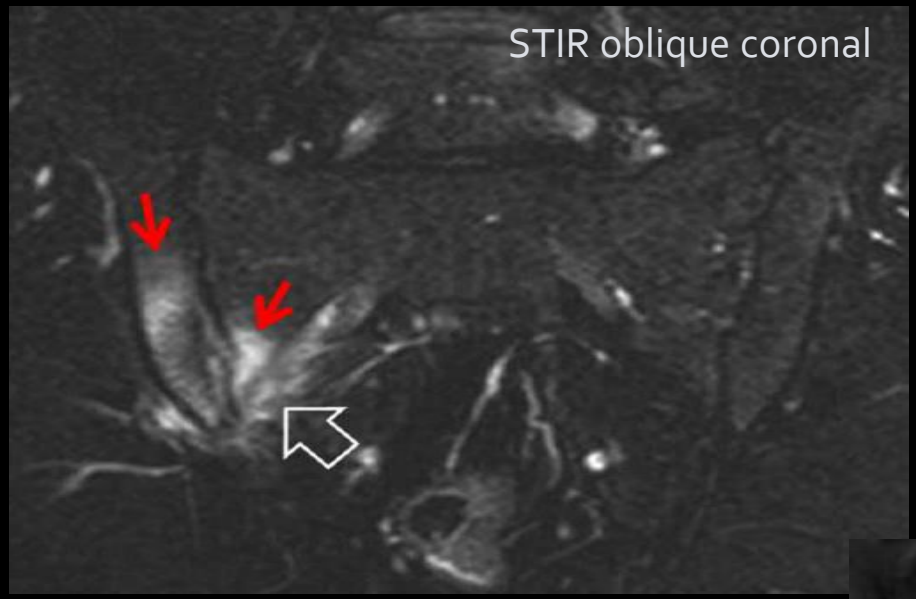
Vassalou EE et al. Eur Radiol 2018;28:447-458
Filler AG et al. J Neurosurg Spine 2005;2:99-115
Lewis AM et al. Arch Neurol 2006;63:1469-72
Pecina HI et al. Skeletal Radiol 2008;37:1019-23

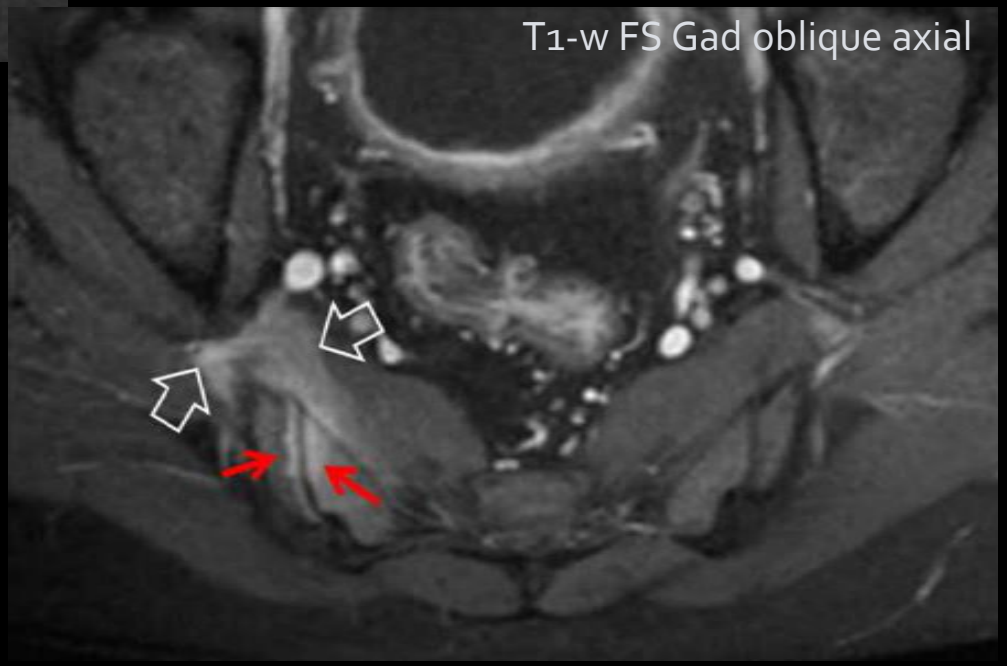




Male, 65y, Blood culture: Staph. aureus
Diagnosis: PMs due to QF muscle pyomyositis/abscess

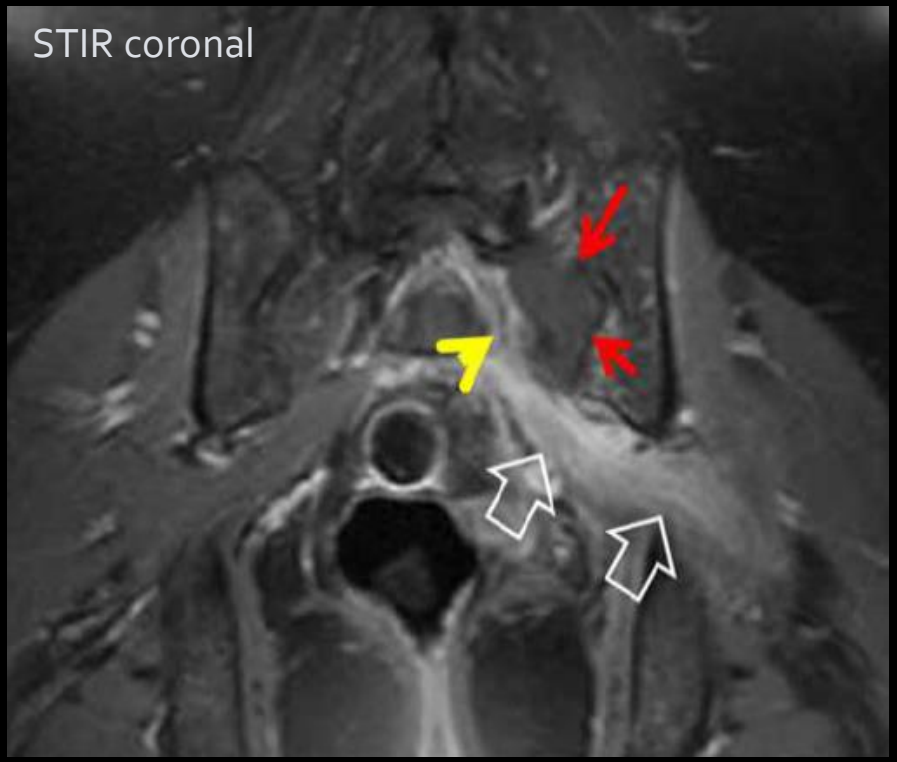
Vassalou EE et al. Eur Radiol 2018;28:447-458

