



Hip and Groin Pain in Soccer Players

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Abstract

Purpose The aim of this article is to illustrate the recent framework necessary to standardize studies on groin pain and review the existing literature on groin pain in football.

Methods The common pathological processes underlying groin pain such as muscle, tendon or ligament strain, bone injury or fracture, sport hernia, bursitis, osteitis pubis, and hip-related diseases have been reviewed and current management options have been considered.

Results Groin pain is considered a pain in pubic or lower abdominal or adductors region which can be monolateral or bilateral. It is common in high-intensity team sports and can negatively affect an athlete’s professional carrier, causing serious disruption in the performance. Despite a high prevalence of groin pain in athletes, diagnosis and management of the underlying pathological processes remain a challenge for surgeons, radiologists, and physiotherapists alike.

Conclusion A multidisciplinary approach is essential for patients with groin pain allowing prompt diagnosis and initiation of treatment thus facilitating more rapid return to play and preventing potential long-term sequelae of chronic groin pathology.

Keywords

- ▶ groin pain
- ▶ football
- ▶ sports
- ▶ athletes

Introduction

Football is a sport characterized by a continuous increase in athletic commitment and intensity and the pelvis and hip are subjected to considerable biomechanical stresses.¹ Therefore acute and chronic groin and hip injuries are very common among soccer players.² Unfortunately, the associated injury mechanisms remain undocumented even though information on causes of groin and hip pain are important for their prevention and therapy.^{2–4} The most common causes of hip and groin pain in soccer players are muscle strains. Other causes may be osteitis pubis, sports hernia, femoroacetabular impingement, bursitis, labral tears, hip dislocations, fractures, snapping hip syndrome, and many other different syndromes.⁵ However, the diagnosis of this disease is diffi-

cult because of the complex anatomy of the area.⁶ The aim of this article is to illustrate the recent framework necessary to standardize studies on this pathology and review the existing literature on groin pain in football.

Groin Pain

The groin is a complex anatomical region halfway between the abdomen and the thigh. The groin area is crossed by a multitude of anatomical structures each of which, alone or in association with other adjacent structures, may be the source of groin pain in athletes. The anatomic complexity of the groin area is significant contributing factor to the vast number of terms and diagnoses reported in current literature.

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In football players, groin pain is considered a pain in pubic or lower abdominal or adductors region which can be mono-lateral or bilateral. In general, high running loads, sprinting, sudden change of direction, and kicking are considered potential groin injury mechanisms.

Groin injuries are common in high-intensity team sports⁷ and account for 8 to 18% of all injuries in soccer,^{8–16} with a reported incidence of 0.8 to 1.3 groin injuries per 1,000 hours of athletic activity.^{9,10,17–22} They can negatively affect an athlete's professional carrier, causing serious disruption in the performance of both athletic endeavors and activities of daily life. Interestingly this syndrome is rarely seen among female athletes.¹⁹

Despite the widespread occurrence of groin pain in the soccer players, there is, still today, a lack of clearness and uniformity regarding the correct use of the terminology to classify the underlying pathologies, the diagnostic criteria and the treatment guidelines of the groin pain in athletes. At the same time, a first step in this direction has already been accomplished. In 2015, a major consensus report was published by an array of expert physician. It introduced the Doha classification system that is intended to simplify communication between medical specialists. The Doha agreement has brought significant simplification to the terminology and classification and has simplified this confusion identifying three major categories of groin pain in athletes²³ mentioned below:

1. Groin pain related to a specific musculoskeletal structure.
2. Groin pain due to hip-joint disease.
3. Groin pain associated to other medical condition.

The former can further be separated into four subcategories referring to a specific anatomical region: (1a) the abdominoinguinal, (1b) the pubic, (1c) the iliopsoas, and (1d) the adductor region.²⁰

In patients with groin pain, it is important to perform thorough physical examination to identify the exact anatomical origin of the pain. On physical examination, each region of the groin that has the potential to produce groin pain must be examined, bilaterally. This included the adductor muscles, pelvic bones, hip joint and its surrounds, the hip flexors, and the lower abdominal muscles. The physician has to identify the exact origin of the pain by palpation and consider the anatomical structure lying underneath. However, sometimes the pain may be poorly localized and felt in several different areas simultaneously. The physician must not overlook the less common but important causes of pain in this region such as intra-abdominal pathology, urinary tract pathology, gynecological pathology, and rheumatological disorders. The differential diagnosis must be made from other causes of groin pain originating from orthopaedic diseases of the spine, the pelvis, and the hip such as stress fracture, bursitis, myositis ossificans, and spinal or peripheral nerve damages.

