Ischiofemoral Impingement: Lets Narrow it down

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B.PHTY (Honours)

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Contents

Have you had a patient with deep gluteal/posterior hip pain that doesn’t quite fit, nothing notable on scans and seems to not be improving?

WHY Ischiofemoral Impingement (IFI)?

Often the forgotten cause of hip / bum / groin pain

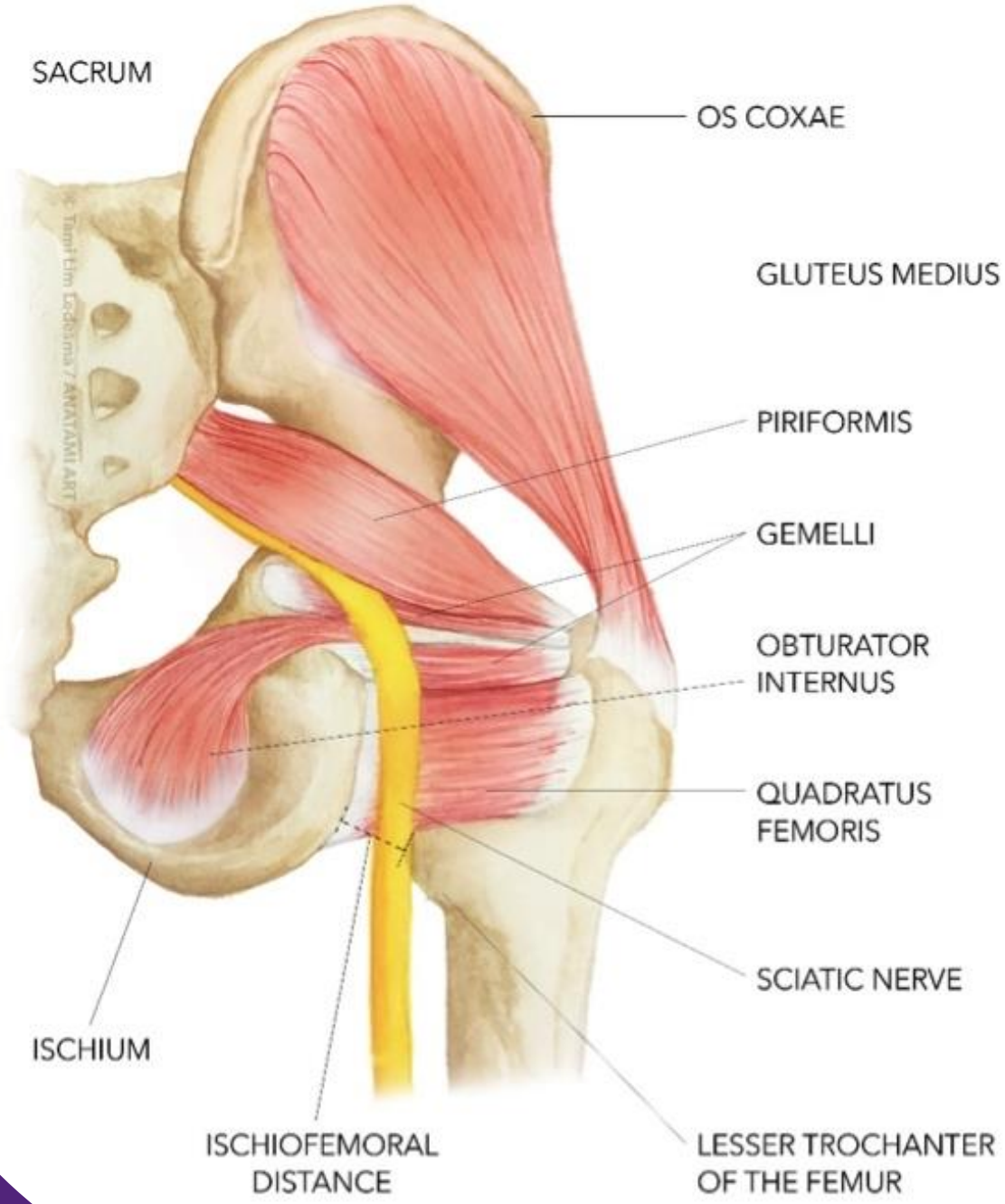
Often misdiagnosed → delays in effective management

Responds well to targeted rehab if recognized early

Definition

IFI, which is rare and more commonly seen in females, results from entrapment of soft tissues caused by narrowing of the space between the outer edge of the ischium and lesser trochanter. This narrowing may result from:

- abnormality present since birth
- strenuous repetitive activities
- arthritic changes
- following hip replacement surgery



