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Groin pain in athletes

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Abstract Groin pain in athletes is not infrequently a cause of frustration and aggravation to both doctor and patient. Complaints in the groin region can prove difficult to diagnose, particularly when they are of a chronic nature. These injuries are seen more commonly in sports that require specific use (or overuse) of the proximal musculature of the thigh and lower abdominal muscles. Some of the more common sports would be soccer, skiing, hurdling, and hockey. The differential diagnosis can cover a rather broad area of possibilities. Most common groin injuries are soft-tissue injuries, such as muscular strains, tendinitis, or contusions. More difficult areas to pinpoint are such entities as osteitis pubis, nerve entrapment, the so-called “sports hernia,” or avulsion fractures, to name but a few. The evaluation of such patients includes a familiarity with the sport and possible mechanism of injury (i.e., taking a careful history), meticulous physical examination of the groin, abdomen, hips, spine, and lower extremities. Diagnostic examinations may or may not prove helpful in formulating a final diagnosis. Some patients may be required to undergo procedures, such as laparoscopic evaluation of the region to obtain adequate information that allows a proper diagnosis and treatment plan. This article describes many of the possible causes of groin pain in athletes. The list is quite lengthy, and only the more common problems will be discussed in detail.

Keywords Groin pain · Athletes · Hernia

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Introduction

A discussion of groin pain in athletes does not receive much attention in much of the surgical literature. Perhaps it is because a complaint of groin pain represents both a diagnostic and therapeutic challenge even to the most skilled surgeon or clinician. This is compounded by the fact that any discussion related to the groin region may be rather nebulous in terms of a clearly defined location or etiology. Stedman's medical dictionary defines groin as “synonymous with inguinal region, sometimes used to indicate just the crease in the junction of the thigh with the trunk.” Moreover, Stedman's defines inguinal as “relating to the groin.” The rather superficial definition is quite apparent. Additionally, the term “myopectineal orifice,” that is so well known to the surgeon when describing the area of the inguinal hernia repair is of little assistance in the evaluation of the patient with pain in the inguinal area.

Athletes are no better prepared to clearly define this region, as suggested by the confusing array of complaints such as “I pulled my groin,” “I was kicked in the groin,” or “I feel swelling in my groin.” Each of these complaints refers to a different anatomical location and suggests quite unrelated diagnoses.

Acute groin pain is fairly common in sports-related activities and usually relates to a musculoskeletal etiology. This is particularly common in sports that require sharp cutting movements, as in kicking and running sports, especially soccer. Important historical clues will suggest the probable musculoskeletal nature of the complaint. These acute injuries are most likely seen with overstretching of a muscle and are usually associated with a sudden change in direction while running. These injuries may also be seen with a forceful muscle contraction. There are no remarkable physical findings, such as a groin impulse or tenderness at the external inguinal ring. Findings such as bruising, muscle swelling, tenderness, or defects may be noted on examination. Groin injuries such as these are most often readily

apparent and will resolve in 4–6 weeks with conservative management. They may be quite easily treated with rest, ice, and nonsteroidal anti-inflammatory drugs (NSAIDs).

Chronic groin pain represents the more difficult diagnostic challenge. These complaints are usually not related to a musculoskeletal etiology. These athletes will present with ongoing complaints that may have been present for months to years. In these athletes, determining the exact cause of the pain may prove quite elusive due to the lengthy differential of diagnostic possibilities (Table 1). Complete discussion of each entity is beyond the scope of this article. This discussion will focus on the more common causes of chronic groin pain in athletes, namely, stress fractures, avulsion fractures, osteitis pubis, sports hernia, hockey player's syndrome, and ilioinguinal neuralgia.

Stress fractures

Stress fractures at any site are the result of repetitive force, usually from overusage. It is a fairly common cause of groin pain and should be suspected in athletes who have had a sudden change in their training regimen. Stress fractures usually present as pain that has been gradual in onset and worsened by weight-bearing activities, such as running. The pain worsens following activity and improves with rest. There is a frequent association with amenorrhea and disordered eating patterns.

The most common sites of stress fractures causing groin pain are the pubic ramus and the femoral neck. The inferior pubic ramus is the most common site of pelvic bone involvement. Stress fractures of the femoral neck may occur in two different sites. If the fracture occurs on the superior, or tension, side of the femoral neck, this may be treated with rest and a non-weight-bearing status until pain-free. Non-weight-bearing status would necessitate that the athlete avoid placing any

weight on the affected lower extremity. This could be accomplished by the use of crutches and/or a wheelchair. However, if the fracture is noted on the inferior, or compression, side of the neck, this should be referred to an orthopedist. These stress fractures may progress to overt fracture and which may then require open reduction and internal fixation.

Oftentimes plain radiographs are not diagnostic early in the course of the disease process. A bone scan may be performed, which should be positive within 4–8 days following the onset of symptoms. The diagnosis may be confirmed with computed tomography (CT) or magnetic resonance imaging (MRI) and should be performed if clinically indicated. Consideration for the performance of either CT or MRI might be entertained, should the bone scan be nondiagnostic or the pain is out of proportion to the physical findings. Other indications might consist of persistent symptoms despite rest, increasing tenderness or swelling, or any discoloration. The timing as to the ordering of these tests should be individualized but might be considered after 6–8 weeks.

