Understanding Athletic Pubalgia: A Review

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ABSTRACT

Athletic Pubalgia, more commonly known as sports hernia, is defined as chronic lower abdominal and groin pain without the presence of a true hernia. It is increasingly recognized in athletes as a source of groin pain and is often associated with other pathology. A comprehensive approach to the physical exam and a strong understanding of hip and pelvic anatomy are critical in making the appropriate diagnosis. Various management options are available. We review the basic anatomy, pathophysiology, diagnostic approach and treatment of athletic pubalgia as well as discuss associated conditions such as femoroacetabular impingement.

KEYWORDS: athletic pubalgia, groin pain, sports hernia, impingement

INTRODUCTION

Hip and groin pain has long been a diagnostic dilemma in athletes given the complexity of the anatomy and the multiple sources of pathology. Athletic pubalgia is increasingly identified as a source of pain in athletes as it is becoming more recognized and better understood. Originally termed "Gilmore's groin" over 40 years ago, it has also been known as sportsmen's hernia, groin disruption injury, sports hernia and, most recently, core muscle injury (CMI).[1,2,3,4] The evolution from "hernia" to CMI/athletic pubalgia stems from our developed understanding that there is no true hernia or deficiency from the posterior wall of the inguinal canal but rather an injury to the various structures that comprise the pubic aponeurosis.[4,5,6] Athletic pubalgia can occur in isolation but often occurs in the setting of other hip and pelvic pathology which can make its diagnosis challenging. Although this is much more common in athletes, it can be seen in non-athletes and is referred to simply as pubalgia in this population.

ANATOMY AND PATHOPHYSIOLOGY

The pubic symphysis is believed to act as a fulcrum for the anterior pelvis and, according to Meyers, a majority of pathology stems from this fulcrum point.[7] It is a common attachment site for the rectus abdominus and adductor longus which are confluent and form a sheath anterior to the pubis. The confluence of the rectus abdominus, the conjoint tendon (formed by the internal oblique and transversus abdominus) and external oblique form the pubic aponeurosis, which is also confluent with the adductor and gracilis. The rectus abdominus flexes the trunk, compresses the abdominal viscera, and stabilizes the pelvis for motion at the hip while the adductors stabilize the anterior pelvis. During athletics, a large amount of force occurs at the anterior pelvis in which the pubic symphysis is its center. The opposing forces of the adductor longus directly against the rectus abdominus at the pubic symphysis fulcrum point are thought to be implicated as the origin mechanism of athletic pubalgia. Therefore, when the rectus is weakened, the adductor longus pulls in an unopposed fashion. Typically this is from chronic or acute intense muscle contractions by the athlete while hyperextending and/or twisting the trunk. The inequality of forces acting on the anterior pelvis leads to tearing at the insertion point of the rectus abdominus. (**Figure 1**) Athletic pubalgia is more common in males due to a narrower pelvis that cause greater shifts in force and less stability than the wider female pelvis.[7]

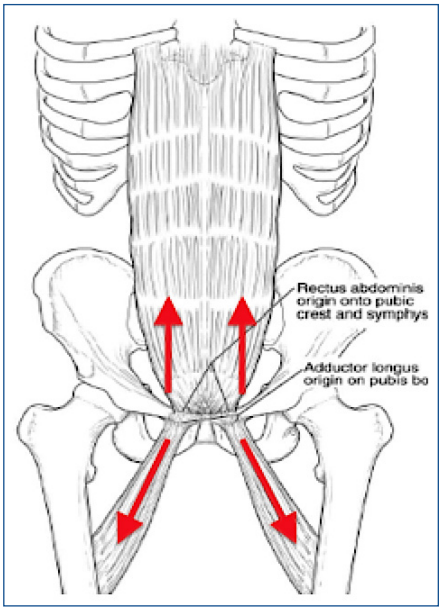

Figure 1. Pathoanatomy of Athletic Pubalgia [7]
The rectus abdominus and adductor longus muscles pull in the opposite direction. With injury to the rectus an imbalance in muscle forces occurs causing groin pain.

