

[Primary Care]

Sports Hernia/Athletic Pubalgia: Evaluation and Management



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Context: Sports hernia/athletic pubalgia has received increasing attention as a source of disability and time lost from athletics. Studies are limited, however, lacking consistent objective criteria for making the diagnosis and assessing outcomes.

Evidence Acquisition: PubMed database through January 2013 and hand searches of the reference lists of pertinent articles.

Study Design: Review article.

Level of Evidence: Level 5.

Results: Nonsurgical outcomes have not been well reported. Various surgical approaches have return-to-athletic activity rates of >80% regardless of the approach. The variety of procedures and lack of outcomes measures in these studies make it difficult to compare one surgical approach to another. There is increasing evidence that there is an association between range of motion-limiting hip disorders (femoroacetabular impingement) and sports hernia/athletic pubalgia in a subset of athletes. This has added increased complexity to the decision-making process regarding treatment.

Conclusion: An association between femoroacetabular impingement and athletic pubalgia has been recognized, with better outcomes reported when both are managed concurrently or in a staged manner.

Keywords: sports hernia; athletic pubalgia; impingement

Since the original report of “Gilmore’s groin” in 1980, sports hernia/athletic pubalgia has received increasing attention as a source of disability and time lost from athletics.⁸ Various terms describe this entity, including sports hernia, Gilmore’s groin, osteitis pubis, slap shot gut, sportsman’s hernia, hockey groin syndrome, athletic pubalgia, and core muscle injury.^{7,13,19,20,23} Nonsurgical outcomes have not been well reported in the literature. Reports after sports hernia/athletic pubalgia surgeries have demonstrated a predictable return to athletics.^{3,6,8,12-14,16,19-21,24} The variety of procedures and lack of outcomes measures in these studies, however, make it difficult to determine if one surgical approach is clearly superior. There is also increasing awareness of an association between range of motion-limiting hip disorders (femoroacetabular impingement [FAI]) and sports hernia/athletic pubalgia in a subset of athletes.^{10,16} This has added an increased level of complexity to the decision-making process regarding treatment.

ANATOMY AND BIOMECHANICS

Sports hernia/athletic pubalgia is activity-related lower abdominal and proximal adductor-related pain seen in athletes. Although some authors distinguish between the terms “sports hernia” and “athletic pubalgia,” there is considerable overlap in patient presentation and anatomic structures involved. The pubic symphysis acts as a fulcrum for the anterior pelvis, and the structures implicated in the development of sports hernia/athletic pubalgia all have an intimate relationship with this fulcrum. From superficial to deep, the abdominal wall structures are the external oblique fascia and muscle, internal oblique fascia and muscle, transversus abdominus muscle and fascia, and the transversalis fascia. Fibers from the rectus abdominus, conjoint tendon (a fusion of the internal oblique and transversus abdominus), and external oblique merge to form the pubic aponeurosis. This pubic aponeurosis is confluent with the adductor and gracilis origin, and it is also referred to as the

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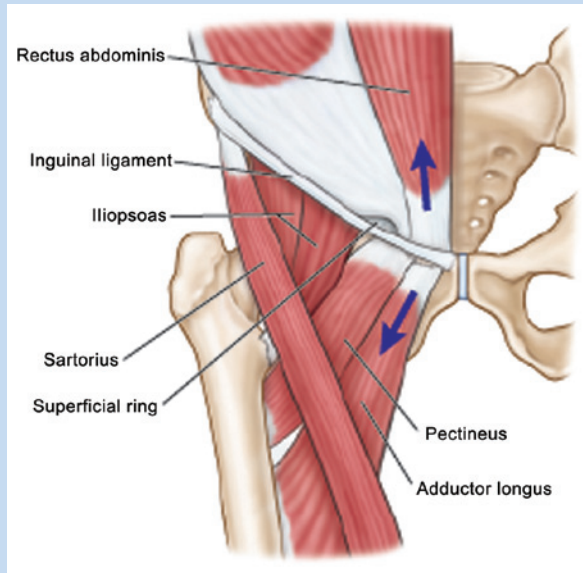


Figure 1. Injury to the abdominal wall at the fascial attachments of the rectus and adductors onto the pubis is implicated in athletic pubalgia. (Reprinted with permission from Delee JC, Drez D Jr. *Orthopaedic Sports Medicine: Principles and Practice*. 4th ed. Philadelphia: Elsevier; 2014.)