Avulsion fractures

These fractures are usually seen in adolescents in their mid- to late teens. It is usually caused by unexpected, explosive contraction of the muscle. Direct trauma is a rare cause of such a fracture. The athlete may complain of a sudden "pop," followed by a severe limp. The pain may be reproduced with palpation and stretching of the site. Plain radiographs are diagnostic where the avulsed fragment may be identified. The most common sites are the attachments of the various muscles around the pelvis. This refers to the following muscles: sartorius, rectus femoris, gluteus minimus, iliopsoas, adductors of the thigh, and the transversus abdominis. Avulsion fractures less than 2 cm in size are treated with relative rest, ice, NSAIDs, and non-weight-bearing status until the pain subsides. Those fragments that are larger than 2 cm warrant surgical reduction and fixation [1].

Table 1 Differential diagnoses of groin pain in athletes

Muscle strain	Inguinal or femoral hernia
Adductor tendinitis	Lymphadenopathy
Avascular necrosis of femoral head	Ovarian cyst
Avulsion fracture	Pelvic inflammatory disease
Bursitis	Postpartum symphysis separation
	Prostatitis
Stress fractures	Sacroiliac joint problems
"Sports hernia"	Lumbar spine pathology
Hockey player's syndrome	Urinary tract infection
Osteitis Pubis	Acetabular disorders
Pubic instability	Snapping hip syndrome
Conjoined tendon dehiscence	Inflammatory bowel disease
Herniated nucleus pulposus	Diverticular disease
Myositis ossificans	Abdominal aortic aneurysm
Nerve entrapment	Epididymitis
Osteoarthritis	Hydrocele/Varicocele
Seronegative spondyloarthropathy	Testicular neoplasm
Slipped capital femoral epiphysis	Testicular torsion
Legg-Calvé-Perthes disease	

Osteitis pubis

Osteitis pubis is the result of repetitive twisting and cutting movements (e.g., sudden changes in direction) that initiate a lytic response in the bone. Symptoms usually consist of pain over the symphysis or medial groin that intensifies with resisted adduction of the thigh. In this latter aspect, this syndrome differs from the osteitis pubis that can be seen following laparoscopic inguinal hernia repair. Plain films reveal irregularity and widening of the pubis consistent with osteolysis. A bone scan may be utilized to further confirm the diagnostic impression. Osteitis pubis may be treated conservatively with relative rest, ice, NSAIDs, and physical-therapy modalities. Some authorities advocate corticosteroid injection into the symphysis, but this therapy remains

controversial [2]. In spite of treatment, osteitis pubis tends to have a protracted course and may take up to 6 months or more to return to a pre-injury level of functioning [3].

Sports hernia

This has also been referred to as sportsman's hernia or athletic pubalgia. There has been scant mention in the literature concerning the incidence of this entity. However, the so-called "sports hernia," has been found in 50% of athletes who had groin pain lasting longer than 8 weeks in one series [4]. The term "sports hernia," refers to a spectrum of injuries principally involving the conjoint tendon, inguinal ligament, transversalis fascia, internal oblique muscle, and the external oblique aponeurosis. It is theorized that the mechanism for development of the sports hernia is an imbalance between the strong adductor muscles of the thigh and the relatively weak lower abdominal musculature. This leads to weakening or tearing of the structures in the pelvic floor [5].

Typically the athlete will have an insidious onset with pain unilaterally localized over the inguinal canal and conjoint tendon. At times, the athlete may complain of radiation of the pain into the adductor region and testicles. It may be aggravated by sudden movements, coughing, or sneezing and is resistant to conservative management. Physical findings may be subtle, with no clinically detectable hernia present. A small cough impulse may be suggested but is usually not apparent. The patient may note local tenderness over the inguinal canal and conjoint tendon. In addition, there may be a dilated superficial inguinal ring and tenderness that is worsened by a resisted sit-up. The difficulty in correctly diagnosing this problem may be compounded by the fact that up to 27% of these athletes may have multiple pathologies [4].

Imaging studies, such as radiographs and bone scan, may be helpful in ruling out other pathologies but are frequently not useful in establishing a diagnosis. The use of herniography for diagnosis has been gaining some support in recent literature [6, 7]. Other radiological tools that have been used to make a correct diagnosis include ultrasonography, MRI, and/or CT [8, 9, 10].