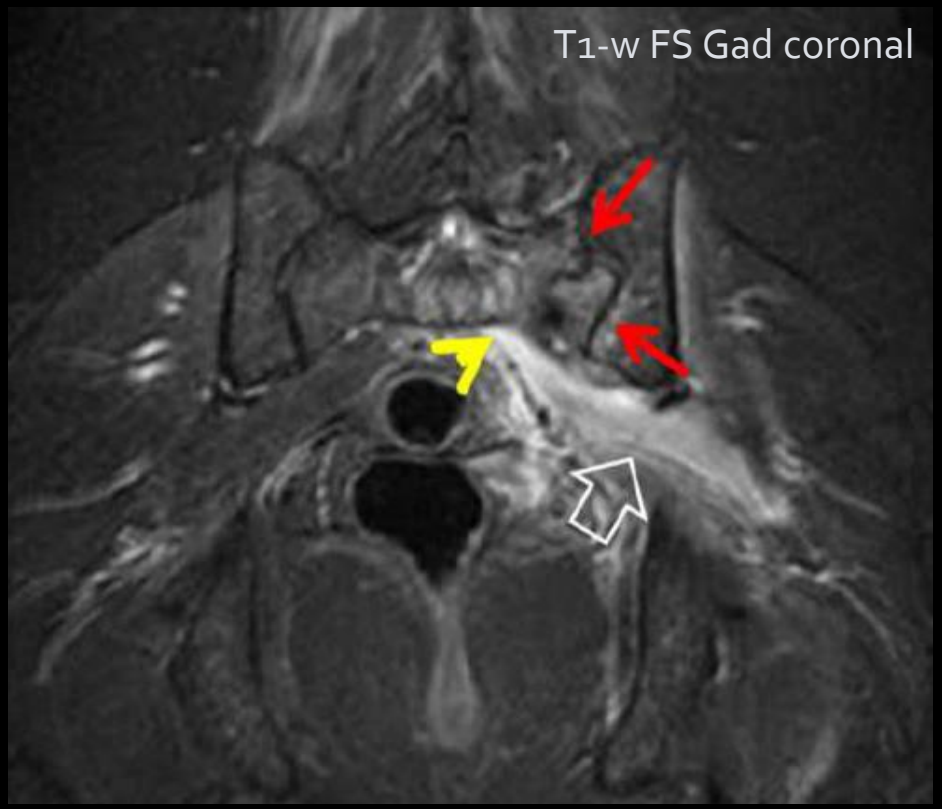




Male, 22y, 8-month RT deep gluteal pain
Diagnosis: axial SPA

Vassalou EE et al. Eur Radiol 2018;28:447-458





Female, 47y, SSLC, breast carcinoma, LT sciatica
Diagnosis: sacral met + SN/PM neoplastic infiltration

Vassalou EE et al. Eur Radiol 2018;28:447-458

DGS etiology

3. Ischiofemoral impingement syndrome

Hip, buttock or inguinal pain due to restriction of IFS

- Bilateral 25-40%
- Females

Causes

- congenital
- acquired
- positional

- Clinical tests: non-specific

MRI

! MRI standardized protocol

! IFS narrowing, QF muscle edema may be seen in asymptomatics

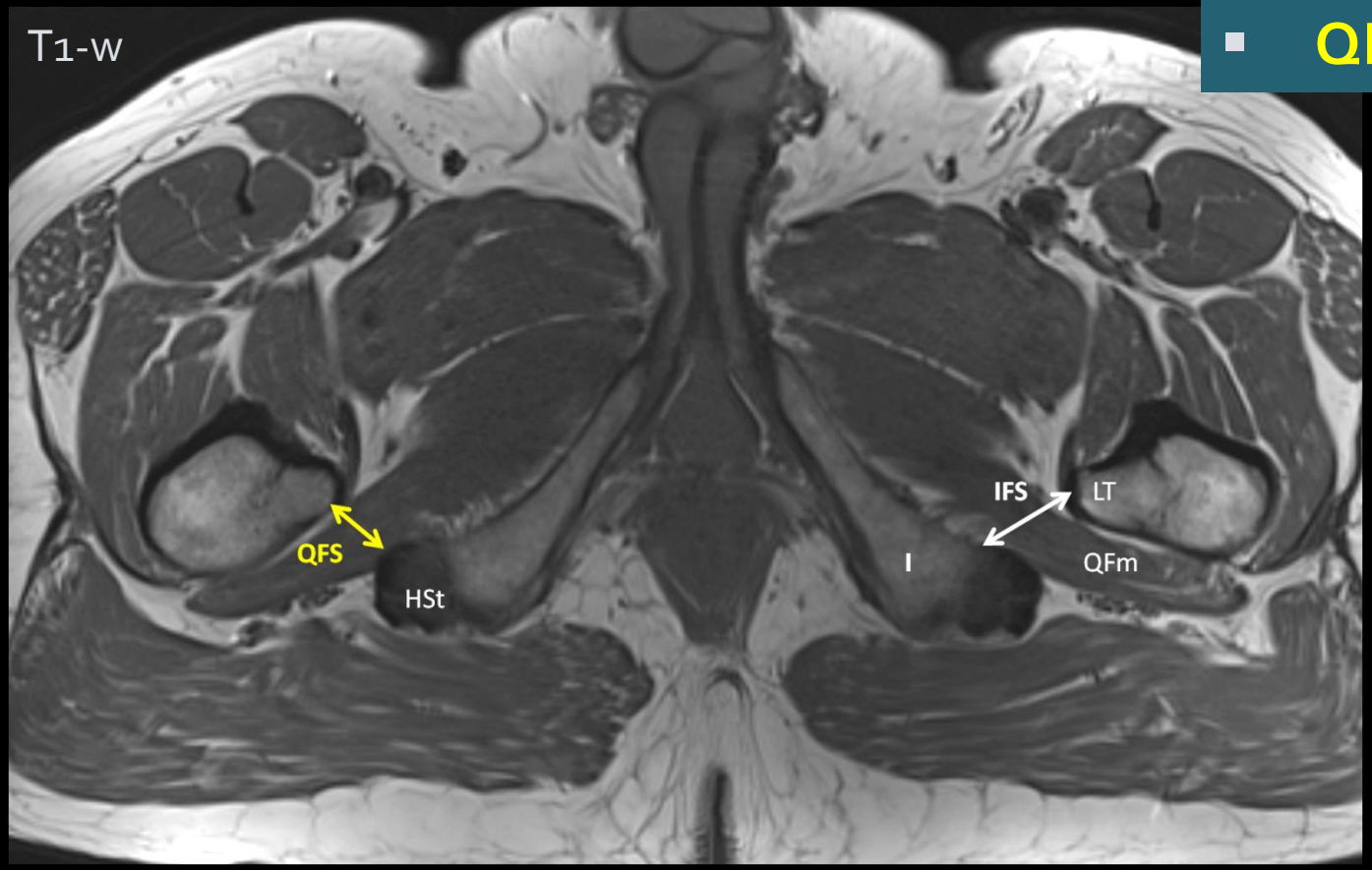
Maraş Özdemir Z et al. Eur Radiol 2015;25:2246-53
Torriani M et al. AJR Am J Roentgenol 2009;193:186-90
Tosun O et al. Skeletal Radiol 2012;41:575-87

