

# MRI investigation for groin pain in athletes: is radiological terminology clarifying or confusing?

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Advances in the field of groin pain in athletes have long been hampered by the use of inconsistent and confusing nomenclature. This reflects a lack of clarity on whether pathology is clinically relevant and on differentiating between often multiple painful structures. In a systematic review of 72 studies, 33 different diagnostic terms were used<sup>1</sup> to describe patient cohorts, often with similar clinical presentations.

## AGREEING ON CLINICAL TERMINOLOGY

A thorough patient and injury history and standardised complete physical examination remain the cornerstone for diagnosing athletes with groin pain. The Doha agreement defined four clinical entities (pubic, adductor, iliopsoas and inguinal-related groin) while also highlighting the hip and other possible causes of groin pain.<sup>2</sup> This agreement aimed to simplify the terminology used to classify/diagnose athletes with groin pain and to provide a standardised approach to physical examination. This approach uses the patient's 'known' pain to identify the specific involved clinical entity. However, not all papers published since have adopted the terminology recommended in the Doha agreement.

## LACK OF HISTOLOGICAL EVIDENCE FOR TISSUE PATHOLOGY

There remains a lack of histopathological evidence to support the multiple

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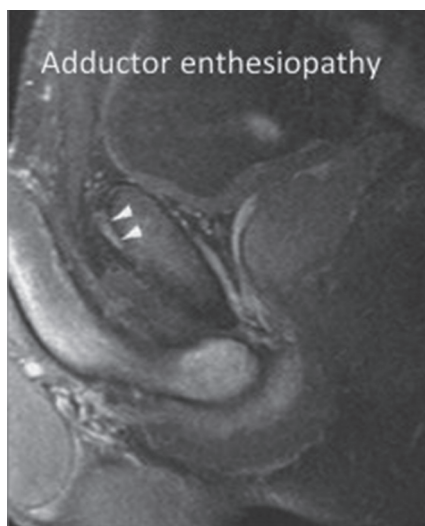
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**Figure 1** Sagittal T2-weighted fat-suppressed sagittal groin MRI. ALT, adductor longus tendon; P, pubic bone; PAD, pubic aponeurosis defect; RA, rectus abdominus; SCF, subcutaneous fat.<sup>5</sup>

pathological conditions implicated in groin pain. A single study examined the histopathological findings in the pubic bone.<sup>3</sup> Superior pubic ramus bone biopsies were



**Figure 2** Sagittal T1-weighted fat-suppressed post-gadolinium groin MRI. Arrowheads show high signal enhancement in adductor enthesiopathy.<sup>6</sup>

performed in athletes with long-standing groin pain and bone marrow oedema on the MRI. New woven bone formation was found without signs of inflammation or osteonecrosis.

Despite some surgical studies recommending adductor, pyramidalis or rectus abdominus detensioning due to tendinous injury, there is little histopathological data on tendons in the groin region to support this. Likewise the exact pathology underlying pain in the inguinal region is unclear, despite the many different surgical approaches that are commonly described for athletes with inguinal-related groin pain. A better understanding of the pathologies underlying these clinical presentations would help better define the problem and possibly improve treatment strategies.

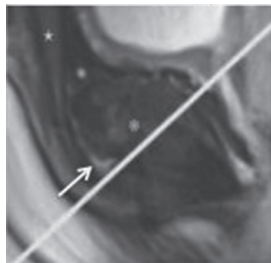
## MODERN IMAGING—WHAT DOES IT ADD?

Modern radiological imaging potentially offers a non-invasive insight into the pathological or adaptive processes in underlying tissues and structures. MRI offers many potential advantages such as reliable and reproducible imaging protocols and avoiding the dangers of ionising radiation. It also gives a clear depiction of the femoroacetabular joint, iliopsoas, rectus abdominus, adductor complex, pubic rami, symphysis and the sacroiliac joints in one examination modality. Regarding the inguinal canal, previous imaging reports have not found any specific or sensitive features that indicate primary imaging abnormality or severity in this patient group.

## COMPLEX ANATOMY—COMPLEX TERMINOLOGY

The radiological interpretation of the complex anatomical intersections in the groin is not straightforward. A critical review of the literature on radiological findings in adductor and symphyseal-related groin pain in athletes identified 17 papers in the field.<sup>4</sup> It highlighted the use of differing diagnostic terminology, reflecting the heterogeneous nomenclature in non-radiological papers.

The tendinous insertions around the pubic symphysis is one area where the anatomical presentation is complex. Anatomically it is thought to be a continuous aponeurosis, with a confluence of pubic symphysis capsule, fascia and tendons of the adductor group and lower abdominal muscles. The detail of these structures and defining where one structure stops and another begins is also



**Figure 3** Sagittal short tau inversion recovery (STIR) groin MRI. Increased signal intensity arrow adductor tendinopathy.<sup>7</sup>

subject to debate. Various studies have described abnormal signal or partial disruption of this continuous anatomical area as adductor tendinopathy, enthesopathy, secondary cleft, superior cleft or plate/aponeurosis injuries.

#### **PUBIC APONEUROSIS DEFECT?—TENDINOPATHY?—ENTHESOPATHY?**

Clinicians need to interpret any radiological findings in the light of their clinical examination to aid localisation and diagnosis. A recent study on clinical and imaging data from a large cohort of athletes with groin pain reported that a ‘pubic aponeurosis defect’ was most prevalent imaging finding. This was defined as a combination of the palpation pain at the rectus pubic attachment with pain on resisted sit up and a positive squeeze test, with MRI findings of the rectus attachment demonstrating fluid between the attachment and aponeurosis (figure 1).<sup>5</sup>

Other research groups have described similar MRI findings previously, but predominantly by radiologist report separate to clinician interpretation and used the term adductor enthesopathy (figure 2).<sup>6</sup>

While others again described similar imaging findings but used the term adductor tendinopathy (figure 3).<sup>7</sup>

Based on the terminology chosen, it would appear that studies are reporting seemingly different conditions. In fact, there may be fewer differences than first thought. The images bear many similarities. It is possible that there is a continuum of pathology between the adductor, gracilis and rectus aponeurosis.

Interestingly, studies testing reliability for reporting this imaging appearance found agreement varied from poor to good.<sup>7–9</sup> In the future, adequate definition of terms used and testing reliability is vital.

#### **RADIOLOGICAL AGREEMENT**

To answer many fundamental questions, agreeing on terminology and definitions for the imaging of groin pain in athletes, while challenging, would be a great achievement. Combining anatomical, histological, clinical and radiological findings, if possible, would improve understanding of underlying pathological mechanisms of groin pain in athletes. Future studies need detailed reporting, reliable assessment techniques and clear definitions to advance the field.<sup>10</sup>

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