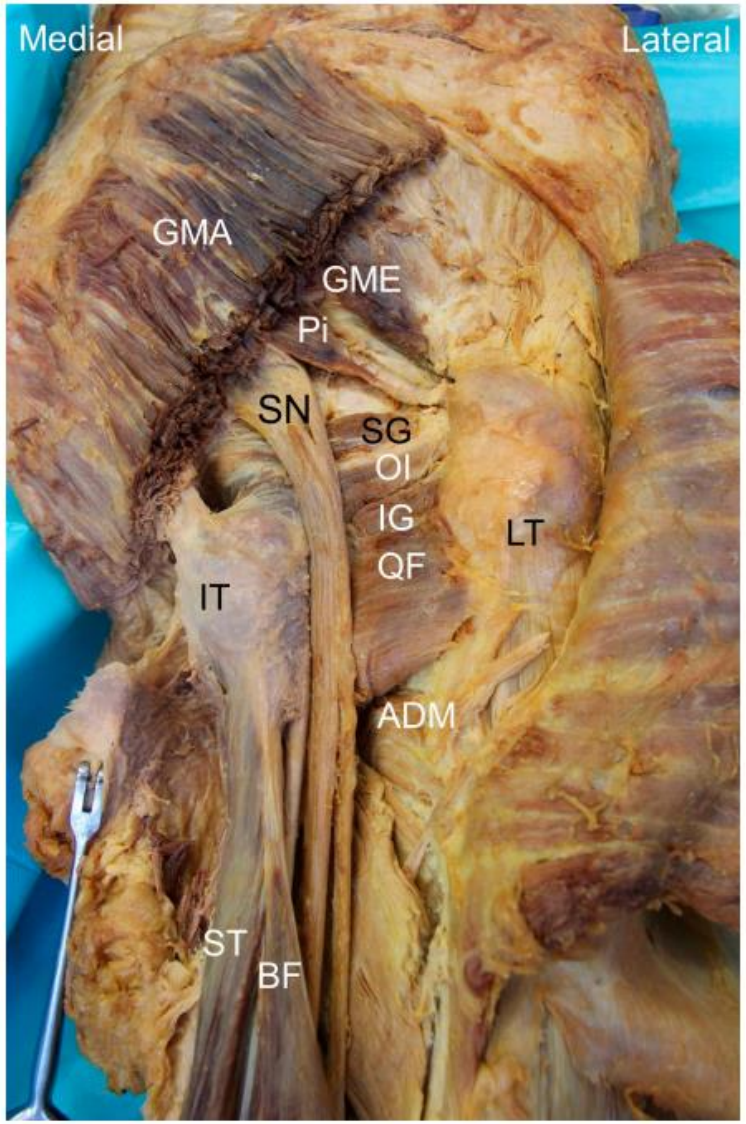
Prevalence

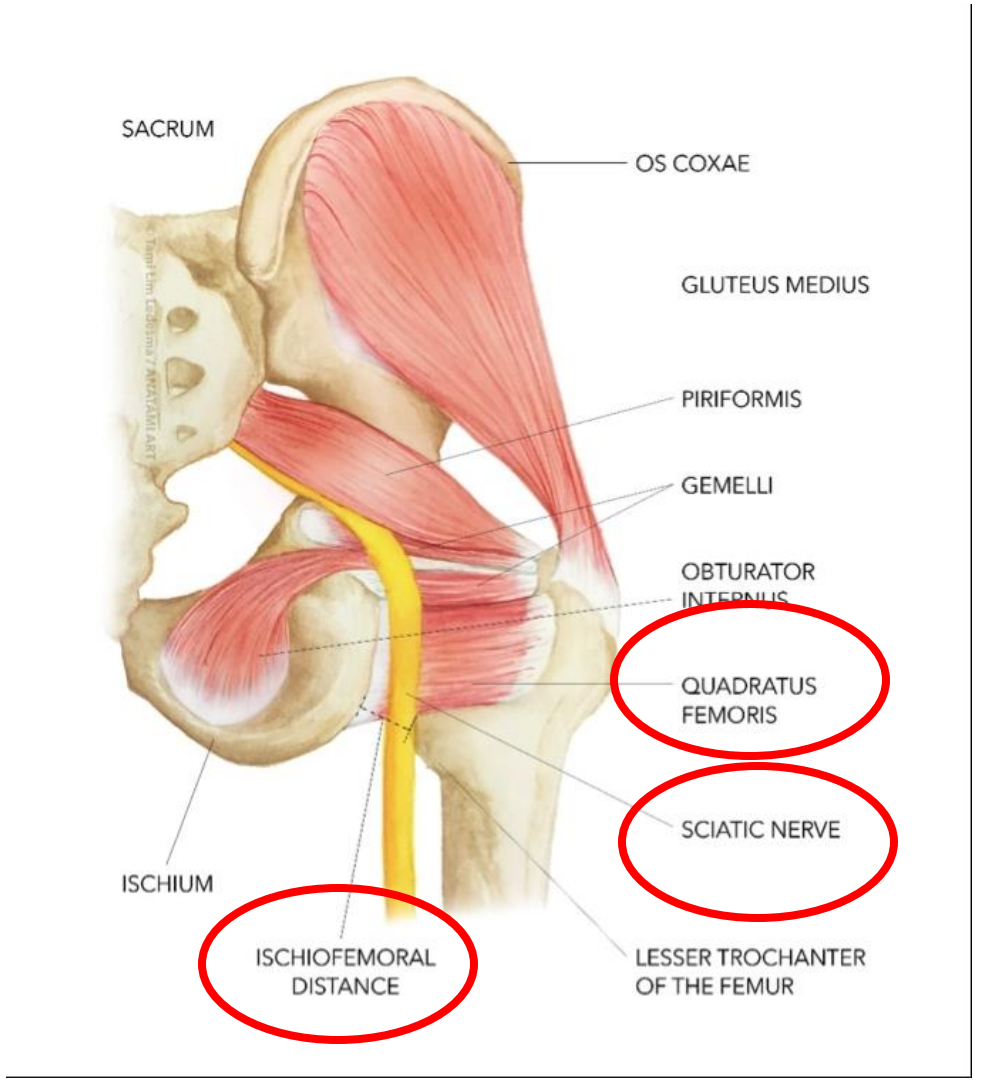
6% to 18% in people >50years old (Gardner et al 2020)

9% in young people (average 34 years old) (Heimann et al 2025)

Heimann, A.F., Wagner, M., Vavron, P. *et al.* Ischiofemoral impingement in joint preserving hip surgery: prevalence and imaging predictors. *Insights Imaging* **16**, 78 (2025). s13244-025-01946-2
Gardner S, Dong D, Peterson L et al (2020) Is there a relationship between femoral neck-shaft angle and ischiofemoral impingement in patients with hip pain? J Hip Preserv Surg 7:43–48. https://doi.org/10.1093/jhps/hnaa006

01 Physiology/Anatomy





Ischiofemoral Space

Normal mean Ischiofemoral Space (IFS)

- 18.6 ± 8 mm in females
- 23 ± 7 mm in males

(Hujazi et al 2016)

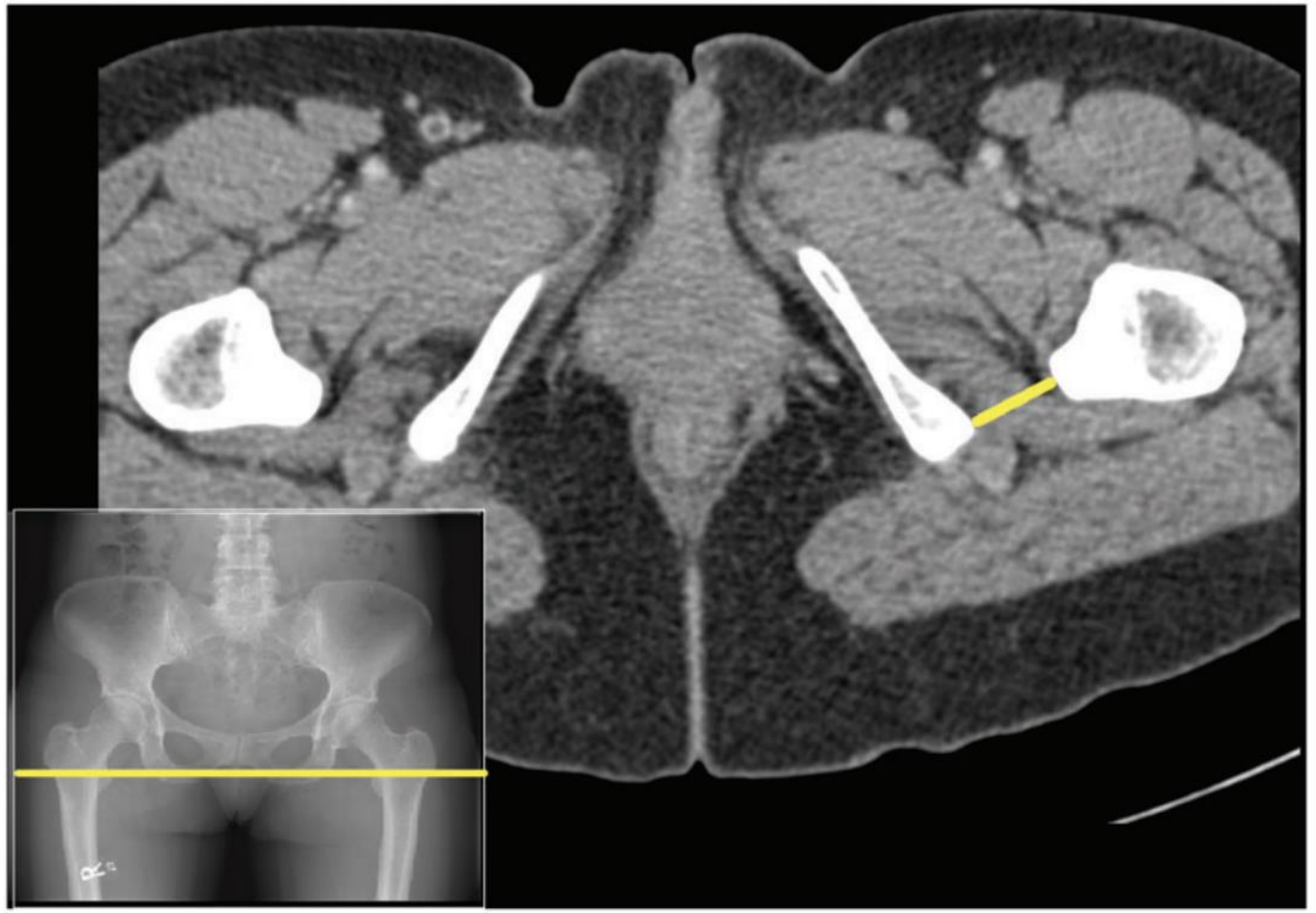
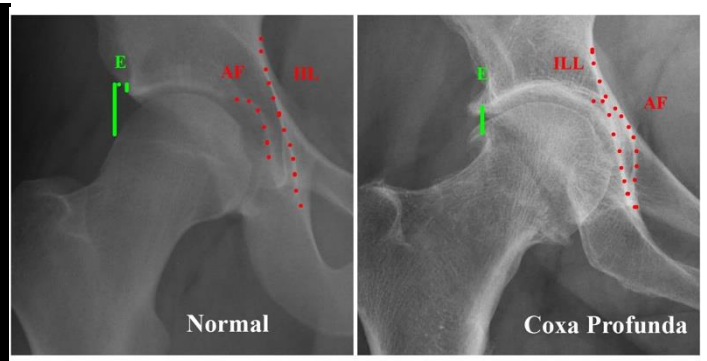


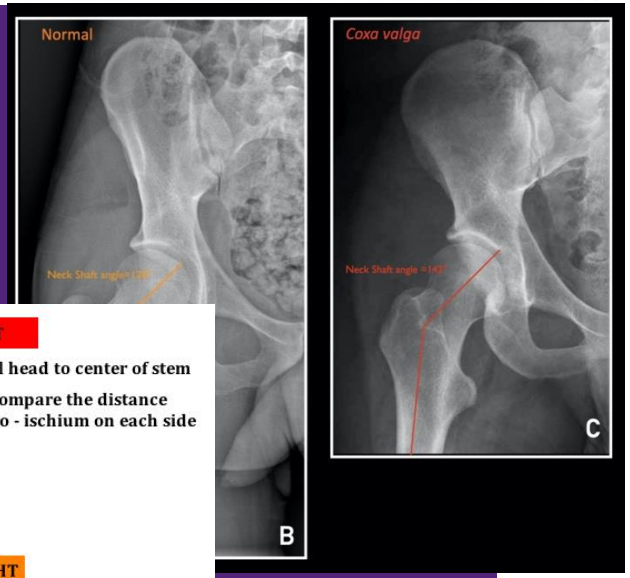
Fig. 1. Axial CT images through the level of the lesser trochanter showing the IFD.