Ischiofemoral impingement syndrome

MRI

1. IFS/QFS restriction

- IFS > 17 mm
- QFS > 8 mm



Vassalou EE et al. Hell J Radiol 2018; in press

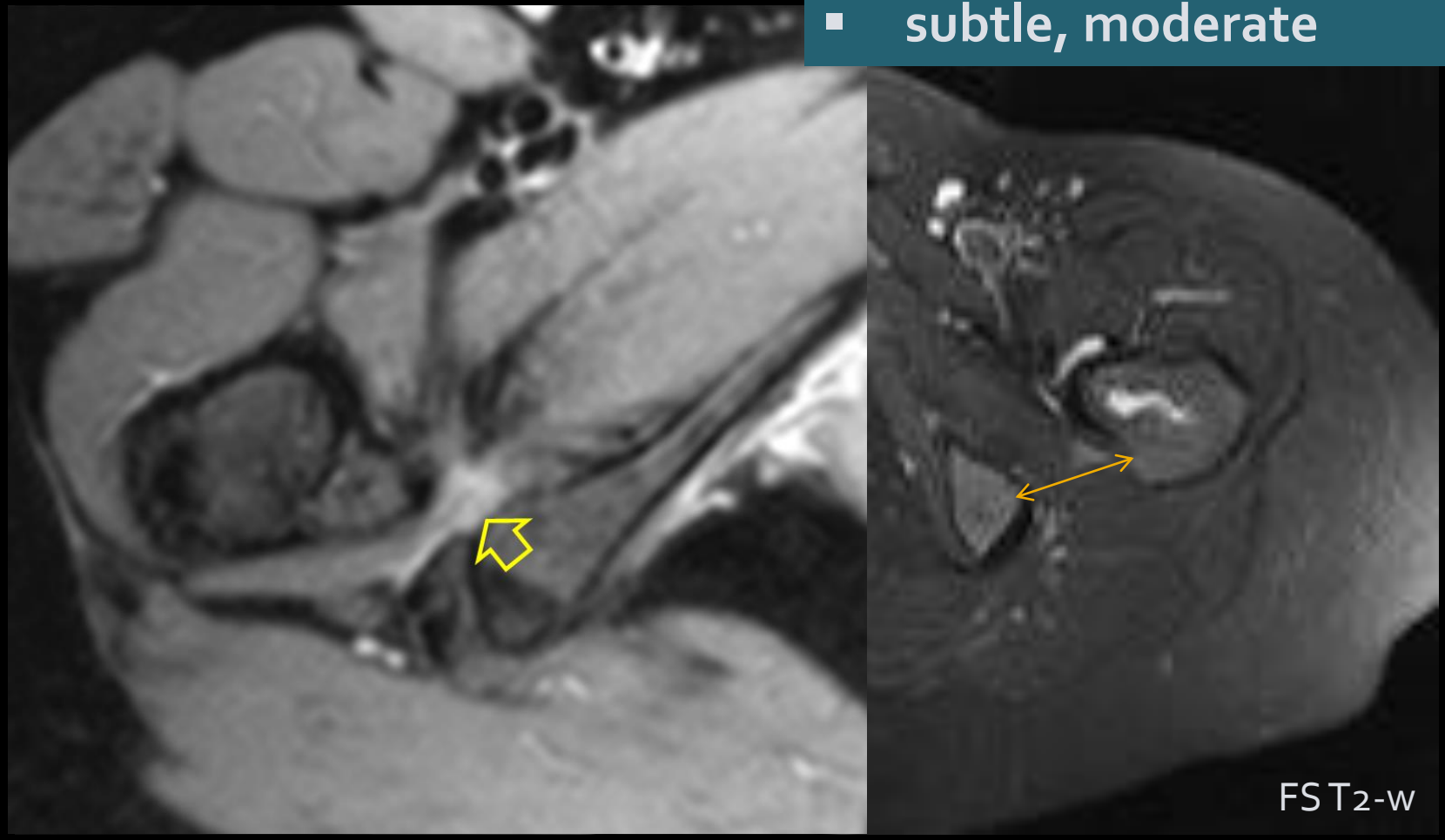
Torriani M et al. AJR Am J Roentgenol 2009;193:186-90

Ischiofemoral impingement syndrome

MRI

2. QFm edema (muscle belly)

- subtle, moderate



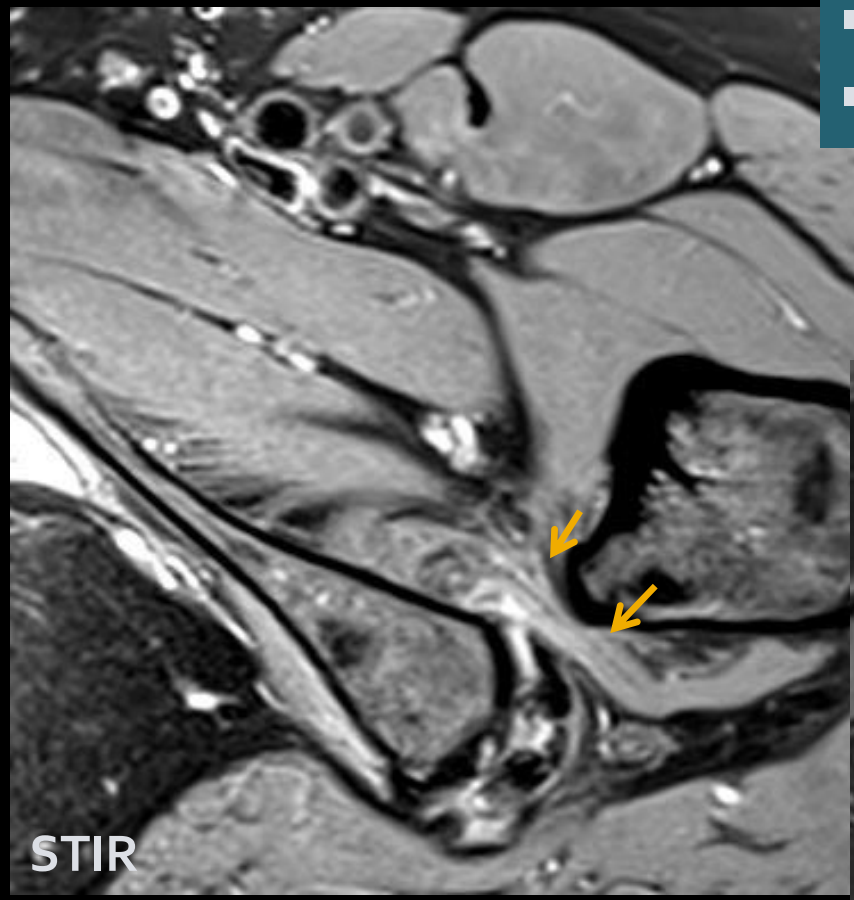
Kassarjian A et al. AJR Am J Roentgenol 2011;197:170-4
Vassalou EE et al. Hell J Radiol 2018; in press

