**Athletic Pubalgia
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***Definition:***

Athletic pubalgia, commonly referred to as sports hernia, is a hard to define injury occurring in a greater proportion of athletes. It is on one of the least understood, poorly defined, and under-researched injuries to the human body.1 However, the term sports hernia typically refers to chronic groin pain caused by weakness of the posterior inguinal wall without an actual clinical hernia.2 It is a painful musculotendinous injury and is exacerbated by vigorous sport or physical exertion.3 It is not a true hernia, however, due to the fact that there is no protrusion of the visceral sac.3 Several terms are used interchangeably with athletic pubalgia and sports hernia to describe this injury. These include incipient hernia, Gilmore’s groin, and hockey groin syndrome.4 Originally, sports hernia was the term described by South Australian Sports Physician, Greg Lovell, to describe chronic groin pain in athletes that also included a small, direct inguinal hernia.5

Athletic pubalgia is often an injury of insidious onset, but occasionally is the result of an acute injury. With this injury, there is “disequilibrium between the upward and oblique pull of the abdominal muscles on the pubis against the downward and lateral pull of the adductors on the inferior pubis. This imbalance of forces can lead to injuries of the lower central abdominal muscles and the upper aneurotic common insertion of the adductor muscles.”3

The typical presenting complaint of athletic pubalgia is exercise related groin pain that goes away with rest.5 Pain starts during the activity (like a soccer game) and persists for a couple of days. After several days of rest, the pain usually goes away, but will resume as soon as the activity starts again.5 The pain is also typically located over the lateral edge of the rectus abdominis muscle and may radiate toward the testis, suprapubic region, or adductor longus origin. Onset is usually insidious, but some athletes have a “tearing” sensation. Sudden acceleration, twisting, turning, cutting, kicking, sit-ups, coughing, and sneezing often increase the pain.5 Unfortunately for the patients, the durations of symptoms can range from 6 weeks to 5 years with an average injury lasting 20 months.1

***Gender and Age:***

Athletic pubalgia typically occurs in athletes with male injuries resulting in the largest percentage (female injury rate only 10-15%). Injuries for the male athlete occur between the ages of 20 to 50 years old.6 Differences in prevalence of injury between males and females can be contributed to pelvic anatomy variations and higher participation rates by males in highly competitive sports. Females with groin pain often have gynecological problems such as endometriosis, ovarian torsion, or ovarian cysts as opposed to males having athletic pubalgia.6

The male and female ratio of sports hernia injuries has actually changed over recent years. In the 1980s, no women were reported to have the injury. In the mid 1990s, 8% of injuries were attributed to women. Currently, the prevalence of women with sports hernias is 15%. This increase in percentage is due to better understanding of the injury allowing for more accurate diagnosis as well as an overall increase in women participating in sports.7

The age of the patients with this injury has also increased over the years. In the 1980s, the mean age of injury was 24.7 years old, increasing to 26.3 years old in the 1990s, and up to 28.6 years old currently. Even with the mean age of injury in the 20s, younger patients (11 years old) up to older patients (70 years old) have been diagnosed with this injury. In both these cases, the patients participated as highly competitive athletes in a sport (soccer and tennis respectively).7

***Sports:***

In professional sports, the incidence of groin pain is 0.5% to 6.2% of the athletes.1 Sports involving kicking and rapid transitions in running speed have a higher incidence of athletic pubalgia. Soccer and football have the highest injury rates, but hockey, tennis, basketball, rugby, Australian rules football, cricket, martial arts, long distance running, baseball, and dancers have all been shown to receive this type of injury as well.5,6,7 In male soccer players specifically, the incidence of chronic groin pain is 10% to 18% per year as compared to the 5% to 7% reported in other sports.1 It has also been proposed that higher prevalence of injury exists in athletes due to short off seasons with less time for recovery.3

Patterns have been established with regards to type and severity of groin injury that occurs. These patterns are related to the sport played as well as the position of the player. One example is that baseball pitchers and hockey goalies are predisposed to a certain adductor injury while bull riders tend to get the most severe sports hernia injuries.7