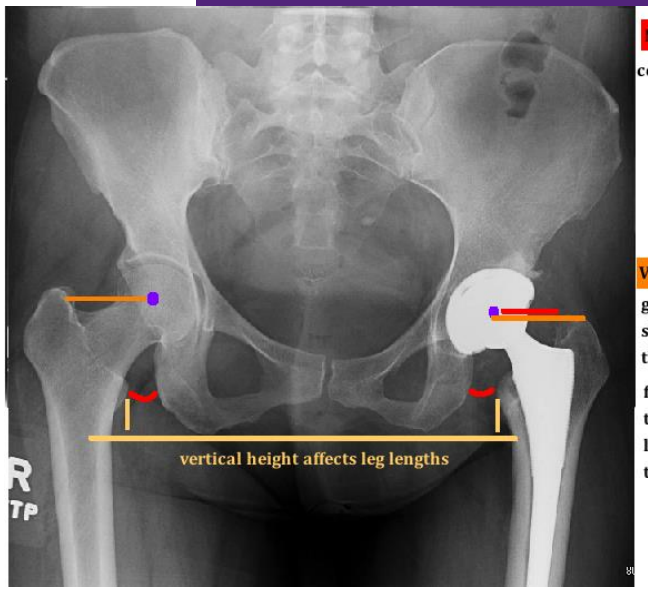
Hujazi I, Jones T, Johal S, Bearcroft P, Muniz-Terra G, Khanduja V (2016) The normal ischiofemoral distance and its variations. J Hip Preserv Surg 3(3):197–202

Narrowing of IFS

- ageing (muscle atrophy),
- abductor muscle injury/weakness causing uncompensated hip adduction during gait,
- female gender (increased width of pelvis),
- coxa profunda,
- coxa valga,
- valgus hip due to proximal femoral osteotomy,
- Perthes disease,
- Leg length difference
- total hip replacement with reduced femoral medial offset
- peritrochanteric fractures with involvement of Lesser trochaner,
- and multiple or isolated exostoses







MEDIAL OFFSET

center of femoral head to center of stem

you can also compare the distance lesser troch - to - ischium on each side

VERTICAL HEIGHT

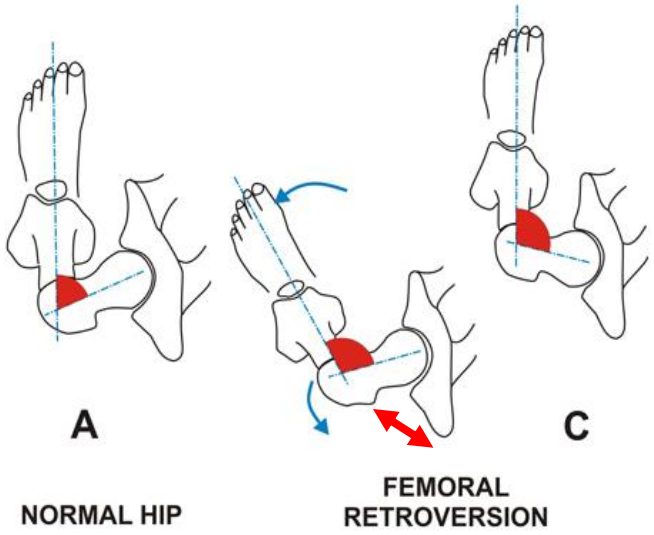
general rule - center of femoral head should be at the same level as the tip of the greater troch

for accurate measurement to determine leg lengths - distance of lesser troch to vertical line across ischial tuberosities

Risk Factors

More common in:

- Women
- Post-THR (especially with increased offset or retroversion)
- Individuals with femoral retroversion
- Dancers, runners, athletes with repetitive hip extension



(Ahmad et al 2023)

Retroversion (<14 deg) is a risk factor for IFI (often compensate with toe out gait)

Ahmad, S. S., Konrads, C., Niemann, M., Stöckle, U., Windhagen, H., & Giebel, G. M. (2023). The Female Pelvis Is Associated with a Lateralized Ischium and a Reduced Ischiofemoral Space. *Journal of Clinical Medicine*, *12*(4), 1603. https://doi.org/10.3390/jcm12041603

Radiological Findings

Fatty infiltration and odema in narrower IFD

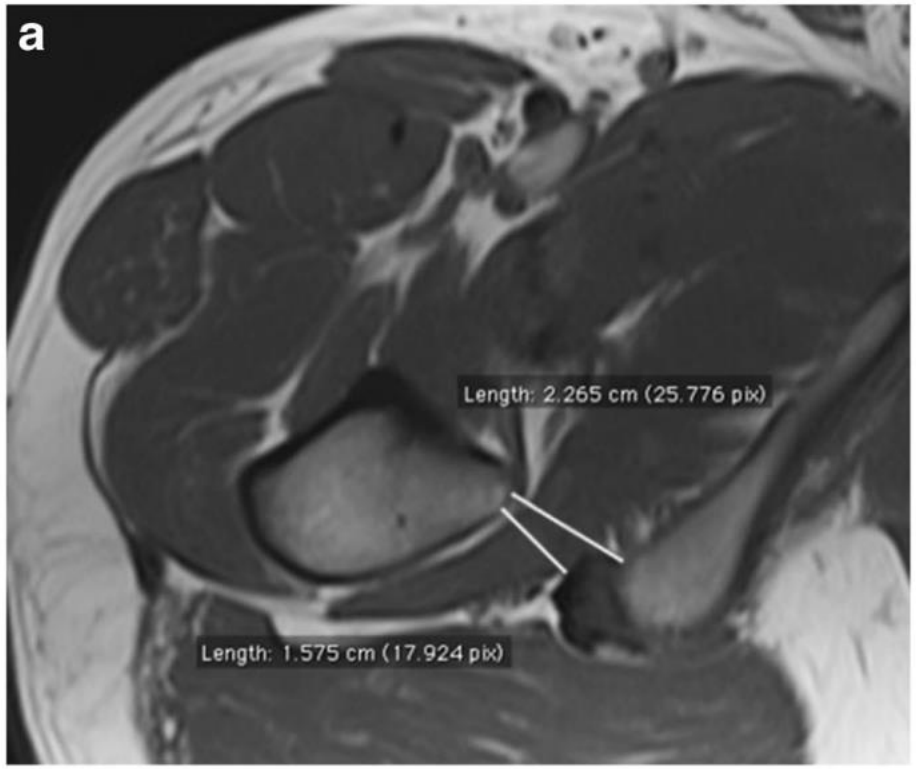


Table 4 Overview of quantitative analyses according to the absence or presence of soft tissue MRI signal abnormalities

Characteristics	Patients without soft tissue MRI signal abnormalities[a] (n=190)	Patients with soft tissue MRI signal abnormalities[a] (n=19)	*p* value
IF space (cm)			
Right	2.59 (1.09–4.82)	1.87 (0.87–2.86)	<0.001[b]
Left	2.52 (0.93–4.80)	1.57 (0.92–3.28)	<0.001[b]
QF space (cm)			
Right	1.52 (0.54–3.35)	0.99 (0.48–1.94)	<0.001[b]
Left	1.63 (0.60–3.90)	0.83 (0.32–1.57)	<0.001[b]
Quantitative QF signal intensity (T1-weighted MRI)			
Right	147.1 (83.1–285.7)	166.1 (128.1–509.1)	0.004[b]
Left	146.7 (77.5–281.1)	188.6 (111.1–614.9)	<0.001[b]
Quantitative QF signal intensity (T2-weighted MRI)			
Right	37.0 (8.8–61.6)	38.6 (27.8–83.4)	0.114
Left	35.1 (10.6–67.1)	40.0 (12.2–134.3)	0.165
QF/VL (T1-weighted MRI)			
Right	1.19 (0.70–1.91)	1.42 (1.00–3.90)	<0.001[b]
Left	1.18 (0.88–1.74)	1.45 (0.98–3.90)	<0.001[b]
QF/VL (T2-weighted MRI)			
Right	1.28 (0.56–2.67)	1.37 (0.77–2.06)	0.252
Left	1.25 (0.31–2.23)	1.26 (0.53–2.96)	0.978

IF, ischiofemoral; QF, quadratus femoris; VL, vastus lateralis

[a] Values given as median (minimum–maximum)

[b] Statistically significant value for $p<0.025$ according to Bonferroni correction

Radiological Findings

- asymptomatic subjects may also have abnormalities in QF muscles (Maras et al 2015)
- **Most patients with IFI are symptomatic, 9.2% asymptomatic (Ozdemir et al 2015)**