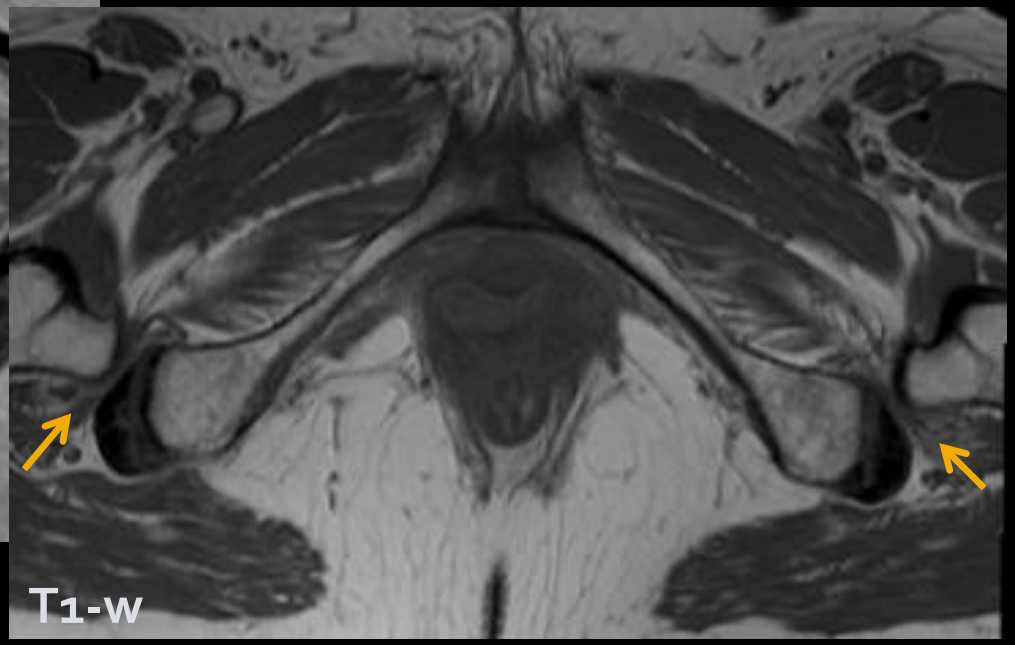
Ischiofemoral impingement syndrome

MRI

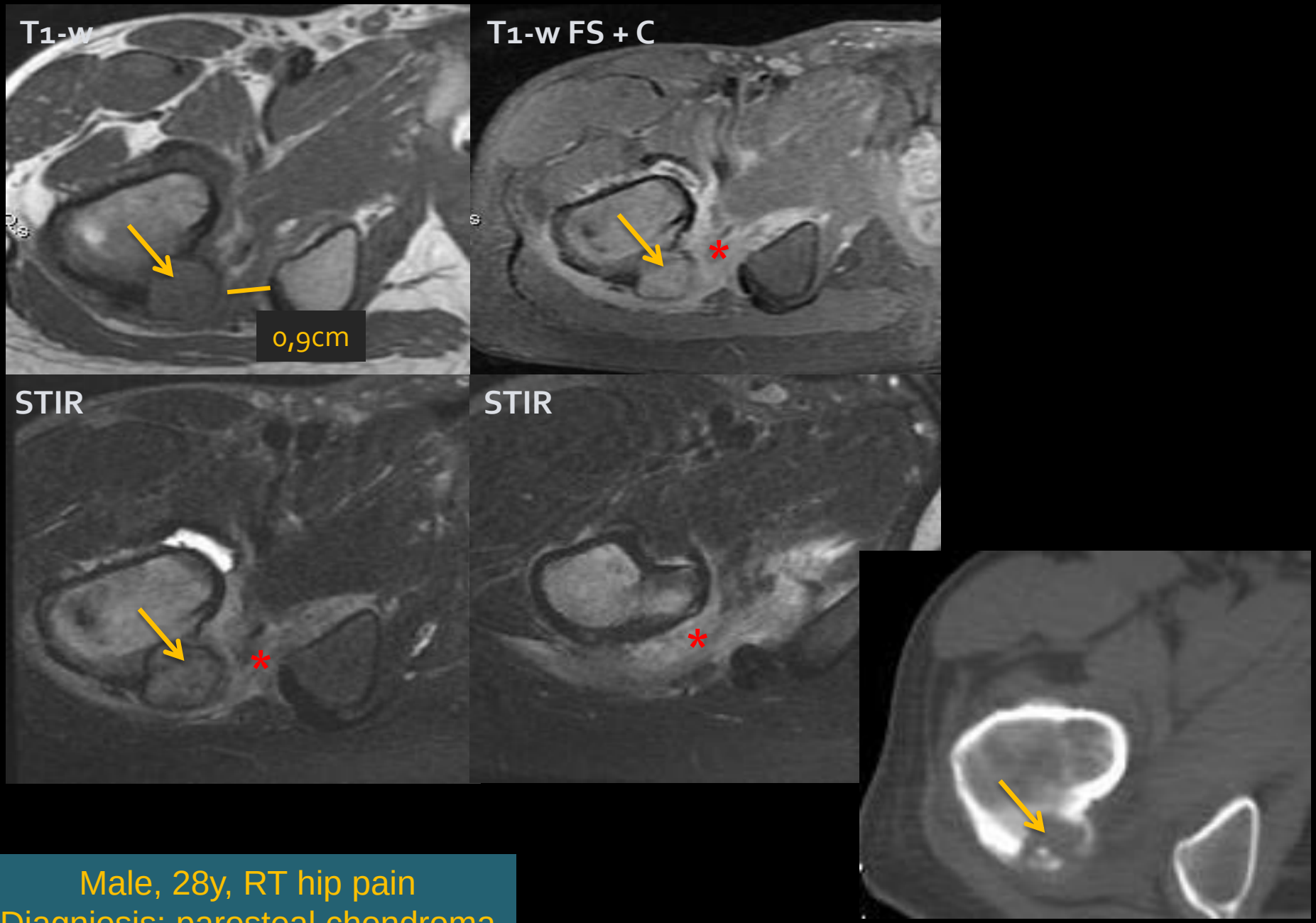
3. Crowded QFm fibers configuration

- T1-w
- FS PD-w/T2-w/STIR images





Kassarjian A et al. AJR Am J Roentgenol 2011;197:170-4
Vassalou EE et al. Hell J Radiol 2018; in press



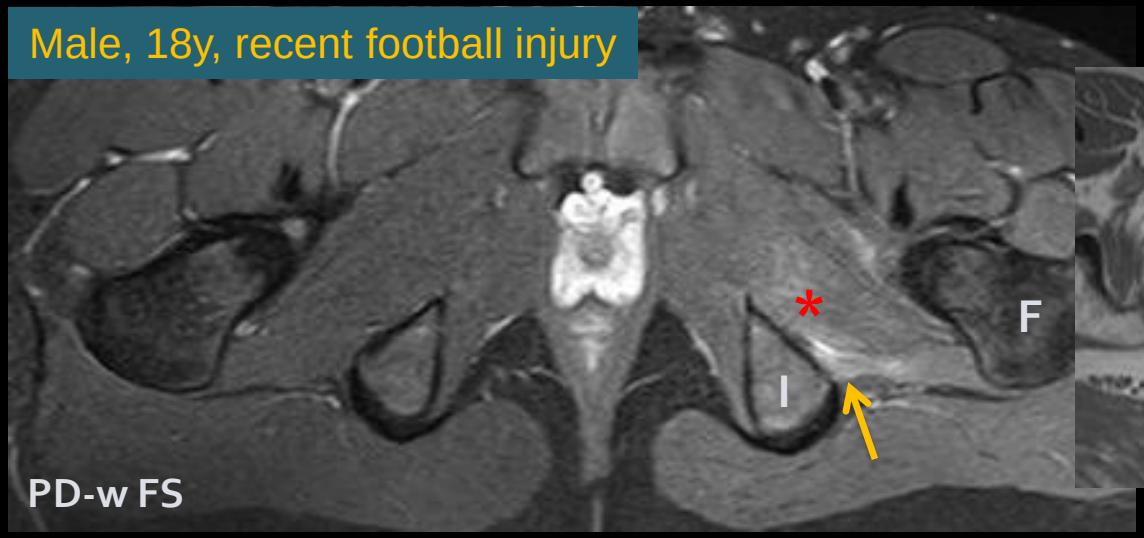
Male, 28y, RT hip pain
Diagniosis: parosteal chondroma