PATIENT HISTORY

Chronic lower abdominal and groin pain is increasingly more recognized in high-level athletes. Forces across the pelvis increase as muscle strength increases, which may explain why athletes are commonly affected. Activities that can lead to athletic pubalgia involve running, kicking, cutting

and twisting movements, and explosive turns and changes in direction. In the United States, soccer, ice hockey, and American football players are most commonly affected.[1,8,9]

Athletes usually present with the complaint of exercise-related unilateral lower abdomen and anterior groin pain that may radiate to the perineum, inner thigh, and scrotum. Pain is mostly relieved with rest. However, even with resolution of symptoms after a period of rest, the pain often returns with return to play. Pain can occur gradually, but 71% of athletes will relate the recurrence to a specific event.[1,9] This event can include trunk hyperextension and/or hip hyperabduction leading to increased tension in the pubic region. Kachingwe and Grech explained 5 signs and symptoms that they felt encompassed athletic pubalgia: "(1) a subjective complaint of deep groin/lower abdominal pain, (2) pain that is exacerbated with sport-specific activities such as sprinting, kicking, cutting, and/or sit-ups and is relieved with rest, (3) palpable tenderness over the pubic ramus at the insertion of the rectus abdominus and/or conjoined tendon, (4) pain with resisted hip adduction at 0, 45 and/or 90 degrees of hip flexion, and (5) pain with resisted abdominal curl-up." [9]

PHYSICAL EXAM

One should start palpation laterally at the inguinal ligament and work centrally to the pubic tubercle. It is important to include the pubic symphysis as osteitis pubis can often be present with athletic pubalgia. Exam findings include tenderness at or just above the pubic tubercle near the rectus insertion or hip adductor origin on the affected side. Pain can also be elicited with resisted sit-up and hip flexion. There is no a bulge at the external inguinal ring, or palpable true hernia. Valsalva maneuvers can occasionally reproduce symptoms. One should evaluate the adductor longus as a source of isolated pain by resisted leg adduction in both flexion and extension. This can also exacerbate the rectus abdominus symptoms. Adductor tenderness can be found in as many as 36% of athletes with athletic pubalgia.[1] A sensory exam should be performed as sensory disturbances and dysethesias in the lower abdomen, inguinal region, anteromedial thigh, and genitals can be present with occasional entrapment of the iliohypogastric, ilioinguinal, and genitofemoral nerves.[19] Both hips must be examined for range of motion and provocative maneuvers to rule out isolated findings of intra and extra-articular pathology that can coexist with athletic pubalgia. (**Table 1**)

Table 1. Examination for Groin and Hip

Athletic Pubalgia Test	Maneuver	Interpretation
Resisted Sit up	Patient supine, stabilizes the patient's feet. Arms straight ahead and sit up is performed. Hold for 5 seconds. .	A positive test is when the pain at rectus insertion is reproduced
Single or Bilateral Resisted Leg Adduction	Patient supine, flex leg to 30°. Places hands on the medial aspect of the patient's heel and instructs the patient to resist abduction . This can be done with isolated leg or simultaneously with contralateral leg	A positive test is when this reproduces the patient's pain
Hip Test	**Maneuver**	**Interpretation**
FADIR (Flexion, Adduction, Internal Rotation)	Patient supine, raises leg with hip flexed to 90 degrees and knee flexed to 90 degrees, adduct and internally rotates the hip	Positive if pain, suggest femoral acetabular impingement, labral tear
FABER (Flexion, Abduction, external rotation) (also know as Patrick test)	Patient supine, flex knee to 90 degrees, foot placed on opposite knee places one hand on opposite iliac crest to stabilizes pelvis against table, other hand placed on knee and externally rotates hip	Positive if pain, suggest sacroiliac disorder is pain posterior, if pain in groin suggest femoral acetabular impingement, labral tear, iliopsoas tendinits
Scour	Patient supine , passively flex and adducts the hip and places the knee in full flexion, then downward force along the shaft of the femur is applied while passively adducting/abducting and externally/internally rotating the hip	Positive is pain/catching/clicking must note where in motion the symptom occur, suggest hip labrum, capsulitis, osteochondral defects, acetabular defects, osteoarthritis, avascular necrosisand femoral acetabular impingment syndrome
DEXRIT (Dynamic External Rotatory Impingement Test)	Patient supine with contralateral hip flexed 90 degrees, affected hip flexed and brought through a wide arc of external rotation and abduction, and extension	Positive if pain, suggest femoral acetabular impingement, labral tear
DIRIT (Dynamic Internal Rotatory Impingement Test)	Patient supine with the contralateral hip flexed 90 degrees, affected hip flexed and brought through a wide arc of internal rotation and adduction, and extension	Positive if pain, suggest femoral acetabular impingement, labral tear