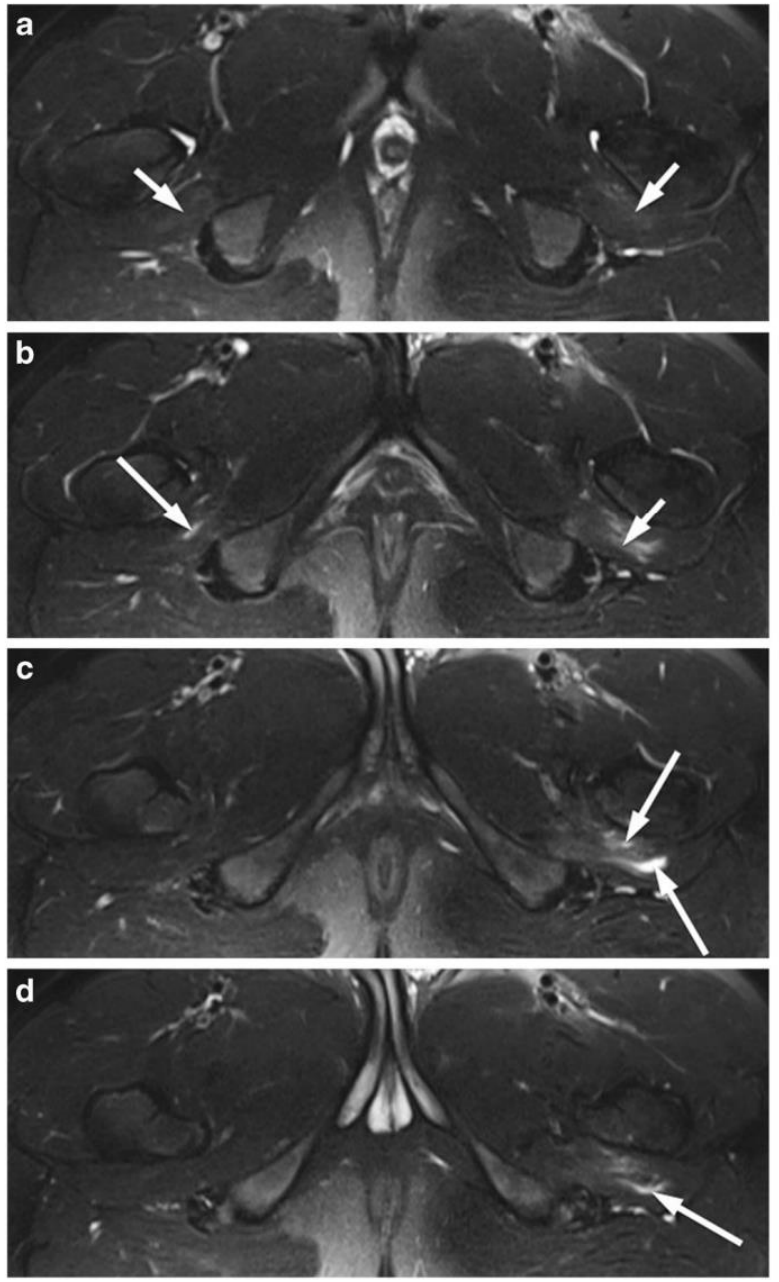


Fig. 5 20-year-old man asymptomatic for hip pain. ***a–d***. Consecutive axial T2-weighted (TR/TE, 4,300/92 ms) fat-suppressed FSE MR images show oedema *(short arrows)* and partial tears *(long arrows)* of the QF bilaterally, extending outside the IF space on the left (***c*** and ***d***)

Maras, O¨zdemirZ,Aydıngo¨zU¨,Go¨rmeliCA,etal.Is- chiofemoral Space on MRI in an Asymptomatic Population: Normative Width Measurements and Soft Tissue Signal Variations. Eur Radiol 2015;25(8): 2246–53.

Ozdemir, Z. M., Aydingoz, U., Gormeli, C. A., & Kahraman, A. S. (2015). Ischiofemoral Space on MRI in an Asymptomatic Population: Normative Width Measurements and Soft Tissue Signal Variations. *European Radiology*, *25*(8), 2246–2253. https://doi.org/10.1007/s00330-015-3625-3

Wu, W.-T., Chang, K.-V., Mezian, K., Naňka, O., Ricci, V., Chang, H.-C., Wang, B., Hung, C.-Y., & Özçakar, L. (2022). Ischiofemoral Impingement Syndrome: Clinical and Imaging/Guidance Issues with Special Focus on Ultrasonography. *Diagnostics (Basel)*, *13*(1), 139. https://doi.org/10.3390/diagnostics13010139

Imaging

Narrowed IFS (<15 mm),
Space occupying lesion
quadratus femoris edema

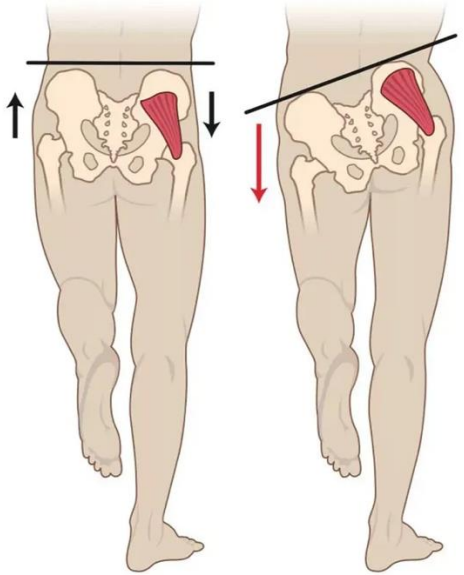
** May be incidental — correlate with symptoms

Meta-analysis (Singer et al. 2015) showed
Cut off of IFS 15 mm = **sensitivity 74.9%, specificity of 81%**

Fig. 5. A 43-year-old female with 2 to 3 months of right hip pain radiating to the knee while walking. (*A*) AP and (*B*) frog lateral radiographs show lucencies at opposing surfaces of ischium (*arrow*) and lesser trochanter (*arrowhead*). (*C*) Routine hip MR imaging axial proton density and (*D*) T2 fat-suppressed images show remodeling of lesser trochanter (*white arrowhead*) and cystic change in the ischium (*white arrow*). Narrowed IF and QF spaces, with edema and thinning of QF muscle (*black arrowhead*) and hamstring tendinosis (*black arrow*) are noted. (*Adapted from* Patti JW, Ouellette H, Bredella MA, Torriani M. Impingement of lesser trochanter on ischium as a potential cause for hip pain. *Skeletal radiology.* 2008;37:939–941. https://doi.org/10.1007/s00256-008-0551-3 with permission).

Singer AD, Subhawong TK, Jose J et al. Ischiofemoral impingement syndrome: a meta-analysis. Skeletal Radiol 2015; 44: 831–7