DGS etiology

4. QF muscle tear/other pathologies

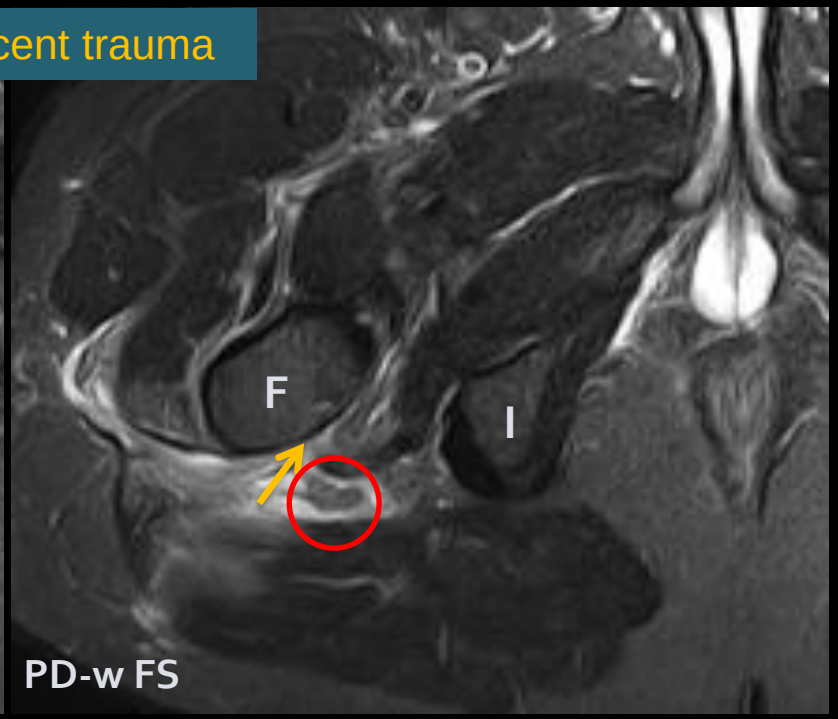
- Infrequently reported in the literature
- Tear
  - strain, grade II, grade III
- Exercise-induced edema
- Others
  - neoplastic disorders
  - myositis ossificans
- MRI findings: do not differ significantly, usually subtle
  - careful analysis of muscular involvement pattern
  - detailed assessment of myotendinous junction

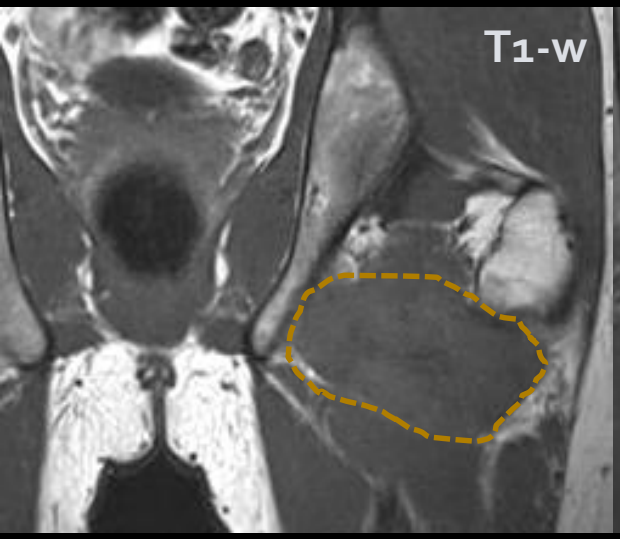
Kassarjian A et al. AJR Am J Roentgenol 2011;197:170-4
Vassalou EE et al. Hell J Radiol 2018; in press

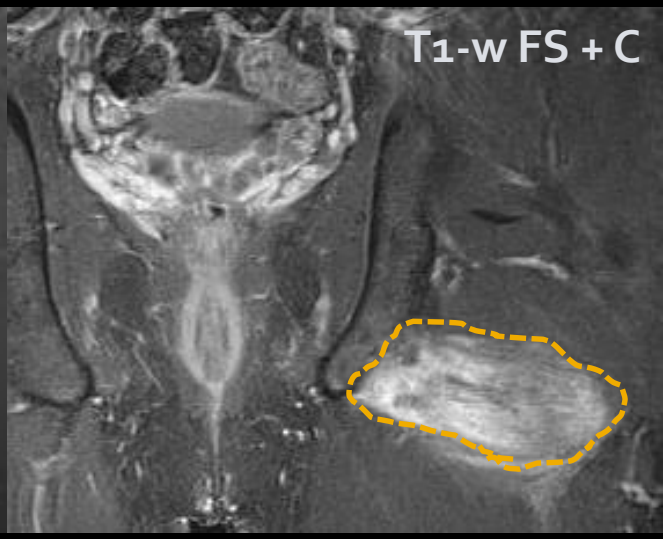

Male, 18y, recent football injury
*
F
I
PD-w FS

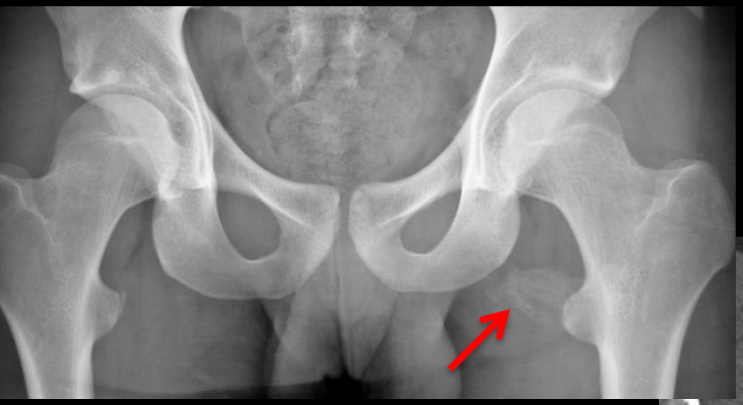

Chronic QF muscle tear
?

