

Dynamic Motion Analysis and the Diagnosis of Ischiofemoral Impingement

Emily Wright BSc, MBChB, Clinical Research Fellow

Giles Stafford, FRCS, Consultant Orthopaedic
Surgeon

South West London Elective Orthopaedic Centre



Emily Wright, BSc, MBChB

I have no financial relationships
to disclose

Giles Stafford, FRCS

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Introduction



Ischiofemoral Impingement (IFI) can be a diagnostic challenge. The condition is caused by narrowing of the ischiofemoral space and subsequent impingement between the ischium and lesser trochanter of the femur. This restricts hip movement particularly hip extension, adduction and external rotation.

Aims



To assess the ability of dynamic motion analysis (DMA) to diagnose IFI by identifying subjects presenting with hip pain, and restricted hip extension, adduction and external rotation on DMA, and compare results to MRI and CT imaging, treatment and clinical outcomes.

Methods



Subjects were stratified into two groups, restricted and control, based on results of DMA. MRI and CT imaging of all subjects were reviewed. The ischiofemoral distance calculated and imaging assessed for signs of IFI. Imaging was correlated with treatment and clinical outcomes.

Methods

31 subjects with less than 15° 'EXT with 15 EXL', (combined extension, adduction and external rotation of the hip) on DMA were in the restricted group (Fig 1) and 30 subjects with a minimum of 15° in the control group (Fig 2).

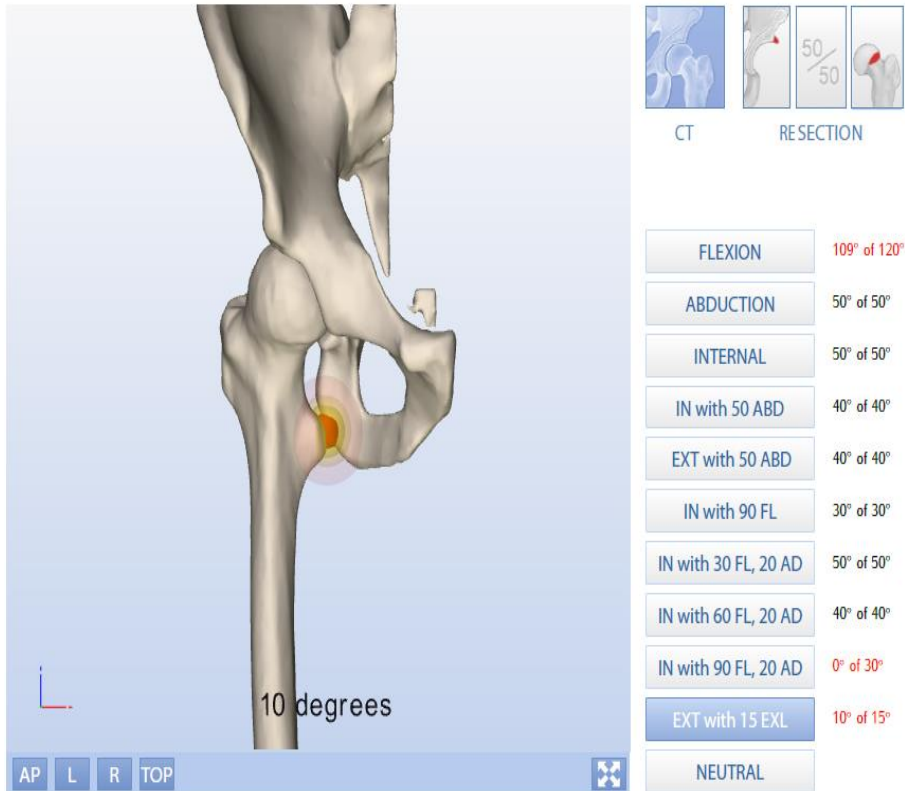


Figure 2



Figure 2

Methods

The ischiofemoral distance was measured from axial pelvic CT scans (figure 3). T3 MRI imaging assessed for signs of IFI such as quadratus femoris oedema.

