Imaging of Athletic Pubalgia and Core Muscle Injuries

Clinical and Therapeutic Correlations

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KEYWORDS

• Core injury • Core muscle injury • Athletic pubalgia • Sports hernia
• Rectus abdominis/adductor aponeurosis • MRI

KEY POINTS

- MRI is the imaging modality of choice for diagnosis and delineation of core injuries or athletic pubalgia lesions.
- The rectus abdominis and thigh adductor muscle origins all attach to a fibrocartilaginous plate at the anterior pelvis, intimate to the pubic symphysis and pubic tubercles.
- Core injuries involving the rectus abdominis/adductor aponeurosis or the pubic plate can be unilateral, bilateral, or midline in location.
- Although hip injury is the most common confounding cause of groin pain in athletes, numerous other musculoskeletal and visceral injuries ranging from the iliac crest to the pubic symphysis should always be considered.

INTRODUCTION

Injuries to the groin are common in athletes. Clinical presentations of the various causes of groin pain in athletes overlap, and incomplete or incorrect diagnoses may lead to protracted pain syndromes and dysfunction. Such delays cause frustrations and consternation with respect to expected time frames for return to play, or even return to normal daily activities. The three broad categories of differential diagnoses for

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activity-induced groin pain are (1) core muscle injury (athletic pubalgia); (2) ball-in-socket hip joint injury; and (3) other causes.[1] Clinicians managing these injuries need to be familiar with the three categories and broad array of causes, and perform histories and physical examinations comprehensively to come up with the correct diagnoses and appropriate treatment paths. Magnetic resonance imaging (MRI) plays a primary role in the diagnosis and grading of these lesions.[2]

Rapid acceleration, deceleration, twisting, lateral motion, or hyperextension/hyperabduction results in tension on the athlete's musculoskeletal core symmetrically arranged around the pubic bone. Some of the activities most frequently associated with core injury are soccer, American football, ice hockey, lacrosse, rugby, and baseball. Other activities, such as rodeo and basketball, may have a lower incidence of groin pain but are associated with more severe injuries. The pattern of groin injury may have a predilection for the sport type or position of the athlete. In American football, an injury to a right-sided defensive back or linebacker may involve the left groin as the player transitions from a "karaoke" style of running to backpedaling while in pass coverage. In baseball, a left-sided power hitter creates incredible torque across the left lower abdomen and groin. Very slight alteration in "opening the hips" during the swing may cause a left-sided core injury. Pitchers, however, may generate great force on the lower abdomen on either the throwing side or contralateral side. Depending on the specific mechanics and wear-and-tear foci, "transition" phases such as covering first base or fielding a bunt, may cause further alterations and lead to injury on one side versus the other. Hockey goalies may effectively separate their thighs from their abdomens to make a save and produce isolated adductor injuries or disrupt their entire rectus abdominis or adductors from the fibrocartilage plate surrounding the pubic bone. The authors have seen numerous severe cases in which this occurs; the injury extends to complete disruption of the pubic symphysis joint.

Core muscle injury and athletic pubalgia are current, roughly interchangeable descriptors of pelvic musculoskeletal injuries that do not originate from the ball-in-socket hip joint.[3] The authors favor the former term because it highlights the true pathophysiology. Despite its accuracy, athletic pubalgia does not exactly roll off the nonmedical tongue. Other terms including "sports hernia" and "sportsman's hernia" have fallen out of favor because of their misleading nature. These different lesions cannot be lumped into one injury type and they have nothing to do with true inguinal, femoral, obturator, or other types of hernias. True hernias do occasionally occur in athletes, but when they do, they are likely coincidental to the exertional pain that the core injuries produce. The authors emphasize the correct terminology because they continue to see many inappropriate traditional herniorrhaphies presumptively related to the use of this term and some studies in the literature without adequate definitions or compulsive long-term follow-up. They do recognize, however, that several procedures predicated on reinforcement or stabilization of the posterior wall of the rectus abdominis muscle have shown some short-term benefit for some lesions.[4]

The fulcrum of most core muscular injuries is the entire pubic bone with its investing fibrocartilage, which in the radiologic literature is often called the pubic plate (aponeurotic plate). The caudal rectus abdominis muscles, adductor longus, adductor brevis, and pectineus muscles of the adductor compartment blend into this plate over the anterior pubic bones and pubic symphysis joint. This large, plate-like attachment extends bilaterally from one pubic tubercle at the anteroinferior region of the superior pubic ramus just lateral to the pubic symphysis, confluently to the contralateral pubic tubercle. The interaction between the rectus abdominis and central adductor attachments provides much of the stability of the athlete's anterior core. Several other muscles pass in close proximity to this pubic plate including the