Functional/Dynamic IFI



Hip Extension
& Adduction
key factors

Gait Analysis

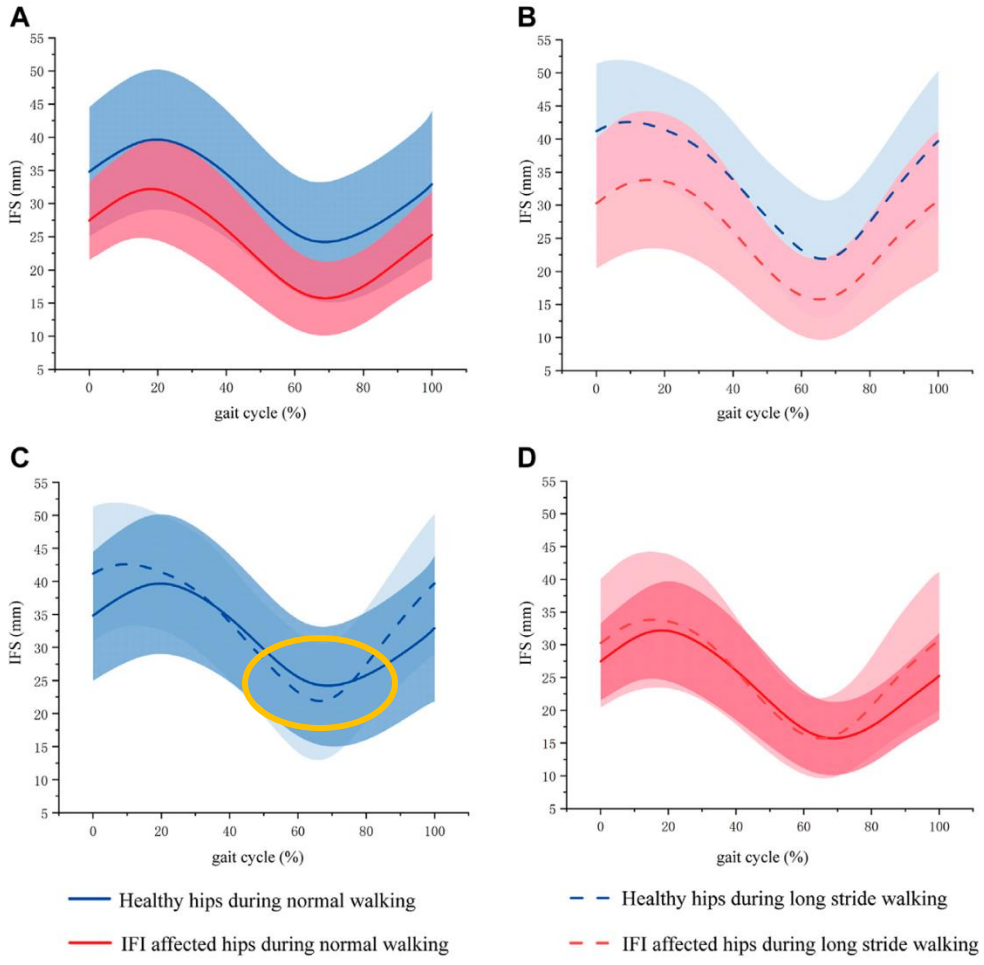


FIGURE 4
Mean (line) and standard deviation (shaded area) of IFS during gait phase of normal and long stride walking. **(A)** Was the IFS of healthy hips and IFI affected hips during normal walking. **(B)** Was the IFS of healthy hips and IFI affected hips during long stride walking. **(C)** Was the IFS of healthy hips during normal and long stride walking. **(D)** Was the IFS of IFI affected hips during normal and long stride walking. The blue curve is the mean and standard deviation of IFS in healthy hips, where the solid blue line is the IFS during normal walking, and the dashed line is the IFS during long stride walking. The red curve is the mean and standard deviation of IFS in IFI affected hips, where the solid blue line is the IFS during normal walking, and the dashed line is the IFS during long stride walking.

Narrowest IFS in late stance/early swing

IFI 10.16mm
healthy 15.09mm

?? Margin of error

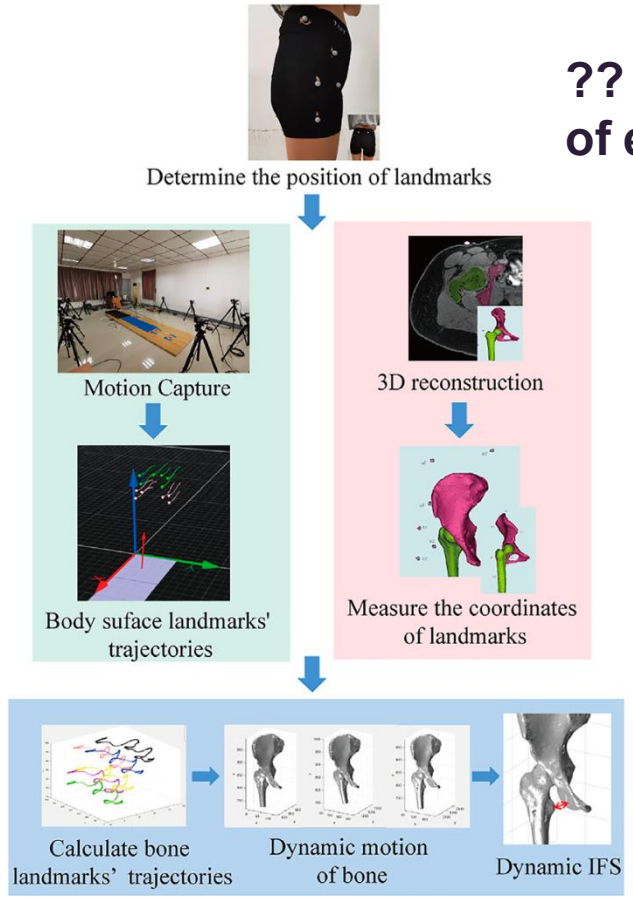


FIGURE 1
The novel *in vivo* dynamic motion analysis method for the measurement of IFS.

Wang Y, Ma D, Feng Z, Yu W, Chen Y, Zhong S, Ouyang J, Qian L. A novel method for *in vivo* measurement of dynamic ischiofemoral space based on MRI and motion capture. Front Bioeng Biotechnol. 2023 Jan 25;11:1067600. doi: 10.3389/fbioe.2023.1067600. PMID: 36761299; PMCID: PMC9905814.

02 Signs and Symptoms

eTable A. Differential Diagnosis of Hip Pain

Diagnosis	*Pain characteristics*	*History/risk factors*	*Examination findings*	*Additional testing*
Posterolateral pain				
Gluteal muscle tear or avulsion*	Pain with direct pressure, radiation down lateral thigh and buttock	Middle-aged women	Weak hip abduction, pain with resisted external rotation, Trendelenburg gait is sensitive and specific	MRI: Gluteal muscle edema or tears
Iliac crest apophysis avulsion	Tenderness to direct palpation	History of direct trauma, skeletal immaturity (younger than 25 years)	Iliac crest tenderness and/or ecchymosis	Radiography: Apophysis widening, soft tissue swelling around iliac crest
Posterior pain				
Hamstring muscle strain or avulsion	Buttock pain, pain with direct pressure	Eccentric muscle contraction while hip flexed and leg extended	Ischial tuberosity tenderness, ecchymosis, weakness to leg flexion, palpable gap in hamstring	Radiography: Avulsion or strain of hamstring attachment to ischium
Ischial apophysis avulsion	Buttock pain, pain with direct pressure	Skeletal immaturity, eccentric muscle contraction (cutting, kicking, jumping)		MRI: Hamstring edema and retraction
Ischiofemoral impingement	Buttock or back pain with posterior thigh radiation, sciatica symptoms	Groin and/or buttock pain that may radiate distally	None established	MRI: Soft tissue edema around quadratus femoris muscle
Piriformis syndrome	Buttock pain with posterior thigh radiation, sciatica symptoms	History of direct trauma to buttock or pain with sitting, weakness and numbness are rare compared with lumbar radicular symptoms	Positive log roll test, tenderness over the sciatic notch	MRI: Lumbar spine has no disk herniation, piriformis muscle atrophy or hypertrophy, edema surrounding the sciatic nerve
Sacroiliac joint dysfunction	Pain radiates to lumbar back, buttock, and groin	Female predominance, common in pregnancy, history of minor trauma	FABER test elicits posterior pain localized to the sacroiliac joint, sacroiliac joint line tenderness	Radiography: Possibly no findings, narrowing and sclerotic changes of the sacroiliac joint space

FABER = flexion, abduction, external rotation; FADIR = flexion, adduction, internal rotation; MRI = magnetic resonance imaging; ROM = range of motion.

**—Conditions associated with greater trochanteric pain syndrome.*

Wilson JJ, Furukawa M. Evaluation of the patient with hip pain. Am Fam Physician. 2014 Jan 1;89(1):27-34. PMID: 24444505.

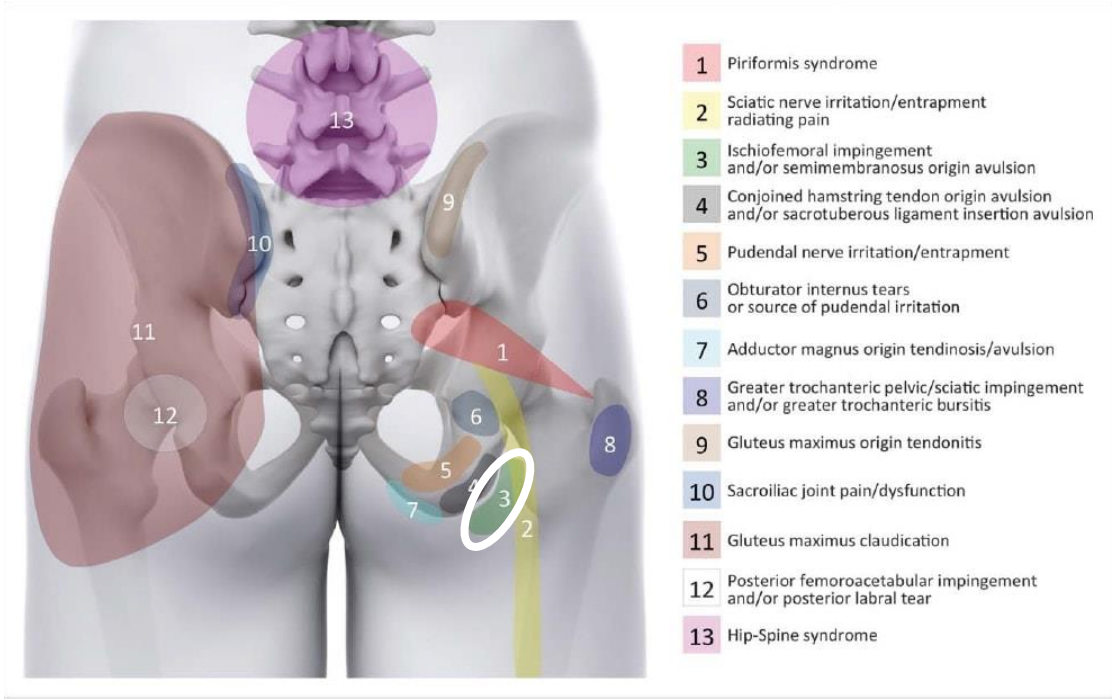
Behaviour of symptoms

The clinical presentation of IFI can be **bilateral** in 25%-40% of cases.