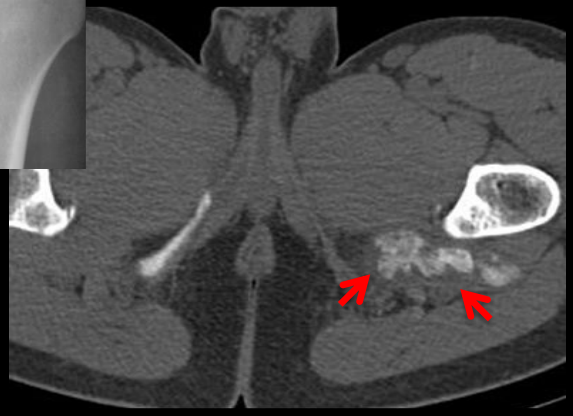

Male, 41y, recent trauma
F
I
PD-w FS


F
I
PD-w FS









Male, 20y football injury since 8w, LT gluteal pain
Diagnosis: QF muscle myositis ossificans

Courtesy: Prof. Apostolos Karantanas

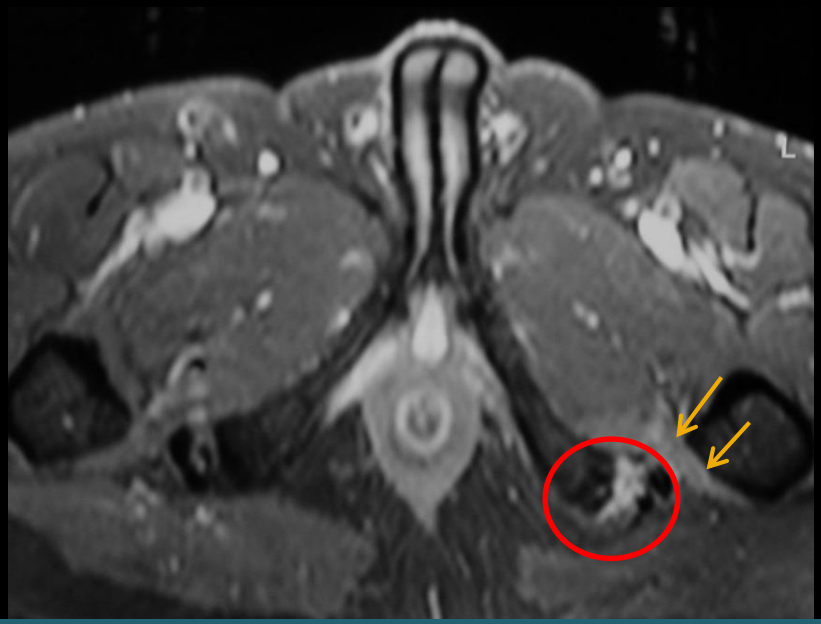
DGS etiology

5. Hamstrings' pathology

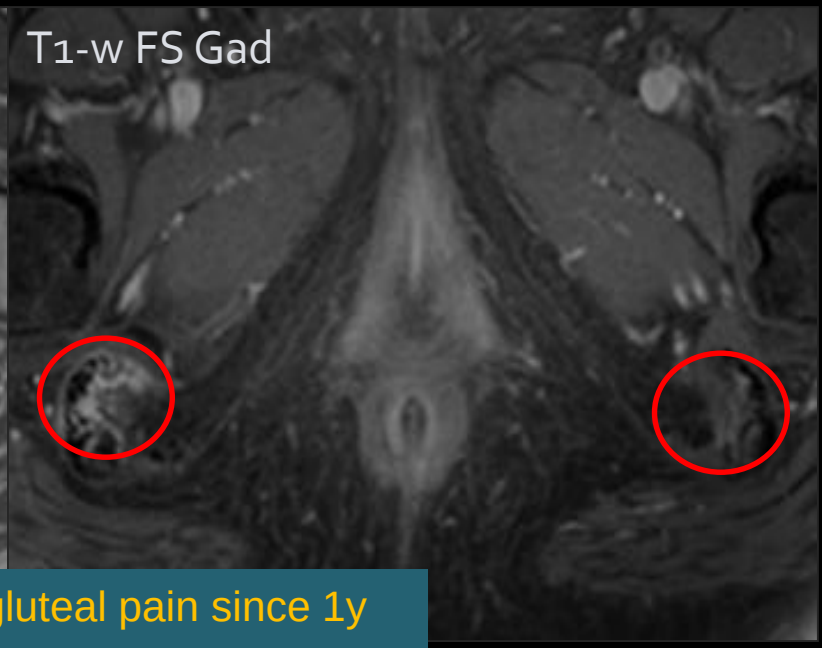
- Various pathologies
  - tendinosis
  - apophysitis
  - partial/complete tear
  - avulsion
  - calcifying tendinopathy

- May be related to sciatic neuropathy:
  - ✓ Acute injury: edema irritates nerve
  - ✓ Chronic injury: scarring, entrapment/impingement syndrome

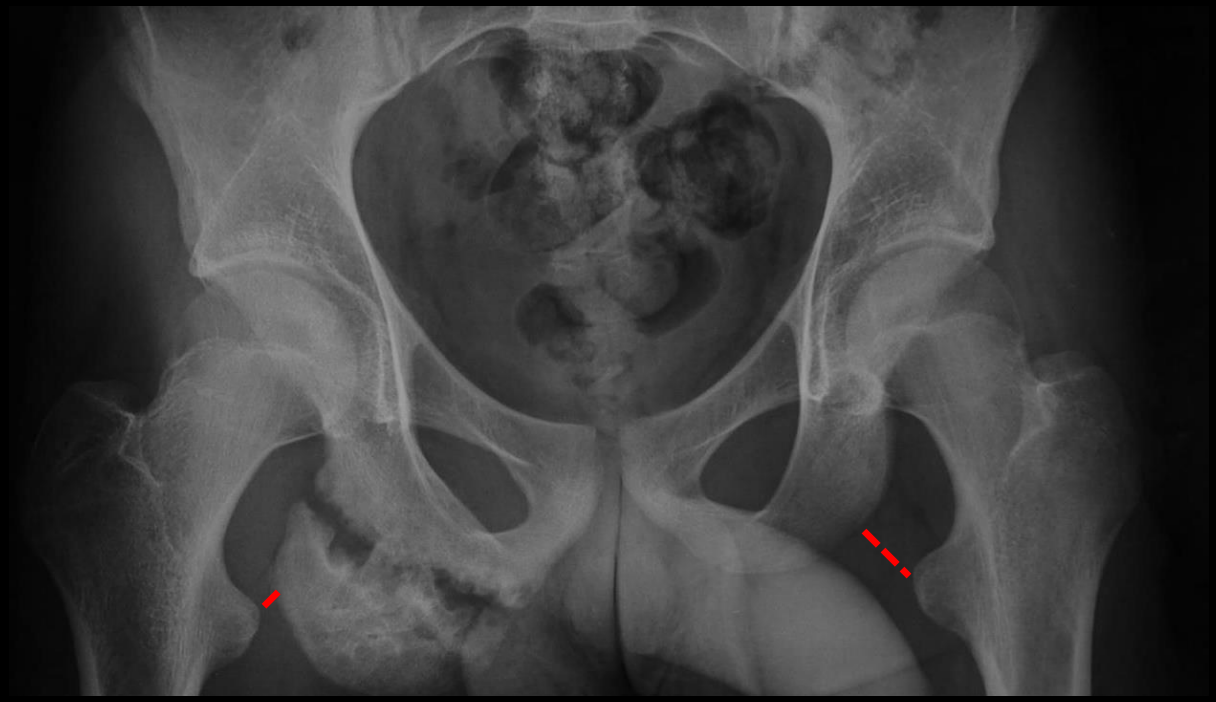
Bucknor MD et al. J Neurosurg 2014;121:408-14