Surgical intervention is considered following a trial of conservative treatment. Conservative measures might consist of the application of heat or ice, stretching and strengthening exercises, and other physical-therapy interventions. Although it may be useful to attempt conservative measures for 6–8 weeks, it should be noted that nonoperative therapy is seldom successful. Most of the surgical approaches are some variation of the standard hernia repair [11, 12, 13, 14]. Because there are no randomized controlled trials to evaluate surgical success rates, those athletes with this problem should undergo diligent search for alternative, missed, or overlapping diagnoses, as noted in Table 1. If no other source can be

found, then laparoscopy may be helpful. Either a transabdominal or extraperitoneal approach can be used. A close inspection of the myopectineal orifice may provide evidence of a small direct or indirect defect that has not been appreciated clinically. Additionally, the surgeon must closely inspect the other infrequent sites of herniation, such as the femoral or obturator areas. Most surgeons will place a prosthetic mesh over the inguinal area as the final step in this procedure. In the study by Ingoldby, 30 repairs were performed on 28 athletes. In this series, 14 had conventional repairs, and 14 were repaired laparoscopically. The final results were virtually the same for either repair. Nearly all of the athletes were able to return to competition within an acceptable time frame. However, 13 of the 14 athletes that had laparoscopic repair were able to resume training within 4 weeks while only nine of the 14 that had conventional repair were able to do so. One athlete had recurrent pain 5 months following laparoscopic repair, while one had a recurrent hernia 22 months after conventional repair [13].

The postoperative recovery differs from the non-athlete and may take up to 6–8 weeks before full return to competition may be permitted, depending on the sport. During this recovery phase, any rehabilitation should avoid sudden, sharp movements. Any musculoskeletal inflexibility or weakness should be addressed with emphasis on isometric adductor and abdominal exercises. This may be gradually initiated on the first postoperative day and progress to a full strengthening program to include both eccentric and concentric contractions. Walking should be permitted during the first week following surgery with progression to jogging. Sprinting type of movements, while avoiding cutting maneuvers, may be begun after postoperative day 21. Sport-specific exercises may begin at this time, in the hopes of permitting the athletes full return to their chosen activity by 6–8 weeks [15].

Hockey player's syndrome

This is actually a subset of sports hernia that is also referred to as "slap-shot gut," [16]. It is a rather unique, atypical lower abdominal-pain syndrome seen in hockey players.

Although it resembles other groin problems, it does not correspond to other entities. In actuality, it represents an overuse syndrome. Anatomically, it may be identified as a tear of the external oblique aponeurosis associated with inguinal nerve entrapment. The pain is gradual in onset and is muscular in nature. The discomfort is exacerbated by ipsilateral hip extension and contralateral torso rotation and occurs on the side opposite to the player's forehand shot. The pain is much worse during the first few strides of skating. It is associated with abdominal wall weakness, musculoskeletal fatigue, and poorly adapted or poorly fitting equipment used in this sport [16].

Physical examination fails to reveal overt signs of hernia, but pain on palpation of the superficial inguinal ring may be noted. Surgical intervention to repair the external oblique aponeurosis with neurectomy of the inguinal nerve is the usual definitive therapy [16]. Unlike the true sports hernia, this entity requires an open approach to the inguinal floor because of the pathology involved. Postoperative rehabilitation should consist of physiotherapy, aquatic therapy, stationary cycling, and the avoidance of twisting, turning, and skating for at least 4 weeks. The athlete may not be able to return to full activity for 6–8 weeks.

Ilioinguinal neuralgia

The ilioinguinal nerve innervates the most inferior portions of the internal oblique, transversus abdominis, and the skin overlying the inguinal ligament. This nerve transmits sensation along the medial thigh and to the base of the penis (or labia) and scrotum. This neuralgia is a nerve-entrapment syndrome that may be caused by intense abdominal muscle training, direct trauma, or various inflammatory conditions. This entity is a well-known cause of chronic pain in patients who have previously had lower abdominal surgery, such as herniorrhaphy. These athletes will describe a burning and/or shooting pain that may be exacerbated by hyperextension of the hip. Tenderness may be noted over the anterior superior iliac spine as well. Blockade of the nerve with local anesthetic will confirm the diagnostic suspicions. Treatment consists of the use of NSAIDs, ice, relative rest, and topical capsaicin. If these measures fail, repeated anesthetic and/or corticosteroid infiltrations may be tried. In recalcitrant cases, nerve ablation may be necessary. This is approached via a small groin incision under local anesthesia. The ilioinguinal nerve is easily identified, as it traverses the inguinal floor. Transection, ligation with suture, and implantation into the nearby muscle is necessary to provide optimal results.

Conclusions

Groin injuries in the athletic setting are not uncommon. They frequently represent a diagnostic and therapeutic dilemma even in the most skilled hands. An accurate assessment of the problem must be preceded by a very astute history and physical examination. This will serve

the physician well as the differential diagnosis is quite extensive. Although conservative measures may be helpful in acute situations, they often fail in chronic cases. Once the groin pain becomes chronic, judicious use of diagnostic studies may be prudent. Generally, the use of medical and nonsurgical therapy will successfully treat most of these patients. Not infrequently, however, the athlete may require surgical intervention, either open or laparoscopic, to correctly identify the problem(s) and provide definitive therapy. Successful treatment will allow the overwhelming majority of these athletes to return to competitive and recreational sports without difficulty or sequelae.

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