***Risk Factors:***

Several risk factors for developing athletic pubalgia exist. Decreased hip range of motion, poor pelvic muscle balance, and limb length discrepancy are among these risk factors. All of these factors contribute to a functional and structural instability of the pelvis predisposing an athlete to the injury.6 Decreased hip internal and external rotation was noted in Australian football players with athletic pubalgia. Due to the restricted motion, higher forces were translated through the pubic symphysis resulting in sports hernias.5 Sports hernias occur when there is both decreased abdominal oblique strength and decreased isokinetic hip strength.5In the case of significant leg length discrepancies, the cause of the injury is due to asymmetrical loading of the left and right hemi-pelvis.5 Previous groin injuries are another established risk factor. Evidence exists that ice hockey players have twice the chance of re-injuring the groin if a previous injury to the groin has occurred in the last year.5 To prevent both injury and re-injury, maintaining rotational control and stability of the pelvis is very important.5

***Clinical Diagnosis:***

With athletic pubalgia, clinical diagnosis can be difficult since many conditions present with similar symptoms. At present, no specific special tests exist and no specific questionnaires are used as outcome measures for athletes with this injury. The average patient presenting for examination will be an athletic male in the mid 20s.1 The athlete will present with a sudden injury to the groin, often occurring during a vigorous eccentric contraction. The patient will complain of pain and tenderness at the groin as well as have swelling and ecchymosis.2 There may by palpable tenderness at or just above the pubic crest on the affected side with tenderness over the medial inguinal floor (Hesselbach’s triangle) being the more specific sign. Pain also may be more severe with resisted hip adduction, flexion, and internal rotation.8 However, pain with a resisted sit-up often is the most specific finding. 3,5Clinicians can use a functional movement screen, Harris hip score, or Oswestry Disability Index to track outcomes even though these questionnaires were designed for other purposes.6

A normal hernia examination includes careful bilateral scrotal and inguinal ring palpation checking for true hernias. Assuming no inguinal hernia exists, the examination continues by examining the patient’s adductors for spasms or tightness. This occurs with the patient supine, heels placed together, and knees bent. In this position, the knees are allowed to passively externally rotate. Gentle percussion over the pubic symphysis will then assist in ruling out osteitis pubis. 3 Resisted adduction of the legs in this same position with palpation for tenderness over the tendons can occur next. In this resisted position, the patient can then perform a partial sit-up and tenderness of the inguinal floor is assessed through further palpation bilaterally.3 Finally to test the medial inguinal floor for tenderness, the patient externally rotates a straight leg, and another partial sit-up is performed while providing resistance.3 If all other conditions are ruled out and pain is produced with palpation at the medial inguinal floor, the diagnosis of athletic pubalgia is confirmed. Sometimes, however, the diagnosis of athletic pubaligia can only be confirmed with surgery.1

***Differential Diagnosis:***

Athletic pubalgia typically has an insidious onset, gradually worsens, diffuses, and is unilateral in nature possibly radiating to the perineum and upper middle thigh. 1 Although the signs and symptoms are common and easy to detect, diagnosis of a sports hernia can often be less clear. In fact, the diagnosis of athletic pubalgia is often a diagnosis of exclusion. Other conditions (including those which are life threatening) to be ruled out include genitourinary, intra-abdominal, gynecological, hip and lumbar issues, or other muscular strains and sprains.3 Thus, a very detailed history, focused questioning, and specific clinical examination will be very important in determining diagnosis.2

