**Imaging for hip-related groin pain: Don't be hip-notised by the findings**

Dr. Kieran O’Sullivan, Sports Spine Centre, Aspetar Orthopaedic and Sports Medicine Hospital, Doha, Qatar

Ben Darlow, Department of Primary Health Care and General Practice, University of Otago, Wellington, New Zealand

Peter O’Sullivan, School of Physiotherapy and Exercise Science, Curtin University, Perth, Australia

Bruce B. Forster, Department of Radiology, Faculty of Medicine, University of British Columbia, Vancouver, Canada

Michael P Reiman, Department of Orthopaedic Surgery, Duke University Medical Center, Durham, North Carolina, USA

Adam Weir, Aspetar Orthopaedic and Sports Hospital, Doha, Qatar and Amsterdam Center of Evidence Based Sports Medicine, Academic Medical Center, Amsterdam, The Netherlands

Corresponding author:

Kieran O’Sullivan

[Kieran.osullivan@aspetar.com](mailto:Kieran.osullivan@aspetar.com)

Tel: +97444132076

Awareness of femoroacetabular impingement (FAI) syndrome, acetabular labral tears and chondral lesions as potential causes of hip-related groin pain has increased considerably due to advances in imaging and arthroscopic surgery. Consequently, hip imaging and surgery rates have grown rapidly.1 However, there is no strong evidence of improved clinical outcomes with arthroscopic interventions. Although imaging findings are only diagnostic for FAI syndrome when they exist *together with clinical signs and symptoms*, imaging remains the main criterion for FAI surgery.2 Most patients (71%) are willing to undergo surgery based solely upon their physician’s recommendation.3 We question whether such reliance on imaging can be justified. Does it have risks (e.g. radiation, downstream testing, costs) and may it lead to suboptimal management of hip-related groin pain?

**Do imaging findings predict hip-related groin pain?**

People with both large cam morphology and reduced hip internal rotation are 25 times more likely to develop future hip osteoarthritis (OA).4 While such high odds ratios cannot be ignored, many with such morphology do not develop future hip OA,4-6 and confounding variables could explain some of this relationship. Over 50% of athletes have cam morphology, and over 65% of asymptomatic people, including athletes, have acetabular labral tears.7 Some imaging findings (e.g. pincer morphology) previously considered pathological might actually be protective.8 Additionally, imaging’s limited clinical utility9 and poor association with hip pain10 make it difficult to distinguish a clinically significant imaging finding from benign variation; thus we strongly support the term cam ‘morphology’, replace ‘deformity’ in this setting.11. Caution is therefore warranted in correlating imaging findings with pain.

**Clinical Considerations**

1. Don’t rush to imaging

While imaging may be indicated in some patients with hip-related groin pain, determining with confidence which patients need imaging, and which findings should guide diagnosis and treatment requires careful correlation with history (e.g. traumatic onset or not), physical examination findings, and factors such as age and activity levels. Consideration of alternative causes for groin pain is critical,12 while correlation with diagnostic joint infiltration11 to confirm an articular etiology, may be useful.

1. Interpret imaging cautiously

When imaging is performed, report findings using the CLEAR principle.13

*Consistent Language:* Minimally threatening language using accurate and easily understood words should be used to communicate imaging findings, without increasing fear that groin pain is always caused by structural ‘damage’.13

*Epidemiological information:* Comparisons to age-matched findings for asymptomatic populations could help patients, and healthcare professionals, contextualise the findings.

*Assessment of Relevance:* Explaining what imaging findings do, and do not, mean for individual patients in isolation from clinical features is fraught with difficulty. There is no clear cut-off which signifies pathology,9-11 with hip morphology being influenced by multiple factors such as ethnicity14 and loading history.15

1. Learn from recent history

Technical advances in surgery have increased imaging and surgery rates without obvious clinical benefit in some clinical contexts – for example, lumbar discectomy16 as well as arthroscopic subacromial decompression17 and knee partial meniscectomy.18 It seems possible that history may be repeating itself at the hip joint;1,19 patients with common changes in tissue morphology which are presumed to be pathological undergo surgery. With respect to FAI syndrome, even when cam morphology is identified, and appears closely linked to pain, there is no strong evidence that any specific management approach (surgical, conservative care, rehabilitation or pharmacological) is superior.11

1. Consider the whole person

Musculoskeletal pain is influenced by multiple factors including training load,20 sleep,21 stress, fatigue, attitudes, beliefs and mood,22 as well as structural morphology. Imaging findings are only one part of the jigsaw puzzle. These ‘non-structural’ factors influence the pain experience as well as tissue resilience and local sensitivity, reinforcing the need to carefully interpret aggravating patterns and physical examination tests. Modifiable factors such as these often represent more potent therapeutic targets than structural tissue changes.

**Future Research Directions**

Some research avenues may enhance understanding and management. Future prospective studies should control for key confounding factors likely to be important in developing musculoskeletal pain (e.g. training load, sleep, mood, stress) to better identify what unique contribution, if any, hip morphology makes in the development of hip-related groin pain. There are several trials currently underway which seek to compare the efficacy of arthroscopic FAI surgery with (i) well described conservative care protocols23,24 and (ii) placebo surgery.25 Unless, and until, these trials demonstrate additional value of arthroscopic FAI surgery, we feel it isprudent to be cautious in assuming that it is effective.