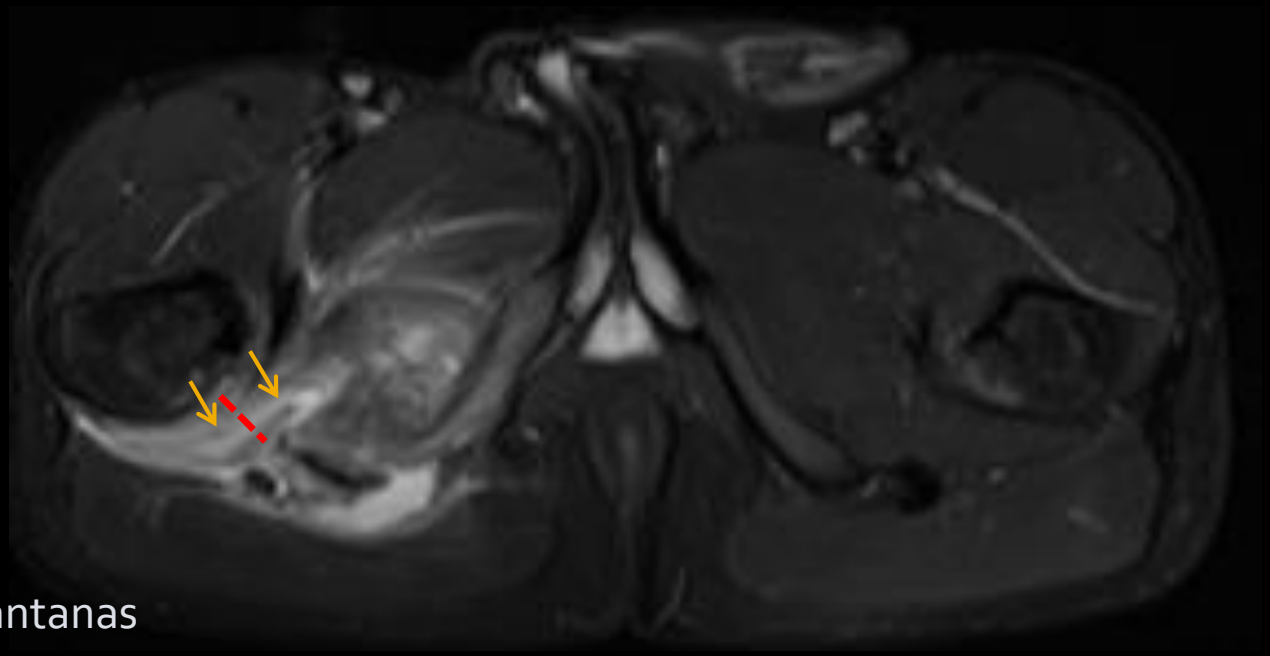


Male, 70y, LT gluteal pain since 6 months



Female, 70y, RT gluteal pain since 1y





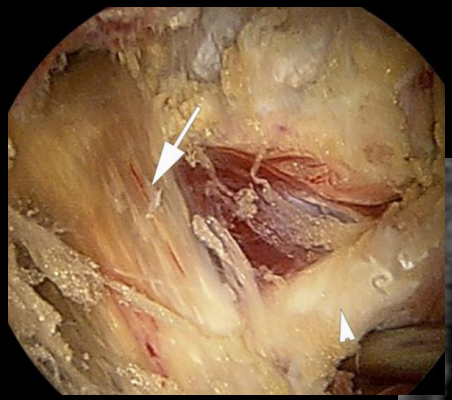
Courtesy: Prof. Apostolos Karantanas

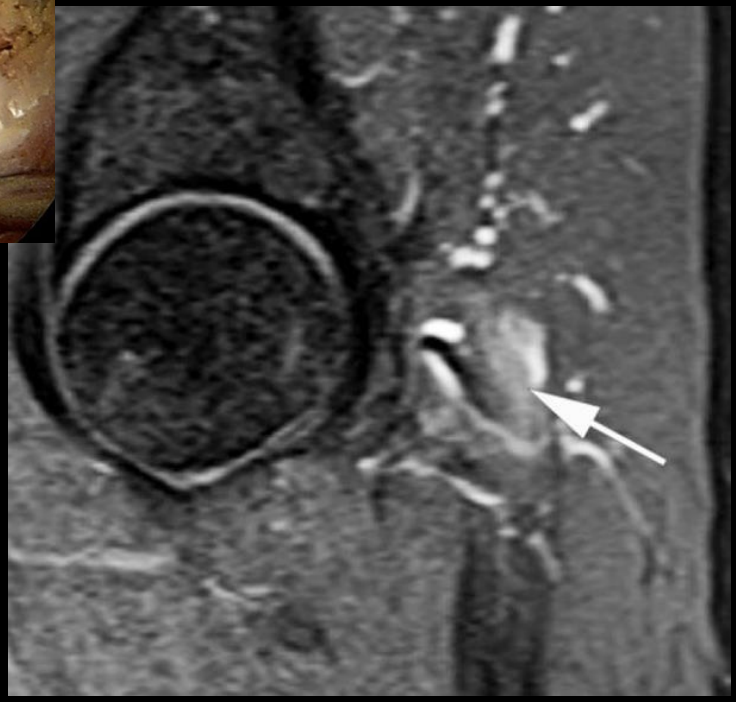
DGS etiology

6. Gemelli/obturator internus syndrome

Sciatic nerve impingement due to obturator internus/gemelli pathology

- Rare condition
- Causes:
  - muscle hypertrophy
  - anatomical variations
  - dynamic impingement





Meknas K et al. Knee Surg Sports Traumatol Arthrosc 2009;17:1249-56

DGS

Imaging-guided treatment options

Techniques for PM and perisciatic nerve injections

- *Blind*
- *Fluoroscopy-guided*
- *CT-guided* ←
- *US-guided*
- *Open MR-guided*

- ✓ *Aseptic conditions*
- ✓ *Avoid sciatic nerve*
- ✓ *Avoid inferior gluteal vessels*

Solution

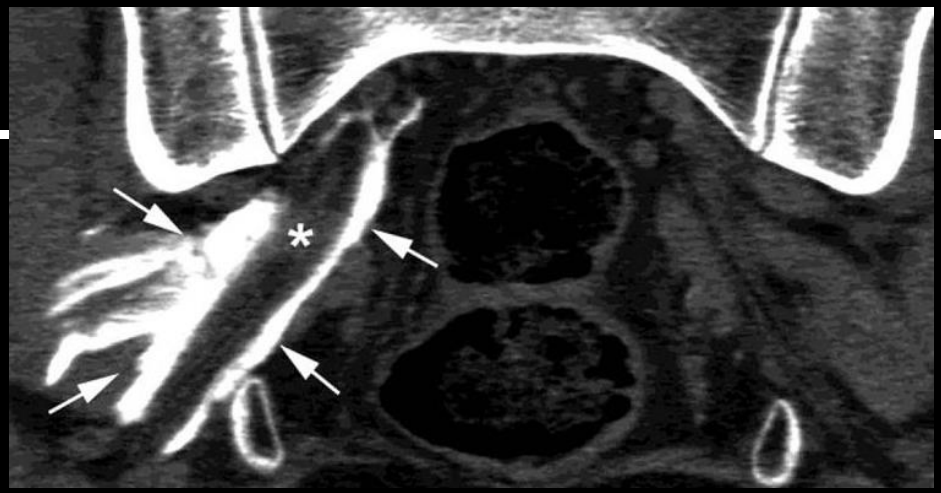
1. Anesthetic
2. Corticosteroids
3. Botulinum toxin
4. Contrast