FEMOROACETABULAR IMPINGEMENT (FAI) AND OTHER ASSOCIATED CONDITIONS

Many disorders around the hip and pelvis can coexist with athletic pubalgia making diagnosis difficult. These include acetabular labral tears, adductor injuries, snapping hip syndromes, iliopsoas tendonitis, osteitis pubis, and femoroacetabular impingement. (**Figure 2**) One must rule out a true

Figure 2. Demonstration of a Pincer and Cam lesion

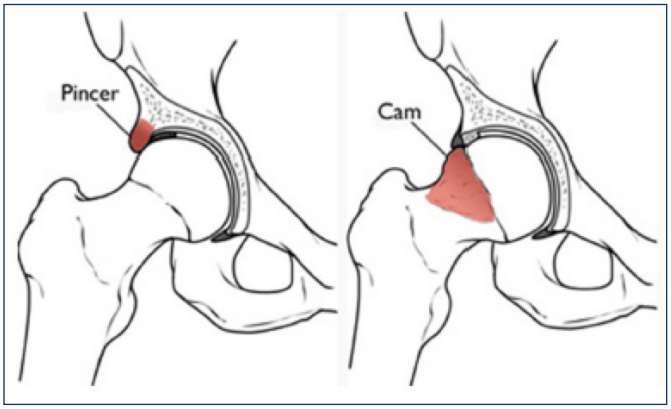

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Figure 3. Common X-ray findings Associated with Athletic Pubalgia
Anteroposterior pelvic radiograph in a collegiate hockey player with clinical examination consistent with intra-articular hip and athletic pubalgia symptoms reveals bilateral cam type de-formities (solid arrow), acetabular retroversion (dashed curved line), and osteitis pubis (dashed arrow).

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groin hernia, genitourinary and gynecological disorders, and intra-abdominal sources of pain that can mimic athletic pubalgia symptoms.

Recent literature has suggested a strong relationship between athletic pubalgia and FAI. Addressing one or the other independently may not resolve symptoms completely. Femoroacetabular impingement is defined as an abnormal contact between the femoral neck and the acetabular rim during terminal motion of the hip due to excessive bone on the acetabular rim, the femoral neck or both. [12] (**Figure 2 and 3**) Limited range of motion associated with FAI can lead to compensatory patterns of movement around the pelvis and trunk.[13] In a cadaveric study, Birmingham showed that cam morphology restricts hip motion and results in increased stress and motion on the pubic symphysis. This causes excessive strain at these joints and on the muscles that attach to them predisposing patients to athletic pubalgia.[14] Therefore, treatment of FAI may normalize hip motion which can restore core and pelvic mechanics.[15]

Multiple studies have shown that the treatment of athletic pubalgia alone may lead to poorer results and inability to return to play. Larson showed that pubalgia surgery alone allowed only 25% of patients to return to the previous level of sport, whereas arthroscopic treatment of FAI alone resulted in a 50% return to the previous level. However, when both conditions were surgically treated, 89% returned to sports.[13] Hammound reported similar findings with no patients returning to sport after athletic pubalgia surgery alone.[15]

Proximal adductor tendonopathy is often associated with athletic pubalgia and FAI. One study showed that 94% of athletes with adductor-related pain had radiographic signs of FAI.[10] Patients may also develop osteitis pubis, a stress injury to the perisymphyseal pubic bones secondary to increased strain on the anterior pelvis, and internal snapping hip syndrome, an iliopsoas tendinitis resulting from irritation of a tight iliopsoas tendon snapping over the iliopectineal eminence as the hip moves from flexion to extension.[1] Intra-articular hip pathology that may produce similar symptoms to athletic pubalgia include synovitis, loose bodies, osteoarthritis, avascular necrosis and torn acetabular labrum.