rectus abdominus/adductor aponeurosis (Figure 1). There is a clinical association between FAI and sports hernia/athletic pubalgia.^{10,16} A cadaveric study demonstrated that a simulated cam deformity increased motion at the pubic symphysis compared with the native noncam state, supporting the hypothesis that motion-limiting FAI might contribute to the development of athletic pubalgia in a subset of athletes.¹

CLINICAL PRESENTATION

History

Although the presentation can be variable, athletes typically complain of gradually increasing activity-related lower abdominal and proximal adductor-related pain. The onset can be acute with a trunk hyperextension, hip hyperabduction mechanism that can lead to partial or complete ruptures of the distal rectus abdominus/adductor aponeurosis.^{19,20,28} This acute presentation is much less common. The pain is activity-related and generally resolves with rest. Taking time off from offending athletic activities can lead to resolution of symptoms, but these frequently recur with resumption of sports.

Sports hernia/athletic pubalgia and groin injuries in general are more common in cutting and pivoting athletes and athletes requiring a high frequency of acceleration and deceleration. Ice hockey, soccer, Australian rules football, and rugby have a particularly high incidence of groin-related injuries.^{7,13,21} Although athletic pubalgia has historically been more frequent in male patients, an increasing number of female patients are being diagnosed with this injury.²⁰

In one series of athletes with lower abdominal pain, 43% developed bilateral symptoms, and two thirds subsequently developed proximal adductor-related pain.¹⁹ In addition, athletes may occasionally complain of pain with coughing or radiation of pain into the groin, thigh, and testicular regions secondary to entrapment of the ilioinguinal, iliohypogastric, and genitofemoral nerves. Deep anterior and lateral pain with prolonged sitting, flexion, abduction, and torsional activities can be secondary to intra-articular hip pathology. Intra-articular hip and pubalgia symptoms may coexist.^{10,16}

Physical Examination

The physical examination for sports hernia/athletic pubalgia begins with palpation of the potential sites of injury. Lower abdominal, adductor, and symphyseal pain to palpation is common in athletes; therefore, it is critical to determine if the pain is consistent with their symptoms. The abdominal obliques, transverses abdominis, and conjoined tendon/rectus abdominus should be palpated. A resisted sit-up or crunch with palpation of the inferolateral edge of the distal rectus abdominus may re-create symptoms.¹⁹ The pubic tubercle and pubic symphysis are painful in up to 22% of patients.^{5,19,27} Radiographic osteitis pubis may present in up to 70% of elite collegiate football players and can present with symphyseal tenderness (67%), adductor origin tenderness (59%), and pain with resisted adduction (96%).^{17,26} The proximal adductor musculature (adductor longus, gracilis, pectineus) should also be palpated; resisted adduction in flexion and extension can be performed to elicit discomfort. Thirty-six percent of athletes with athletic pubalgia have adductor tenderness.^{5,19,27} Valsalva maneuvers such as coughing and sneezing can occasionally reproduce symptoms.¹⁹ The superficial inguinal ring and posterior inguinal canal may be tender as well, and a thorough examination can be helpful. Sensory disturbances and dysesthesias in the lower abdominal, inguinal, anteromedial thigh, and genital regions can be present with occasional entrapment of branches of the iliohypogastric, ilioinguinal, and genitofemoral nerves.

With reports of associated intra- and extra-articular hip pathology in athletes, it is imperative to evaluate the hip joint.^{10,16} In particular, limited hip internal rotation, flexion, and abduction may indicate underlying FAI. Various tests such as the anterior impingement (pain with hip flexion, adduction, internal rotation) are also indicative of concomitant hip joint pathology.^{11,18}

Imaging

Plain radiographs should include a well-aligned anteroposterior pelvis of both hips and a lateral view of the proximal femur, which may demonstrate osteitis pubis, pelvic avulsion fractures/apophyseal injuries, apophysitis, stress fractures, degenerative hip disease, and underlying FAI and dysplasia (Figure 2).

Magnetic resonance imaging can be helpful for a number of hip and pelvic disorders. Coronal oblique and axial sequences through the rectus insertion and pubic symphysis should be obtained in addition to standard sagittal, coronal, and axial sequences. Although full-thickness avulsions of the rectus



Figure 2. Anteroposterior pelvic radiograph in a collegiate hockey player with clinical examination consistent with intra-articular hip and athletic pubalgia symptoms reveals bilateral cam type deformities (solid arrow), acetabular retroversion (dashed curved line), and osteitis pubis (dashed arrow).