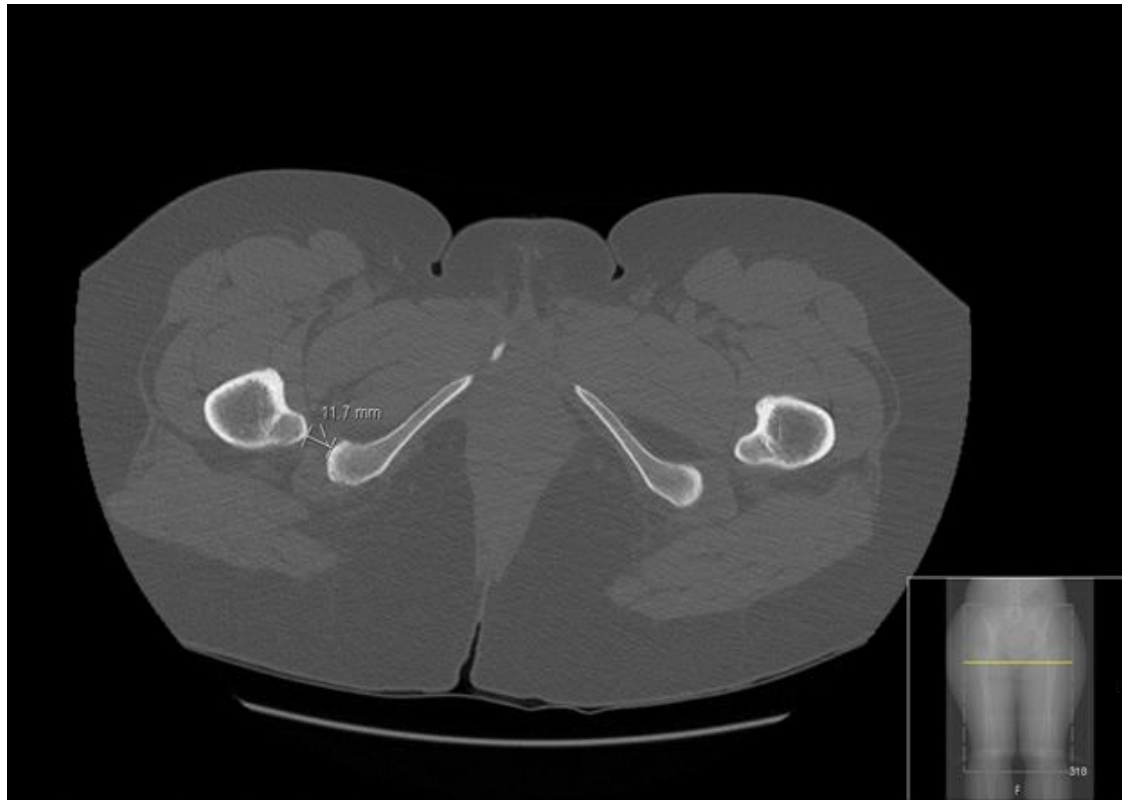


Figure 3

Results



Table 1: Demographic features

Characteristics	External rotation >15° (n =30)	External rotation <15° (n=31)	P value
Age (years)	32.77 SD 8.94	36.23 SD 8.93	0.132
Gender			
Female	14 (46.7)	26 (83.9)	0.002*
Male	16 (53.3)	5 (16.1)	
BMI	24.68 SD 3.20	26.0 SD 5.01	0.795
ASA	1.20 SD 0.41	1.26 SD 0.45	0.593

Abbreviations: standard deviation, SD; body mass index, BMI; femoroacetabular impingement, FAI; American Society of Anesthesiologists, ASA.

Data are presented as No. (%)

*Statistically significant p values

Results



Table 2: Radiological features on CT scan and MRI

Characteristics	External rotation >15° (n =30)	External rotation <15° (n=31)	P value
IF distance (mm)	35.79 SD 8.39	20.86 SD 7.61	0.000*
Femoral neck version angle (degrees)	10.89 SD 10.51	19.83 SD 7.18	0.001*
Femoral neck inclination (degrees)	127.25 SD 5.03	130.06 SD 6.57	0.095
Presence of cam lesion	15 (50.0)	11 (35.5)	0.305
QF oedema	3 (10.0)	11 (35.5)	0.031*

Abbreviations: standard deviation, SD; quadratus femoris, QF; ischiofemoral, IF.

Data are presented as No. (%)

*Statistically significant p values

Results



Table 4: Diagnosis

Diagnosis	External rotation >15° (n =30)	External rotation <15° (n=31)	P value
FAI	17 (56.7)	8 (25.8)	0.022*
Degenerative changes	1 (3.3)	5 (16.1)	0.120
Labral tear	6 (20.0)	12 (38.7)	0.114
Other	6 (20.0)	6 (19.3)	0.949

Abbreviations: standard deviation, SD, femoroacetabular impingement, FAI.

Data are presented as No. (%)

*Statistically significant p values

Discussion



Subjects with reduced hip extension, adduction and external rotation did not have abnormally reduced ischiofemoral distances compared to measurements described in published literature but were significantly narrower when compared to the control group^{1,2,3,4}. The majority of subjects with suspected IFI on DMA were female. The anatomy of the female pelvis would explain why these subjects had a narrower ischiofemoral distance than the control group who were evenly matched for males and females.

Discussion



None of the subjects with suspected IFI on DMA were diagnosed with the condition clinically despite having narrow IFI distances and varying levels of QF oedema. Addressing other pathology such as FAI successfully treated all these patients. This therefore suggests that IFI is may be a radiological diagnosis which may not always not translate clinically.

References



1. Torriani M, Souto SCL, Thomas BJ, Ouellette H, Bredella M a. Ischiofemoral impingement syndrome: An entity with hip pain and abnormalities of the quadratus femoris muscle. *Am J Roentgenol.* 2009;193(1):186-190.
2. Khodair SA, Ghieda UE, Elsayed AS. Ischiofemoral impingement syndrome: Spectrum of MRI findings in comparison to normal subjects. *Egypt J Radiol Nucl Med.* 2014;45(3):819-824.
3. Bredella MA, Azevedo DC, Oliveira AL, et al. Pelvic morphology in ischiofemoral impingement. *Skeletal Radiol.* 2014;44(2):249-253.
4. Maraş Özdemir Z, Aydıngöz Ü, Görmeli CA, Sağır Kahraman A. Ischiofemoral Space on MRI in an Asymptomatic Population: Normative Width Measurements and Soft Tissue Signal Variations. *Eur Radiol.* 2015;25(8):2246-2253.