While examining the patient, there are some other conditions of the groin to consider. Muscle and tendon injuries (especially adductor longus tendon) should be examined. The rectus femoris muscle and tendon is also commonly affected. Taking a good history will be important in identifying the muscle or tendon injured.4 Osteitis pubis is also fairly common in sports that involve kicking or physical contact. This injury occurs from repetitive avulsive trauma near the pubic symphysis and often includes the adductor muscles or gracilis. A direct injury to the pubic symphysis can also occur, or the patient may have pelvic instability from a sacroiliac joint injury. 4Pain at the pubic symphysis is usually found in athletes with greater than 2 mm of motion at this location. In non-injured athletes, pubic symphysis motion is limited to 2 mm. In spinal and hip abnormalities, stiffness, instability, bone tumors, osteochondrities of the vertebral bodies, and disc lesion of L1 or L2 are also possible causes of groin pain.2,4 Stress fractures also present with an insidious onset of lower pelvic and groin pain that worsens with pounding type activities (like running). Often symptoms will decrease with rest allowing patients to treat themselves. The stress fractures can occur with a sudden increase in training intensity. They are not seen on radiographs, because there is no callous formation.2 In long distance runners, a pelvic stress fracture is most common.4

There are also several medical diagnoses that can cause groin pain. Pelvic pain can be caused by bowel and intra-abdominal problems like appendicitis, bowel obstruction, Crohns disease, or diverticulitis. A change in bowel habits, nausea, and vomiting should be clues to these conditions. There are also connective tissue diseases that can cause pelvic pain. These include Rheumatoid Arthritis, ankylosing spondylitis, and Reiter’s Syndrome. Family history and other medical history should help diagnosis these problems.2 Athletes can also have pain related to the genitourinary system. Kidney stones and urinary tract infections are fairly common. In female athletes, gynecological complaints are also very common. Ovarian cysts and menstrual cramps occur frequency, but typically the symptoms will be cyclical and not related to sport. Prostatitis can occur in males. Finally, STDs and pelvic inflammatory disease can result in pelvic pain as well.2

***Diagnostic Imaging:***

Generally, diagnostic imaging does not reveal athletic pubalgia, but it is still often used to exclude other conditions.1 When a sports hernia is suspected, a specific protocol designed to detect this diagnosis should be requested.9 Imaging will usually start with an x-ray performed as an anterior-posterior of the pelvis in normal stance and also in flamingo (standing on one leg) stance focusing on the pubic symphysis. X-rays can reveal pubic symphysis widening or erosion, fractures (including healing stress fractures), skeletal diseases, osteitis pubis, limb length discrepancies, pelvic instability, and hip joint lesions.1,5MRI can then be used to detect the location and extent of pelvic and hip injuries including strains, labral tears, bursitis, and true hernias.1 Ultrasonography provides a dynamic assessment to further reveal the location and extent of tendinous injuries.4 A CT scan can also be performed with the athlete asked to strain (“half sit-up”) during the exam to cause protrusion of the inguinal wall.5 The CT scan is, in fact, the gold standard for most soft tissue diseases. 4 It is also important to remember that mild bulges in the posterior inguinal wall are fairly common and asymptomatic. Thus, the symptoms and history reported by a patient should be used in addition to imaging to make a diagnosis. 5

***Conservative Treatment:***

Once athletic pubalgia is suspected, conservative treatment is the first intervention utilized even though the success rate is low. Treatment usually begins with 6 to 8 weeks of rest followed by physical therapy, which includes hip and core strengthening exercises, sports-specific exercises, and gradual return to play. Treatment can also include ice or heat, massage, and NSAIDs. Nerve stimulation and interferential current can be used to decrease pain.1 Other recommendations during physical therapy are soft tissue mobilization techniques (to the lumbar and hip regions), joint mobilizations or manipulations (to the pelvis, hips, and sacroiliac joints), stretching, and neuromuscular reeducation.3

In a case study, the following program of exercises was used:6

 **Exercise**

1st Phase Thigh Adduction

 Wall Bangers

 Hip Drops

 Side Walking (with theraband around ankles)

 Pelvic bridge (with theraband around ankles)

 McGill big 3 (modified curl-up, side plank, bird dog)

 Single leg stance on rocker board (sagittal and coronal)

 Janda balance sandals

2nd and 3rd Phase Wall Bangers (on BOSU)