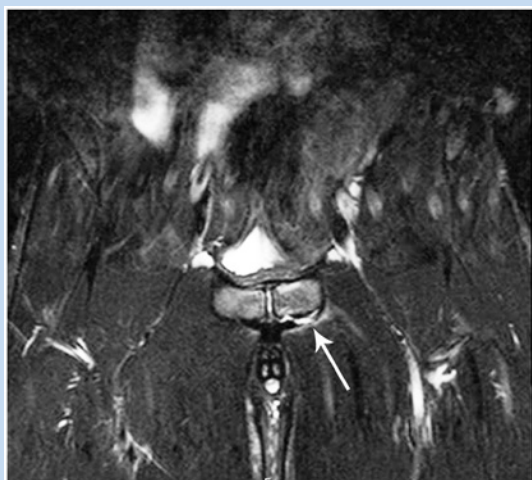


Figure 3. Magnetic resonance imaging of the hip and pelvis in a 22-year-old Division 1 football player with left-sided lower abdominal and proximal adductor-related pain reveals a disruption of the distal rectus abdominus/adductor aponeurosis on the left (solid arrow).

abdominus are rare, a deep disruption or cleft sign at the rectus abdominus/adductor aponeurosis at the anterior pelvis is consistent with athletic pubalgia (Figure 3).²⁸ MRI is 68% sensitive and 100% specific for rectus abdominus pathology compared with findings at surgery, and 86% sensitive and 89% specific for adductor pathology.²⁸ Intra-articular hip pathology and associated FAI can also be diagnosed on arthrogram and hip-dedicated MRI. Interestingly, athletic pubalgia (36%) and intra-articular hip pathology (64%) is quite common on MRI in asymptomatic collegiate and professional hockey players.²⁵ It is

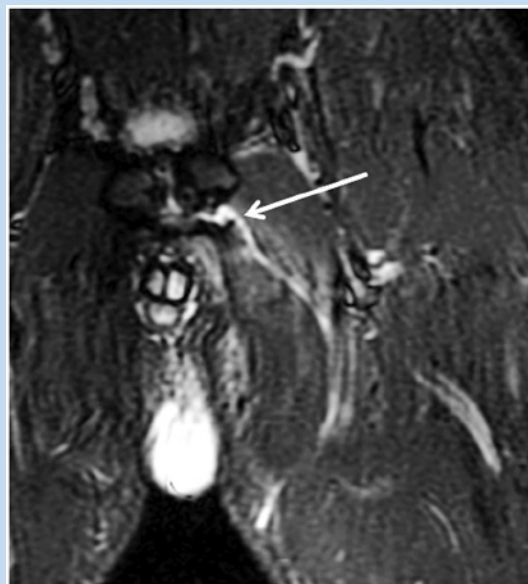


Figure 4. Magnetic resonance imaging of the hip and pelvis in a 26-year-old National Hockey League hockey defensive with an acute left-sided “groin injury” reveals a disruption of the proximal adductor longus tendon.

therefore critical to correlate imaging studies with the history and physical examination in this athletic population. In addition, MRI can identify stress fractures, synovial disorders, osteonecrosis, tumors, and myotendinous injuries about the hip and pelvis (Figure 4).

Diagnostic Injections

Because of the frequent overlap in pain location for various hip and pelvis disorders, diagnostic anesthetic injections are useful to determine the primary pain generators. A fluoroscopic or ultrasound-guided intra-articular, low-volume (<5 mL) injection followed by physical examination or exercise challenge can help determine hip joint-related pain. If lower abdominal/adductor-related pain remains despite an intra-articular anesthetic injection, athletic pubalgia/sports hernia may be the primary or a concomitant pain generator. Fluoroscopic or ultrasound-guided injections into the symphysis can be diagnostic for osteitis pubis, and occasionally, dye will tract into the rectus abdominus/adductor aponeurosis, which can be seen with athletic pubalgia. Adductor and psoas-related pain can be identified with pubic cleft and psoas bursal injections, respectively.

