Imaging Athletic Groin Pain

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KEYWORDS

• Groin pain • Athlete • Inguinal disruption • Adductor injury • Imaging

KEY POINTS

- Outlining the diagnostic challenges of groin pain in athletes.
- Describing the 4 main entities of groin pain based on clinical findings.
- Describing the key imaging features of the 4 clinical entities.

INTRODUCTION

Sports hernia, athletic pubalgia, Gilmore's groin, hockey groin, and osteitis pubis are just some of the terms used interchangeably to describe groin pain in athletes. This reflects the difficulty radiologists encounter when reporting the pathology in this area. This is in part explained by the very complex anatomic area of the body, where soft tissue and bony structures are intimately related. The lack of a consensus on pathologic findings and terminology poses a real difficulty for allowing a clear discourse with clinicians about patient management options and comparative research. In an attempt to define this complex condition and unify diagnostic terms across different clinical disciplines, leading experts in this field met in the first world conference on groin pain. The key aspect of this conference was to agree on terminology and definitions of groin pain.[1] First, 'groin pain in athletes' was agreed as the preferred term for this group of conditions. They defined 4 clinical 'entities' for groin pain in athletes to reflect the recognizable pattern of symptoms and signs exhibited by the athlete. Therefore, the entities are primarily based on history and clinical examination and not imaging findings. The 4 defined entities are (**Fig. 1**):

- Adductor-related groin pain,
- Pubic-related groin pain,
- Inguinal-related groin pain, and
- Iliopsoas-related groin pain.

The athlete's history should include groin pain worsening with exercise. The clinical examination should comprise palpation, resistance testing, and stretching of the specific affected muscle groups.[1] Based on the injury pattern on imaging, the radiologist will help in deciding which of the 4 patterns or combination of patterns is present. The expert group also agreed that pain from the hip joint should always be considered as a possible cause of groin pain. When there is clinical suspicion of hip-related pain, the patient should be accordingly referred and managed.

This article outlines each separate clinical entity, with a description of the corresponding functional anatomy and imaging findings. The imaging has been described mainly in terms of MR imaging findings, because this is the principal imaging modality used to investigate groin pain, although plain radiographs and ultrasound can be very useful adjuncts in specific circumstances, especially if an alternative pathology needs to be excluded.

Conflicts of Interests: None declared.

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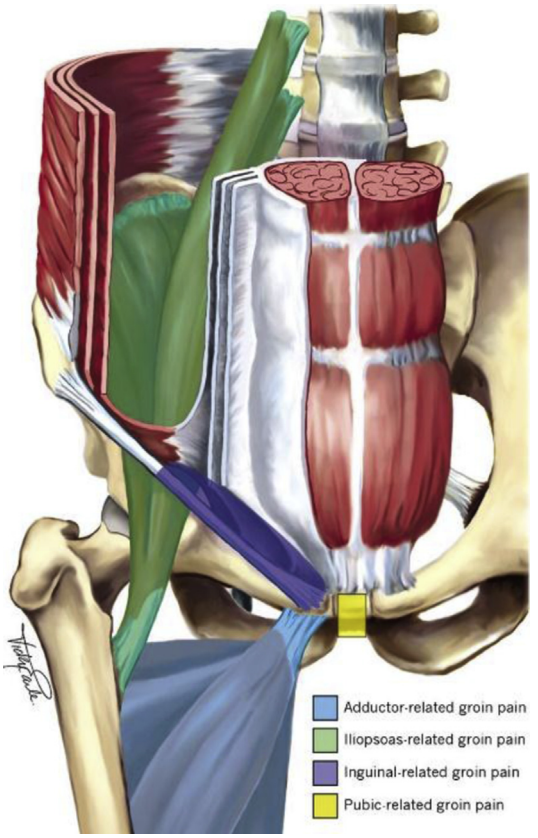

Fig. 1. Defined clinical entities for groin pain. Adductor-related groin pain: Adductor tenderness AND pain on resisted adduction. Iliopsoas-related groin pain: Iliopsoas tenderness and more likely if pain on resisted hip flexion AND/OR pain on hip flexor stretching. Inguinal-related groin pain: Pain in inguinal canal region AND tenderness of the inguinal canal. No palpable inguinal hernia is present. More likely if aggravated with abdominal resistance OR Valsalva/cough/sneeze. Pubic-related groin pain: Local tenderness of the pubic symphysis and the immediately adjacent bone. No particular resistance tests to test specifically for pubic-related groin pain. (*From* 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;49:768–74; with permission.)

FUNCTIONAL ANATOMY OF THE CLINICAL ENTITIES OF GROIN PAIN

The groin is a very complex anatomic region and it is accepted that often the clinical/imaging findings will not be able to diagnose a discrete entity since multiple groin pathologies may coexist. Another contributing factor to diagnostic confusion is the variable nerve supply of the groin. The lumbar plexus is formed by the ventral rami of L1 to L5 and is located posteromedial to the psoas muscle and anterior to the lumbar vertebrae. The branches of the lumbar plexus provide innervation to the groin and thigh. A detailed anatomic description of the nerve supply to the groin is beyond the scope of this article, but it should be appreciated that any variation in the neural anatomy will cause variation in symptoms, even when produced by the same pathology. Also any involvement of a nerve close to the area of pathology will cause referred pain as well as local symptoms, again causing diagnostic confusion.

Adductor-Related Groin Pain

The hip adductor muscles are composed of the short adductors: pectineus, adductor brevis, and adductor longus and the long adductors (gracilis and adductor magnus); (**Fig. 2**). The adductors originate on the pubis and ischial bones and insert onto the posteromedial femur with the exception of gracilis, which inserts onto the medial tibia. The pectineus is innervated by the femoral nerve, whereas all the other adductor muscles are innervated by branches of the obturator nerve (L2-L4). The main function of this muscle group is to adduct the hip and stabilize the pelvis during the swing phase of gait. With regard to sport, they are important in any sport that requires fast changes in direction and rapid leg movements against resistance, such as kicking a ball. It is the adductor longus muscle that is chiefly implicated in adductor-related groin pain. The adductor longus is the most anterior of the adductor muscles and it has a tendinous origin from the anterior pubic body. This tendon has a characteristic triangular shape and it meets and blends with the

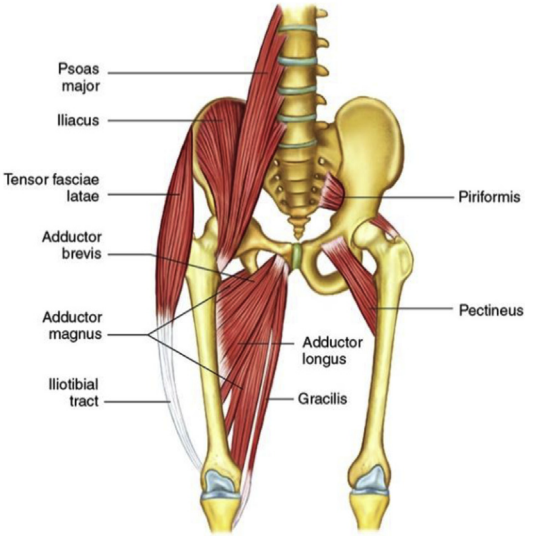

Fig. 2. Diagrammatic representation of the adductor muscle anatomy and their relationship to surrounding structures.