Usual symptoms include deep gluteal pain, sciatica, and snapping/clicking

Aggs: prolonged weightbearing/standing, restricted/painful long-stride walking

Eases: short strides, feet wider, reduce pelvic drop (“stay tall”), SPS



Wu, W.-T., Chang, K.-V., Mezian, K., Naňka, O., Ricci, V., Chang, H.-C., Wang, B., Hung, C.-Y., & Özçakar, L. (2022). Ischiofemoral Impingement Syndrome: Clinical and Imaging/Guidance Issues with Special Focus on Ultrasonography. *Diagnostics (Basel)*, *13*(1), 139. https://doi.org/10.3390/diagnostics13010139

03 Physical Examination

IFI Specific tests

Figure 6. (**A**) Step 1: The volunteer's hip is brought to extension, external rotation, and adduction to compress the ischiofemoral space in the upright position. (**B**) Step 2: The participant is in the lateral decubitus position with the knee being flexed and the hip being externally rotated (brown arrow). The examiner places the thumb over the ischium to check if the tenderness can be provoked.

Wu, W.-T., Chang, K.-V., Mezian, K., Naňka, O., Ricci, V., Chang, H.-C., Wang, B., Hung, C.-Y., & Özçakar, L. (2022). Ischiofemoral Impingement Syndrome: Clinical and Imaging/Guidance Issues with Special Focus on Ultrasonography. *Diagnostics (Basel)*, *13*(1), 139. https://doi.org/10.3390/diagnostics13010139

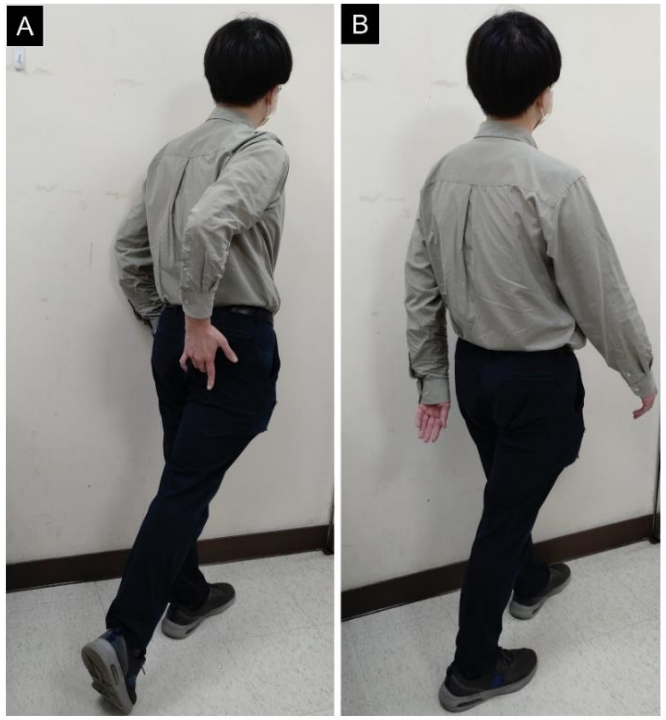


Figure 4. Pain over the ischium can be reproduced by walking with a long stride (**A**) and relieved during short-stride walking (**B**).

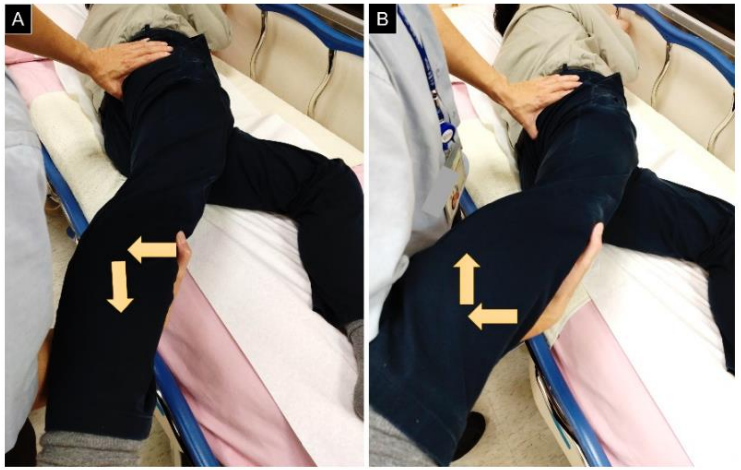


Figure 5. (**A**) Tenderness over the ischium is elicited under passive hip extension and adduction, and it disappears during (**B**) hip extension and abduction. Arrows: direction of force applied by the examiner.

Palpation of quadratus femoris

Pain on palpation +/- click

Ischiofemoral Impingement test

Palpate laterally to ischial tuberosity + passively extend and adduct hip

= reproduces symptoms

82% sensitivity, 85% specificity

Long Stride Walking Test

Step 1:

- active hip extension,

Step 2:

- Add ER

+ve pain lateral to ischium during

relieved by shortening stride length

94% Sensitivity, 85% specificity

Imaging

Narrowed IFS (<15 mm),
Space occupying lesion
quadratus femoris edema

** May be incidental — correlate with symptoms

Meta-analysis (Singer et al. 2015) showed
Cut off of IFS 15 mm = **sensitivity 74.9%, specificity of 81%**

Fig. 5. A 43-year-old female with 2 to 3 months of right hip pain radiating to the knee while walking. (*A*) AP and (*B*) frog lateral radiographs show lucencies at opposing surfaces of ischium (*arrow*) and lesser trochanter (*arrowhead*). (*C*) Routine hip MR imaging axial proton density and (*D*) T2 fat-suppressed images show remodeling of lesser trochanter (*white arrowhead*) and cystic change in the ischium (*white arrow*). Narrowed IF and QF spaces, with edema and thinning of QF muscle (*black arrowhead*) and hamstring tendinosis (*black arrow*) are noted. (*Adapted from* Patti JW, Ouellette H, Bredella MA, Torriani M. Impingement of lesser trochanter on ischium as a potential cause for hip pain. *Skeletal radiology.* 2008;37:939–941. https://doi.org/10.1007/s00256-008-0551-3 with permission).

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Diagnose by Triad

Clinical Features

+ve Physical Findings

Imaging findings (MRI)

Diagnostic IFS injection

injection of 3–5 mL of local anesthetic

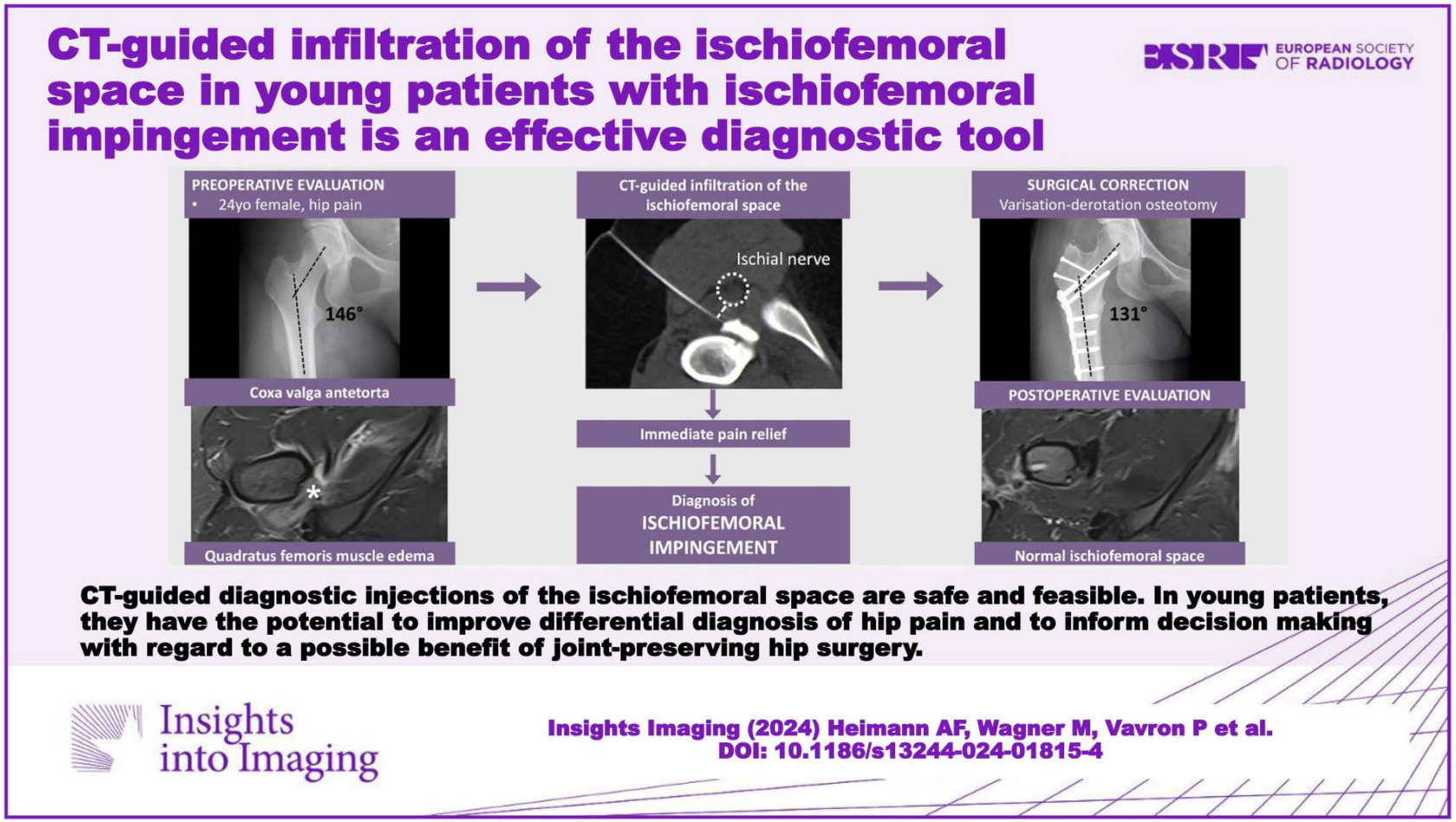
Heimann *et al. Insights into Imaging* (2024)15:235
https://doi.org/10.1186/s13244-024-01815-4