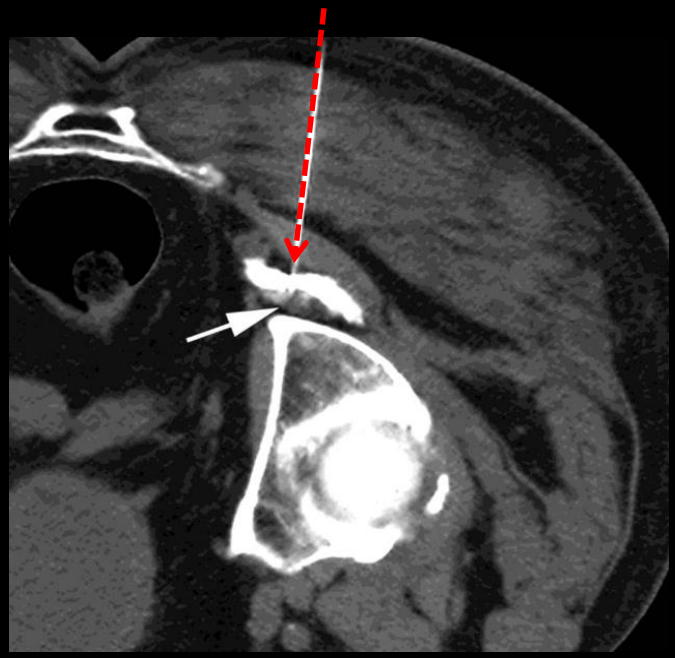
Hernando MF et al. Skeletal Radiol 2015;44:919-934
Fanucci E et al. Eur Radiol 2001;11:2543-8
Benzon HT et al. Anesthesiology 2003;98:1442-8

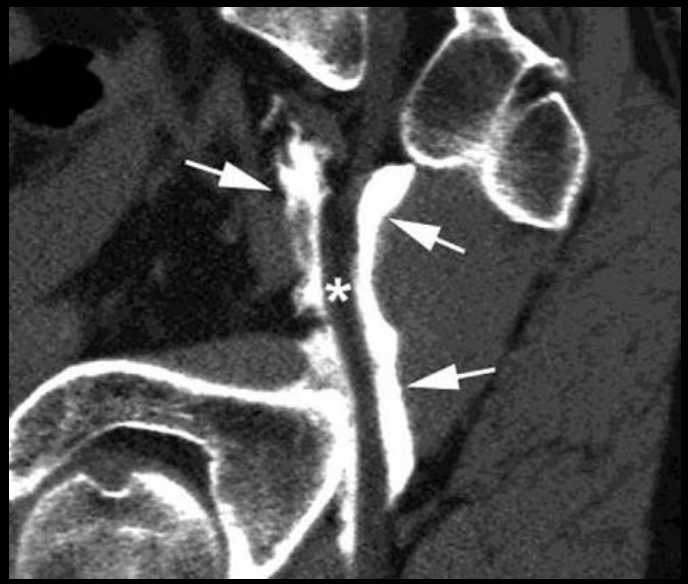
DGS

CT-guided procedure

- Patient: prone
- 22-gauge spinal needle
- Injection through PM







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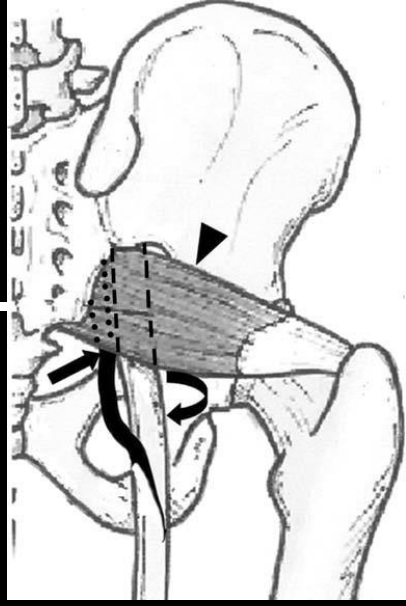
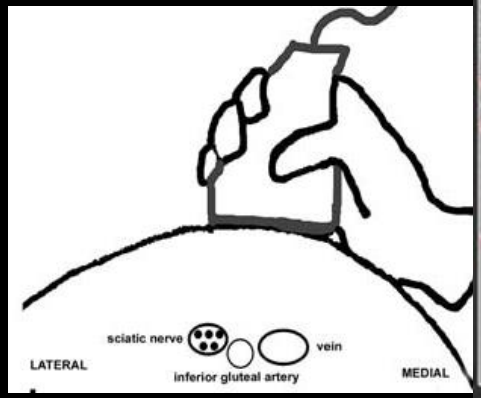
Fanucci E et al. Eur Radiol 2001;11:2543-8

DGS
US-guided procedure



- Patient: prone
- Probe: Superomedial quadrant
- Trace inferior gluteal artery
- SN: lateral to artery
- Inject in plane (22 gauge needle)



Reus M et al. Eur Radiol 2008;18: 616-620

Imaging-guided treatment options

Outcome

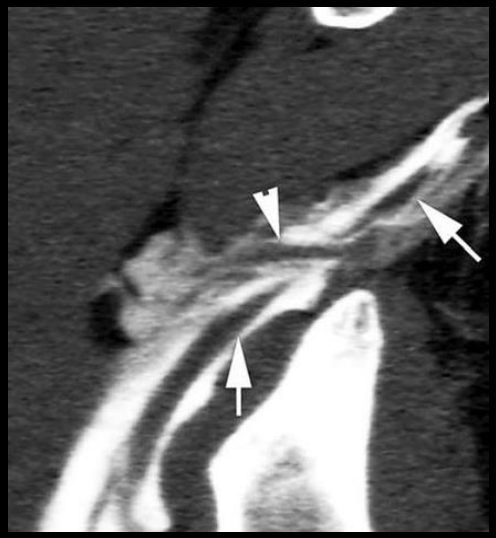
Advantages

1. Confirm diagnosis
2. Fibrous bands identification
3. Symptoms' relief

- 84-100% of patients: improved symptoms
- Clinical improvement: from 5-7 days to 1 y (mean 2-3 months)

Side effects:

- ✓ feet numbness (lasting 40–130 min)
- ✓ hemorrhage
- ✓ neural injury
- ✓ infection



Benzon HT et al. Anesthesiology 2003;98:1442-8
Reus M et al. Eur Radiol 2008;18: 616-620
Masala S et al. Cardiovasc Intervent Radiol 2012;35:375-82

Conclusion

- Anatomy

DQS etiologies

1. fibrous/fibrovascular bands
2. piriformis muscle syndrome (PMs)
3. ischiofemoral impingement syndrome (IFIs)
4. quadratus femoris muscle pathologies
5. hamstrings' pathology
6. obturator internus/gemellus syndrome

Imaging-guided treatment options

- CT-guided
  1. Confirm diagnosis
  2. Fibrous bands identification
  3. Symptoms' relief


Thank you!