TREATMENT

Athlete and Treatment Strategies

When contemplating options, a period of non-surgical treatment should be initially attempted. However, there are issues unique to the athlete regarding timing, sports seasons, and level of athlete that are worth mentioning. If an athlete is in season and

Table 1. Outcomes after surgical management of athletic pubalgia/sports hernia

Reference	Repair Type	Outcome
Brannigan et al (2000) ² Gilmore (1991) ⁸	Open/no mesh	95% return to sports
Hackney (1993) ⁹	Open/no mesh	87% return to sports
Brown et al (2008) ³	Open/mesh	99% return to sports
Kluin et al (2004) ¹⁵	Laparoscopic/mesh	93% return to sports
Gentisaris et al (2004) ⁶	Laparoscopic/mesh	100% return to sports
Muschaweck and Berger (2010) ²²	Open/minimal repair	84% return to sports
Meyers et al (2000) ¹⁹ Meyers et al (2008) ²⁰	Open/broad pelvic floor repair	95% return to sports
Jakoi et al (2013) ¹⁴	Various types/hockey (National Hockey League)	80% return to hockey

able to function at a high level despite pain, nonsurgical treatment and occasional nonnarcotic analgesics (eg, nonsteroidal anti-inflammatory medications, acetaminophen) are appropriate with consideration for surgery after the season if still symptomatic. If the athlete is limited in season and unable to participate despite nonsurgical measures, surgery can be considered. In-season surgery may or may not be season-ending depending on timing and the length of the season. For higher level athletes, corticosteroid injections might be considered in an attempt to allow these athletes to complete a season. The evidence, however, is lacking regarding the short- and long-term efficacy of these injections.⁴

Nonsurgical Treatment and Outcomes

Physical therapy should be instituted focusing on core stabilization, postural retraining, and normalization of the dynamic relationship of the hip and pelvis muscles. Although normalization of the hip and pelvis range of motion is reasonable, aggressive attempts at improving range of motion or pain resulting from specific range of motion activities should be avoided. Aggressive stretching and attempts at increasing range of motion can result in increased hip pain with underlying hip pathology/FAI. After a period of rest, a gradual pain-free progression to sports may be possible. It may be helpful to avoid deep hip flexion, low repetition, heavy weight strength training during this recovery period. There are very little data regarding the effectiveness of non-surgical treatment for athletic pubalgia/sports hernia. A prospective, randomized study of athletes with chronic groin pain/sports hernia compared physical therapy with surgical repair (laparoscopic mesh repair) for sports hernias.²⁴ Seven of 30 patients in the nonsurgical arm switched to the surgical arm secondary to continued symptoms, and only 50% returned to sport at 1-year follow-up.²⁴ In the

surgical arm, 29 of 30 athletes returned to full sports and were pain free at 1-year follow-up.

Surgical Treatment and Outcomes

When nonsurgical treatment options fail and the athlete continues to experience pain and disability, surgical treatment is considered (Table 1). There have been a number of different surgical techniques described, including repair of the external oblique, transversus abdominus, transversalis fascia, repairs with mesh reinforcement, laparoscopic repairs, mini-open repairs, and broad pelvic floor repairs with or without adductor releases and neurectomies with 80% to 100% return-to-sport rates (Table 1). Gilmore⁸ described plication of the transversalis fascia, reapproximation of the conjoint tendon to the inguinal ligament, and approximation of the external oblique aponeurosis (Table 1).² One study compared open versus laparoscopic repairs with respect to timing of return to sports.¹² The open repairs returned to sports at a mean 5 weeks versus 3 weeks for the laparoscopic repairs.¹² Recently, Muschaweck and Berger²² reported results after a “minimal repair” technique, which consists of decompression of the genital branch of the genitofemoral nerve and a tension-free suture repair of posterior inguinal wall deficiency or defect, with return to sport at 4 weeks postoperatively for most (Table 1). No long-term follow-up was reported. Meyers et al^{19,20} had the largest series of patients (n = 8490), and they treated these athletes with a broad pelvic floor repair focusing on the distal rectus abdominus/adductor aponeurosis (Table 1). They also reported a significant variation in the structures involved and an increasing number of female patients presenting with athletic pubalgia. A recent study reported on 43 National Hockey League hockey players who had sports hernia surgery over 7 years (Table 1).¹⁴ In the end, most of the previously mentioned