Insights into Imaging

ORIGINAL ARTICLE Open Access

CT-guided infiltration of the ischiofemoral space in young patients with ischiofemoral impingement is an effective diagnostic tool

Alexander F. Heimann[1,2], Moritz Wagner[3], Peter Vavron[3], Alexander Brunner[3], Ricardo Donners[4], Ehrenfried Schmaranzer[5], Simon D. Steppacher[6], Moritz Tannast[1], Reto Sutter[7] and Florian Schmaranzer[7,8]*



04 Treatment

Journal of Hip Preservation Surgery Vol. 4, No. 4, pp. 289–298
doi: 10.1093/jhps/hnx035
Advance Access Publication 31 August 2017
Review article

How to address ischiofemoral impingement? Treatment algorithm and review of the literature

Hans Gollwitzer[1,2]*, Ingo J. Banke[1], Johannes Schauwecker[1], Ludger Gerdesmeyer[3] and Christian Suren[1]

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[2]ATOS Klinik München, Effnerstr. 38, 81925 München, Germany and
[3]Universitätsklinikum Schleswig-Holstein Campus Kiel, Sektion für Onkologische und Rheumatologische Orthopädie, Arnold-Heller-Straße 3 DE 24105 Kiel, Germany
*Correspondence to: H. Gollwitzer. E-mail: info@drgollwitzer.de
Submitted 29 June 2017; revised version accepted 30 July 2017

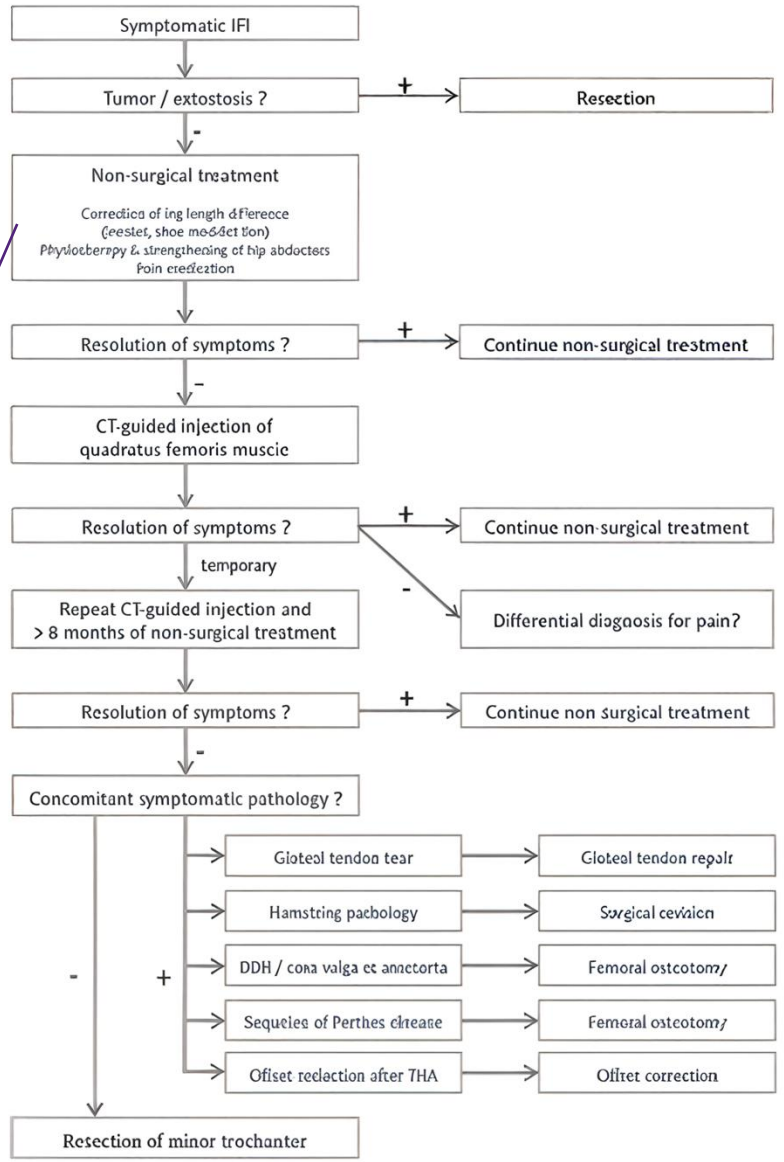


Fig. 5. Treatment algorithm for symptomatic IFI including concomitant pathologies that commonly cause IFI.

Knee Surgery, Sports Traumatology, Arthroscopy (2020) 28:2772–2787
https://doi.org/10.1007/s00167-018-5251-5

HIP

Treatment strategies for ischiofemoral impingement: a systematic review

Naoki Nakano[1] · Haitham Shoman[1] · Vikas Khanduja[1]

the combination of rest, activity modification, taking NSAIDs and gabapentin, physiotherapy, hot packs, and ultrasound-guided injections.

good short-term results (from 2 weeks to 1 year)

only 5% of patients diagnosed with IFI required surgical intervention.

Treatment Outline

Conservative first line (if no severe anatomical changes)

- Load modification: reduce stride/avoid long steps, side sleeping
- Activity re-education: reduce hip extension load
- Strengthen hip abductors, deep rotators
- Neuromuscular control (glutes, pelvic control)
- Manual therapy adjunct (soft tissue, glute release)
- Injections: corticosteroid or local anesthetic into quadratus femoris
- Surgery: rare — lesser trochanter resection or ischial osteoplasty (only if severe bony impingement)

Injections

CT guided injections clinically effective, accurate and safe procedures

Can provide **immediate pain relief in 85% of cases and upto 1 month in 58% of cases**

?improvements of irritated sciatic nerve (proximity)

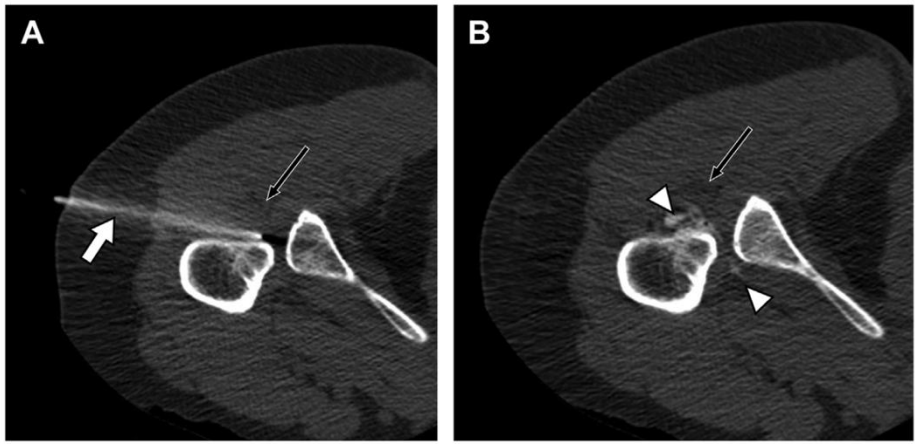


Fig. 9. A 62-year-old-female with chronic left hip pain and IF space narrowing. Prone low-dose CT axial images show (*A*) lateral needle approach to IF space (*white arrow*), passing anterior to the sciatic nerve (*long black arrow*). (*B*) After injection, cortisone and contrast mixture are noted within the IF space (*arrowheads*).