**So, how to avoid hip-nosis?**

Clinicians may currently be over reliant on imaging findings when making treatment decisions. When requested, imaging should only form one part of the overall assessment to evaluate an athlete’s health. Findings should be reported in an understandable manner, and reference the prevalence of such tissue changes in age-matched asymptomatic populations. In this way, imaging may inform, but does not necessarily dictate, management. This helps ensure that the athletes themselves are treated, rather than just their imaging findings.

**References:**

1. Reiman MP, Thorborg K. Femoroacetabular impingement surgery: are we moving too fast and too far beyond the evidence? *Br J Sports Med* 2015;49(12):782-84.

2. Peters S, Laing A, Emerson C, et al. Surgical criteria for femoroacetabular impingement syndrome: a scoping review. *Br J Sports Med* 2017;bjsports-2016-096936

3. Boye GN, Murray K, Clohisy JC, et al. Feasibility of a randomized clinical trial for treatment of femoroacetabular impingement of the hip. *Orth J Sports Med* 2015;3(7):2325967115592844.

4. Agricola R, Waarsing J, Thomas G, et al. Cam impingement: defining the presence of a cam deformity by the alpha angle: data from the CHECK cohort and Chingford cohort. *Osteoarthr Cartilage* 2014;22(2):218-25.

5. Bardakos N, Villar R. Predictors of progression of osteoarthritis in femoroacetabular impingement. *Bone & Joint Journal* 2009;91(2):162-69.

6. Hartofilakidis G, Bardakos N, Babis G, et al. An examination of the association between different morphotypes of femoroacetabular impingement in asymptomatic subjects and the development of osteoarthritis of the hip. *J Bone Joint Surg BR* 2011;93(5):580-86.

7. Frank JM, Harris JD, Erickson BJ, et al. Prevalence of femoroacetabular impingement imaging findings in asymptomatic volunteers: a systematic review. *Arthroscopy* 2015;31(6):1199-204.

8. Agricola R, Heijboer M, Roze R, et al. Pincer deformity does not lead to osteoarthritis of the hip whereas acetabular dysplasia does: acetabular coverage and development of osteoarthritis in a nationwide prospective cohort study (CHECK). *Osteoarthr Cartilage* 2013;21(10):1514-21.

9. Reiman MP, Thorborg K, Goode AP, et al. Diagnostic Accuracy of Imaging Modalities and Injection Techniques for the Diagnosis of Femoroacetabular Impingement/Labral Tear: A Systematic Review With Meta-analysis. *Am J Sports Med* 2017:0363546516686960.

10. Kim C, Nevitt MC, Niu J, et al. Association of hip pain with radiographic evidence of hip osteoarthritis: diagnostic test study. *Bmj* 2015;351:h5983.

11. Griffin D, Dickenson E, O'Donnell J, et al. The Warwick Agreement on femoroacetabular impingement syndrome (FAI syndrome): an international consensus statement. *Br J Sports Med* 2016;50(19):1169-76.

12. Weir A, Brukner P, Delahunt E, et al. Doha agreement meeting on terminology and definitions in groin pain in athletes. *Br J Sports Med* 2015;49(12):768-74.

13. Darlow B, Forster BB, O'Sullivan K, et al. It is time to stop causing harm with inappropriate imaging for low back pain. *Br J Sports Med* 2017;51(5):414-15.

14. Mosler AB, Crossley KM, Waarsing JH, et al. Ethnic Differences in Bony Hip Morphology in a Cohort of 445 Professional Male Soccer Players. *Am J Sports Med* 2016;44(11):2967-74.

15. Nepple JJ, Brophy RH, Matava MJ, et al. Radiographic findings of femoroacetabular impingement in National Football League Combine athletes undergoing radiographs for previous hip or groin pain. *Arthroscopy* 2012;28(10):1396-403.

16. Reiman MP, Sylvain J, Loudon JK, et al. Return to sport after open and microdiscectomy surgery versus conservative treatment for lumbar disc herniation: a systematic review with meta-analysis. *Br J Sports Med* 2016;50(4):221-30.

17. Ide J, Maeda S, Takagi K. A comparison of arthroscopic and open rotator cuff repair. *Arthroscopy* 2005;21(9):1090-98.

18. Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med* 2013;2013(369):2515-24.

19. Kemp J, Crossley K, Roos E, et al. What fooled us in the knee may trip us up in the hip: lessons from arthroscopy. *Br J Sports Med* 2014;48(16):1200-01.

20. Gabbett TJ. The training—injury prevention paradox: should athletes be training smarter and harder? *Br J Sports Med* 2016;50(5):273-80.

21. Finan PH, Goodin BR, Smith MT. The association of sleep and pain: an update and a path forward. *J Pain* 2013;14(12):1539-52.

22. Linton S, Nicholas M, MacDonald S, et al. The role of depression and catastrophizing in musculoskeletal pain. *Eur J Pain* 2011;15(4):416-22.

23. Palmer A, Ayyar-Gupta V, Dutton S, et al. Protocol for the Femoroacetabular Impingement Trial (FAIT). *Bone and Joint Research* 2014;3(11):321-27.

24. Griffin DR, Dickenson E, Wall PD, et al. Protocol for a multicentre, parallel-arm, 12-month, randomised, controlled trial of arthroscopic surgery versus conservative care for femoroacetabular impingement syndrome (FASHIoN). *BMJ open* 2016;6(8):e012453.

25. FIRST Investigators. A multi-centre randomized controlled trial comparing arthroscopic osteochondroplasty and lavage with arthroscopic lavage alone on patient important outcomes and quality of life in the treatment of young adult (18–50) Femoroacetabular impingement. *BMC Musculoskelet Disord* 2015;16(1):64.