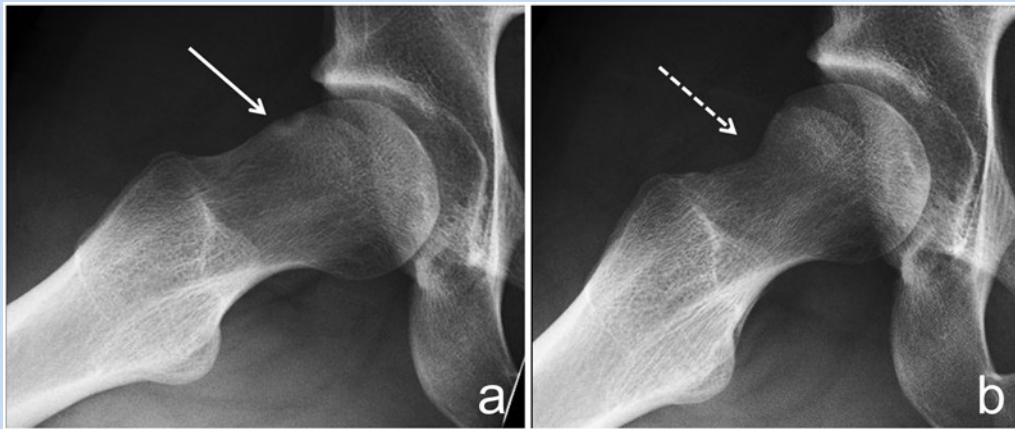


Figure 5. (a) Preoperative lateral radiograph of the right hip in a 22-year-old Division 1 lacrosse player and clinical examination consistent with athletic pubalgia and intra-articular hip pathology reveal cam type morphology (solid arrow). (b) Postoperative lateral radiograph in the same athlete after concomitant athletic pubalgia/sports hernia repair and arthroscopic femoroacetabular impingement corrective procedure reveals improved head neck sphericity and offset (dashed arrow). This improved sphericity and offset improves hip range of motion, which might help to protect the athletic pubalgia repair or result in resolution of athletic pubalgia symptoms when a concomitant or prior repair has not been performed.

studies report short-term follow-up with return to sports as the end-point. Specific outcomes measures and longer term follow-up is not available for the majority of these studies, making it difficult to identify a clearly superior surgical technique or the long-term benefit of such procedures.

ADDITIONAL CONSIDERATIONS

In 37 hips of primarily Division I and professional athletes that presented with sports hernia/athletic pubalgia and intra-articular hip/FAI disorders with pubalgia surgery alone, 25% returned to sports.¹⁶ When only arthroscopic FAI correction was performed, 50% returned to sports. When both conditions were surgically managed in a staged manner or at the same setting, 89% returned to sports without limitations. The mean modified Harris hip score improved from 75 points preoperatively to 96 points at a mean follow-up of 29 months. In 38 professional athletes with both sports hernia/athletic pubalgia and intra-articular hip/FAI disorders, FAI surgery alone resulted in a resolution of athletic pubalgia symptoms in 39%.¹⁰ No patient returned to their prior level of activity after athletic pubalgia surgery alone. With combined FAI and athletic pubalgia surgery, they all returned to professional competition.¹⁰ The proposed concept is that motion-limiting FAI can increase compensatory stresses on the adjacent pubic symphysis, lower abdomen, and proximal adductors, which might contribute to the development of sports hernia/athletic pubalgia in a subset of athletes. Of interest, 39% to 50% of athletes had resolution of their pubalgia symptoms after arthroscopic FAI corrective surgery (Figure 5). Therefore, it may be reasonable to consider FAI corrective surgery with later pubalgia surgery if symptoms do not subsequently resolve. In higher level athletes, however, management of both disorders surgically, in a staged or

concurrent manner, may allow for a more predictable return to sports with less time lost from athletics secondary to persistent symptoms and increased rehabilitation time.

CONCLUSION

Athletic pubalgia/sports hernia in athletes can lead to significant disability and time lost from athletics. A careful history, physical examination, and imaging are needed for an accurate diagnosis. Although nonsurgical treatment should initially be attempted, there are limited data evaluating the efficacy of such treatment. Surgical outcomes vary significantly, but ultimately, >80% of athletes return to their prior level of sporting activity without limitations.^{2,3,5,6,8,9,12,14,15,19,20,22} There is a subset of athletes that present with both symptomatic intra-articular hip disorders and sports hernia/athletic pubalgia. Management of both may be necessary in some instances to improve outcomes.^{10,16}

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