Torriani M. Ischiofemoral Impingement Syndrome in 2024: Updated Concepts and Imaging Methods. Magn Reson Imaging Clin N Am. 2025 Feb;33(1):63-73. doi: 10.1016/j.mric.2024.06.005. Epub 2024 Sep 26. PMID: 39515961.

Surgical

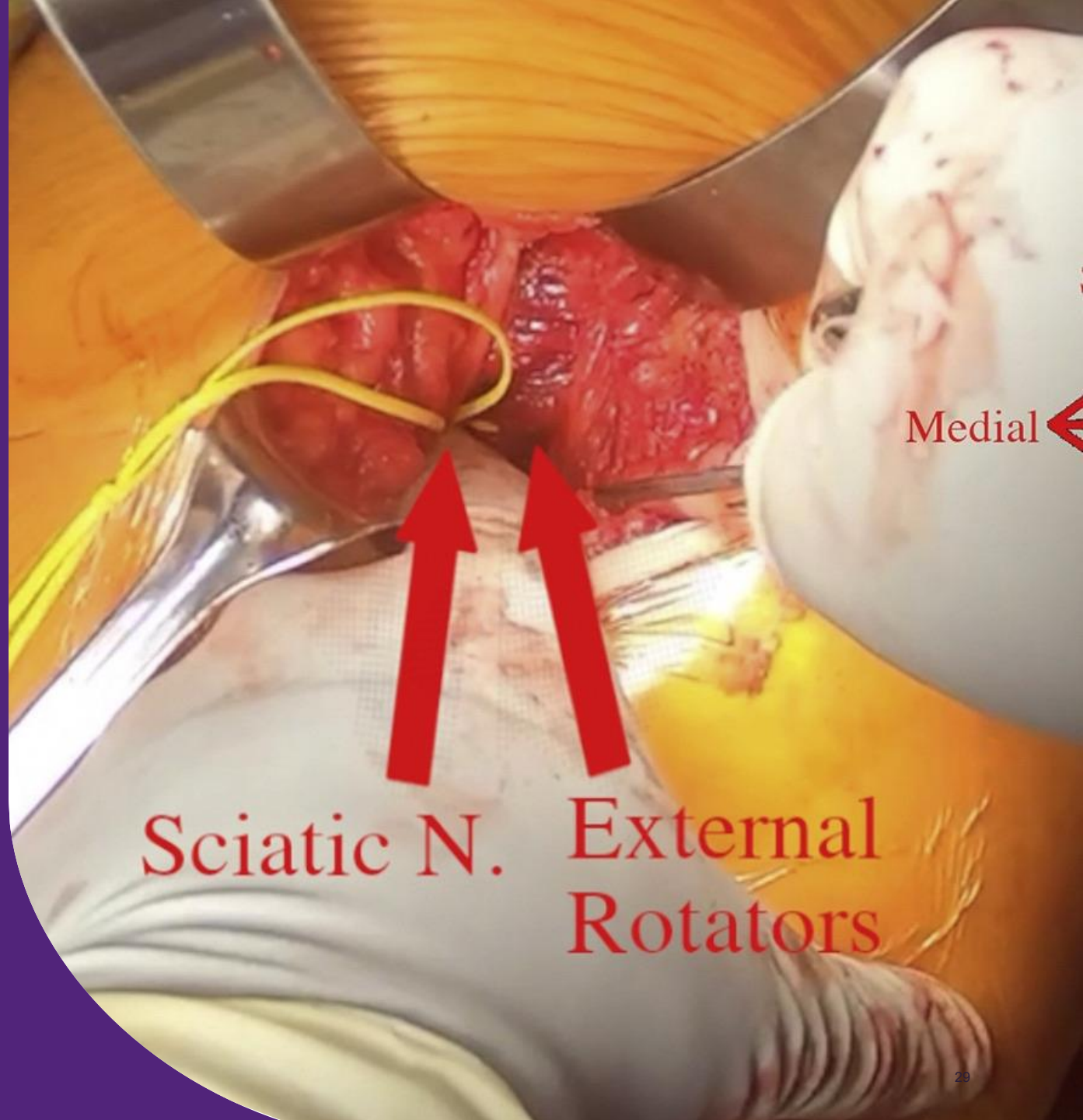
open surgical treatment OR Endoscopic surgical treatment

an anterior approach or lateral approach:

- excision of ischial exostosis
- excision of a lipomatous tumour
- resection of the LT

Complications:

- no complications were reported
- Medial (18mm from LT) and lateral femoral circumflex arteries, which course on the upper border of the QF muscle
- resection of the LT requires detachment of the iliopsoas tendon which risks persistent weakness of hip flexion



05 Take Home Message

Consider IFI in deep gluteal pain patients

IFI is multifactorial

Diagnose via Triad: Clinical Symptoms + Physical Examination + MRI findings

Treatment includes

Functional IFI
conservative Mx +/- image-guided injections for pain management

Structural IFI
if conservative Mx fails, surgery aimed at widening the IFS

Most cases improve with targeted conservative care

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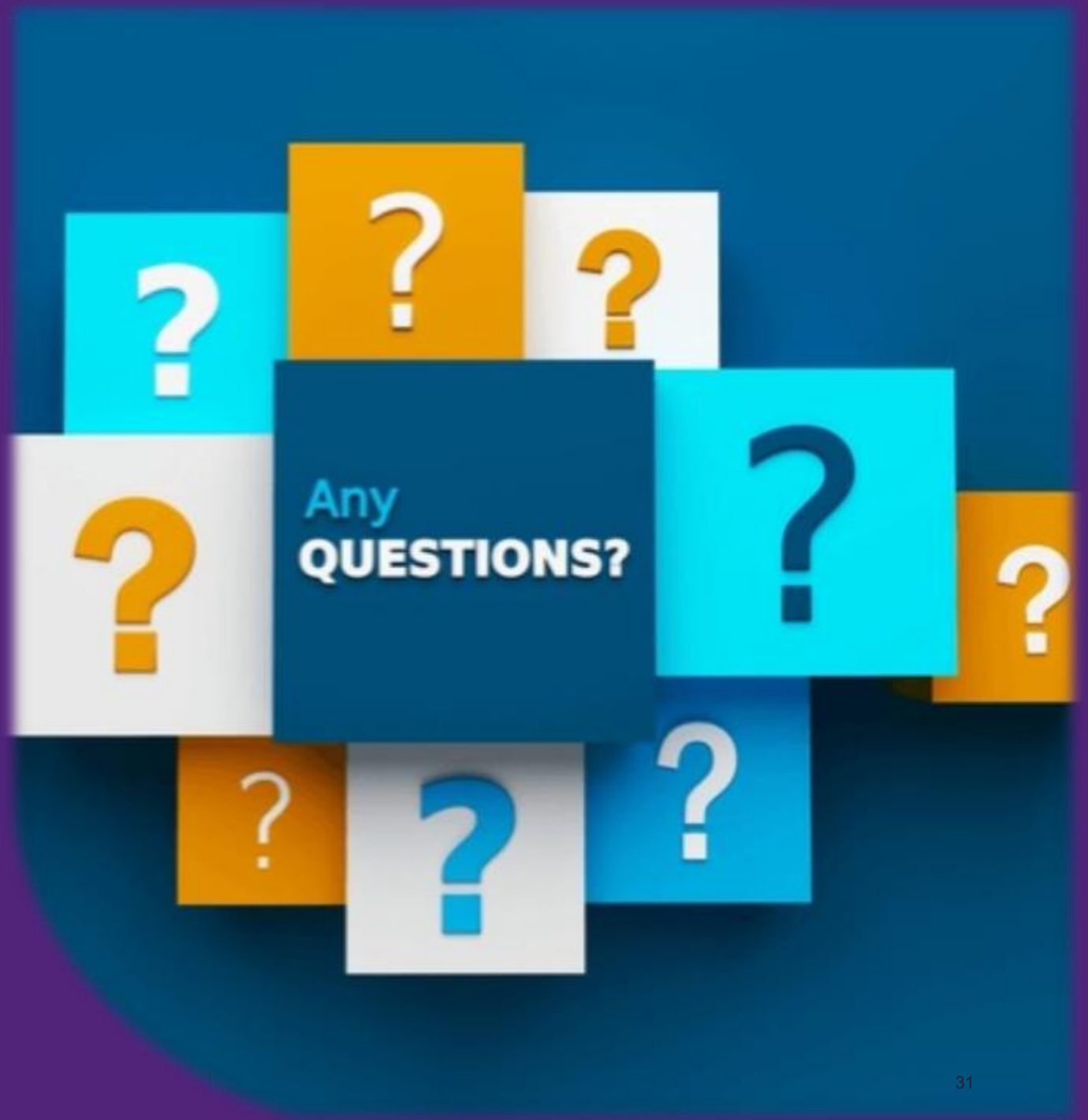

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