Clock Squats (between 9 and 3 o’clock)

Sled Pull (from front, behind, side)

Lunge on stability disc

Step ups

Step up and over

Single leg squats (on BOSU)

Monster walk (forward, backward, sideways with theraband around ankles)

Pelvic bridge (with theraband and alternating knee extensions at top of bridge)

Single leg stand on diagonal rocker board (with medicin ball passes and heading soccer ball)

Janda sandals (walking backwards)

Carioca running

Interestingly in this case, the three participants were able to return to sports and did not require surgery.6

***Surgery:***

Often surgery is the last option in treating athletic pubalgia, but many times it is the most successful option.10 At Baylor University, tenderness is assessed on a scale from 0 to 5 (with 0 being no tenderness and 5 for very severe pain). When a patient scores a 3 or higher (which is moderate tenderness) in the medial inguinal floor that is clearly not just adductor tenderness, the patient is considered for surgery.3

The surgical techniques available for this injury are varied. They range from open Bassini repair to a laparoscopic pre-peritoneal hernia type repair. Surgery is also used to correct injuries in the adductor longus tendon with staggered tenotimies as well as a complete transection of the tendon.8 Laparoscopic surgery is gaining popularity in that it is less invasive than open techniques. The posterior placement of mesh behind the conjoint tendon and pubic bone creates a stronger support than conventional anterior hernioplasty.10 The pain after surgery and complications in the wound are also less frequent with laparoscopic surgery as compared to open surgery.10 The overall purpose of surgery is to reinforce the weak areas of the inguinal floor and also restore balance of the rectus abdominis muscle origin from the pubic tubercle.8 The most common reason for reoperation is the development of the same injury, but on the contralateral side.7

***Post surgical Rehab:***

Typically, patients report immediate improvement in pain post-operatively.8 Sharp sudden movements should be avoided early on during recovery. Walking is encouraged and athletes can slowly progress to running in 3 to 4 weeks. Return to play after laparoscopic repair is generally 6 to 8 weeks while open repair is around 17 weeks. 1 The exercises used in post-op rehab are very similar to those used in conservative treatment with continual progression of exercises until the patient is able to return to play. Focus is placed on core and hip strength as well as flexibility with sports-specific exercises also incorporated. 1

***Prevention:***

 Moving forward, groin injury prevention and detection of at-risk players must be stressed in order to decrease incidence of athletic pubalgia. 5 Steps should be taken to minimize known risk factors and to monitor the athletes’ training load. Range of motion of the hips should be assessed as well as muscle balance, motor control, and general flexibility.5 Athletes should develop a controlled single-leg-stance as well as rotational control in the pelvis. 5 If an athlete has had a previous injury, close monitoring is appropriate. In the case of leg length discrepancies, an orthotic should be used that includes a heel lift to correct this problem and prevent injury.5

***Conclusion:***

 Athletic pubalgia typically occurs in males in the mid-20s age range, who play a sport that involves cutting, kicking, pivoting, and sharp sudden movements. 1 The onset is insidious and often the groin pain will go away with rest returning with reengagement in sport. A good history and physical examination is vital in diagnosing a sports hernia or excluding more life threatening diagnoses. Diagnostic images can be used to rule out these other issues. Conservative treatment of rest and physical therapy is usually performed first. If this fails, athletes often have surgery, which relieves pain quickly. The athlete then follows a rehabilitation regimen, which takes 2 to 4 months prior to return to sport. Physical therapy (performed both conservatively and post-operatively) focuses on range of motion, stabilization, and strength in hips and core as well as sports-specific activities.1

 Athletic pubalgia continues to be a misunderstood and under-researched injury that affects athletes at all levels of competition. 1Increasing knowledge in this area will allow for clinicians to more accurately diagnosis and treat this problem. A more thorough understanding of the anatomy of the pelvis, the characteristic history and physical examination, and the possible differential diagnoses will allow for clinicians to find a solution to the injury.

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