DIAGNOSTIC IMAGING AND DIAGNOSTIC INJECTIONS

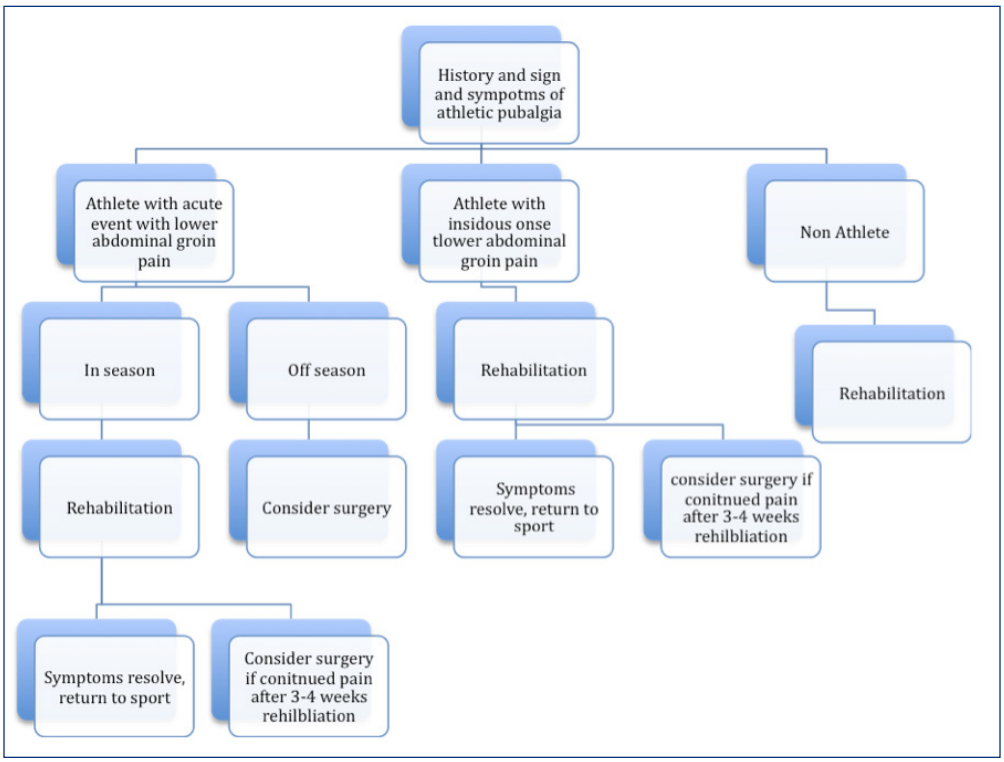
Radiographic evaluation includes a standing anteroposterior (AP) pelvis and lateral hip radiographs. One should look for intra-articular disorders including FAI, arthritis, loose bodies and acetabular dysplasia. Extra-articular pathology that may be visible on radiographs includes osteitis pubis, acute or chronic pelvic avulsion fractures/apophyseal injuries and fractures. Magnetic resonance imaging (MRI) of the pelvis is important to obtain for suspicion of athletic pubalgia and other already discussed pathology, although a dedicated hip MR arthrogram should be performed if there is specific concern for hip pathology such as FAI and labral tears. Concern for athletic pubalgia should be specified in the history. Tears of the rectus abdominus on MRI are uncommon. When a tear is seen, it is essentially pathognomonic for athletic pubalgia. Zoga found MRI to be 68% sensitive and 100% specific for rectus abdominus pathology when compared with findings at surgery. Rectus disruptions are seen as a cleft sign with increased signal on T2-weighted images at the rectus abdominus/adductor aponeurosis. (**Figure 4**) Also, MRI is 86% sensitive and 89% specific for adductor pathology and 100% sensitive for osteitis pubis.[16]

Diagnostic intra- and extra-articular injections of local anesthetic and/or corticosteroid can be helpful to make a diagnosis. This can be done either fluoroscopically or ultrasound guided. Injection of the hip joint followed by provocative maneuvers can be used to distinguish hip from pelvic pain. Continued pain in the lower abdominal/

Figure 4. MRI of Pelvis

Magnetic resonance imaging of the hip and pelvis in 22-year-old Division 1 football player with left sided lower abdominal and proximal adductor related pain reveals a disruption of the distal rectus abdominus/adductor aponeurosis on the left (solid arrow).

Figure 5. Algorthrim for Treatment of Athletic Pubalgia



adductor regions, despite an intra-articular injection, can help diagnose athletic pubalgia. Pubic symphysis injections can be performed when osteitis pubis is suspected. Pubic cleft and psoas bursal injections can also be performed for adductor and psoas-related pain, respectively.

CONSERVATIVE TREATMENT

Rehabilitation with physical therapy is first-line treatment for most patients with athletic pubalgia. However, treatment should be individualized based on the level of the athlete, the length of time before the athlete is expected to return to play, and timing of sport season. (**Figure 5**) Physical therapy should include core strengthening and stabilization, restoration of pelvic tilt and postural training. Increasing range-of-motion of the hip should be done with caution in patients with underlying hip pathology/FAI as changes in the pelvic motion may increase the patient's symptoms. Generally, conservative treatment should be attempted for 3 months before considering surgery. In-season athletes can trial a 4-week period of rest. Pharmacological treatments include nonsteroidal anti-inflammatories and oral steroid taper. Injections include selective corticosteroid or platelet-rich plasma injections into the rectus abdominus and/or adductor longus origin. After this rest period, return to sport can be trialed. If pain continues, it is up to the athlete whether or not to return to play. Return to play is not believed to worsen the tear or the surgical results of repair.[17] Paajanen compared nonsurgical treatment consisting of physical therapy and corticosteroid injections with surgical treatment for athletes with chronic groin pain. Twenty-three percent of patients in the nonsurgical group crossed over into the surgical arm due to continued pain. Only 50% of the nonsurgical patients returned to sport at 1-year. At 1-year follow-up, 97% of patients in the surgical group were pain free and returned to full sport.[18]

SURGICAL TREATMENT

If the athlete has continued pain despite a trial of nonsurgical management, surgery may be warranted. Athletes should be referred for evaluation to an orthopedic or general surgeon who is familiar with the recognition, treatment and management of athletic pubalgia. Multiple operations and

techniques including laparoscopic and open procedures exist which make it difficult to compare outcomes. Most techniques have satisfactory results reported in the literature. Principles of operative management include reinforcement of the posterior wall and fixation of the rectus abdominus or conjoint tendon. Most also recommend adductor tenotomy when adductor pain and dysfunction is present. Femoroacetabular surgery should also be considered accordingly if recognized as a contributing issue, as previously discussed. A full return to sport is expected at about 6–8 weeks if an isolated athletic pubalgia repair is performed and 4 months if FAI surgery is concomitantly done.[17]

SUMMARY

Though referred to as many names in the literature, chronic lower abdominal and groin pain without a true hernia is known as athletic pubalgia. It is most commonly seen in male athletes. The pathophysiology is based on weakening or tearing of the lower abdominal or adductor muscles and their opposing forces on the pubic bone. Symptoms include exercise-related unilateral lower abdominal and anterior groin pain that is relieved with rest. Examination shows tenderness at or just above the pubic tubercle near the rectus insertion and pain with a resisted sit-up. Intra-articular hip, genitourinary, and intra-abdominal pathology, as well as gynecological sources of pain in women, must be ruled out. FAI has been shown to be associated with athletic pubalgia and addressing both pathologies may be necessary for complete relief. Plain radiographs, pelvic MRI, and diagnostic injection should used to help make a diagnosis. Conservative treatment is the mainstay and physical therapy should be tried prior to any surgery. However, the timing and length of therapy should be individualized to the athlete. With failure of conservative treatment, referral to a specialist should be made for repair. Results of surgical treatment allow most athletes to return to play at 6 weeks.

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