Diagnosis

The diagnosis of hip and groin pain in soccer players is difficult because of the complex anatomic structures and the numeral and various causes. A study cohort of 34 elite young male soccer

players with hip and groin pain underlines this by finding out that magnetic resonance imaging (MRI) or ultrasound findings in asymptomatic athletes are often equal to those of symptomatic athletes. Therefore these methods do not predict injury or symptom development.²⁴ Tests that may be helpful for the diagnosis of hip and groin pain in soccer players are the isometric hip adduction (HADD-ISO) test, the isometric hip abduction (HABDISO) test, the hip flexion (HFLEXION-ISO) test, the isometric hip-flexion-modified Thomas' test (HFLEXION-MT-ISO), and the eccentric hip adduction (HADD-ECC) test. They are tested in that order and the right leg is always tested before the left leg.²⁵ Among others, these tests can be observed that eccentric hip adduction strength is lower in soccer players with adductor-related groin pain in confront to those without.²⁵ A cross-sectional study with male soccer players from 40 teams points out that large eccentric hip adduction strength deficits are frequently in soccer players with adductor-related groin pain in confront to asymptomatic soccer players.²⁵ Furthermore, hip pain provocation tests, like the flexion/adduction/internal rotation test (FADIR) and positive flexion/abduction/external rotation tests (FABER), were also reported as helpful for the diagnosis of hip and groin pain in soccer players. Moreover investigation like plain radiographs, computed tomography (CT) scan, MR scan, bone scan, and arthroscopy are useful.²⁶

There are also some parameters and scores which are useful for the diagnosis, like the parameter of hip range of motion (HRM) and the Copenhagen Hip and Groin Outcome Score (HAGOS). HRM is related to both hip and groin pain and also to the presence of a cam deformity (CD).²⁷ It is measured with the hips and knees in 90 degrees of flexion and the player has to be supine. The HAGOS is lower in soccer players who have hip and groin pain in confront to those without.²⁸

Muscle Strain

Compared with other sports, soccer, as sport with a high level of physical strain on the locomotor system, is characterized by a high prevalence of injuries in the hip and groin regions.²⁹ The most common reason for hip and groin pain in soccer players are muscle strains.³⁰ General strain injuries of the posterior thigh account for 10 to 23% of all acute injuries. According to literature documentation, 10 to 18% of all injuries in soccer players are groin or hip related and 62% of these are adductor strains.³⁰ Most frequently, these muscle strains in soccer players are placed in the musculotendinous junction of the adductor longus or gracilis muscle. Usually the muscle strains are in the kicking leg of soccer players.³¹ Typically, a strain occurs in muscles that are overstretched or torn.¹⁰ Complete avulsions of these tendons also occur but very rarely.³⁰ Some soccer players who sustain acute muscle strains may be able to recall a specific onset of injury in confront to others who don't remember a specific instance of the injury, those often have chronic pain. Usually clinical findings include pain with palpation of the adductor longus insertion on the pubic bone and/or pain with resisted adduction.⁹ A study with 36 male professional soccer players, who were randomly selected and followed-up over 2 years, compares the isokinetic profile of hip abductor and adductor muscle groups between soccer players suffering from

chronic adductor-related groin pain (ARGP), soccer players without ARGP, and healthy volunteers from general population. The result was that the imbalance between abductor and adductor muscle groups is a risk factor for adductor-related groin injury. On account of this restoring, the correct relationship between these two hip muscles is an important preventative measure that should be a primary concern of training and rehabilitation programs.³² A descriptive and prospective study with 527 professional footballers shows that football goalkeepers are prone to acute adductor and overuse hip and groin injuries, while muscle strains, in particular located in the hamstrings, are lower compared with field players. Muscle strains are typically managed nonoperatively.³³ This includes physical therapy and rehabilitation, followed by an active training program.⁹ Should nonoperative treatment be ineffective, a surgical intervention may be necessary. The surgical treatment in these cases is a muscle tenotomy.^{30,34} This last-resort option is typically more used in the chronic injuries.³⁰

Sports Hernia

The long-term efficacy of the large series of players of this type of surgery is still to be defined. The sports hernia is a weakness in the transverse fascia (posterior wall of inguinal canal) which may allow localized bulging that compresses the genitofemoral and/or ilioinguinal nerve, causing a chronic activity related pain in the groin and its surrounding structures.³⁵

The sports hernia commonly presents a painful groin in those sports that involve kicking and twisting movements while running, particularly soccer. Typically the pain is localized at the common point of origin of the rectus abdominis muscle and the adductor longus tendon and also of the inguinal ligament.³⁶ Clinical findings are local tenderness over the conjoined tendon, pubic tubercle, and midinguinal region, a dilated superficial inguinal ring and pain with resisted adduction.³⁷ The conservative treatments of sports hernias are laser, acupuncture, rehabilitative exercise, and polymeric training. These treatments improve the strength, coordination, and correct imbalance of pelvic muscles.³⁸ Unfortunately, conservative management is often unsuccessful. An open surgical hernia repair combined with an adductor longus tenotomy relieves the in 95% of athletes.³⁹ As an alternative to an open surgical treatment, laparoscopic repair is an efficient method for the treatment of groin pain originating from a sports hernia. It has fast recovery and excellent long-term results.⁴⁰ After 2 to 3 weeks, the majority of the patients is able to participate in the sporting activities.⁴⁰ All in all laparoscopic repair offers a shorter convalescent period and better results comparing to open surgery.⁴⁰ Unfortunately, there are only few studies reporting the results of sports hernia surgical treatment, open or laparoscopic. Genitsaris et al reported only a few recurrences during the follow-up (0.76%).⁴⁰ The long-term efficacy and on the large series of players of this type of surgery is still to be defined.

Bursitis

In the hip and groin region, there are many bursas, but the most commonly involved are the trochanter, the ischial, and

the iliopsoas bursas.⁴¹ Bursitis is mostly secondary to hip diseases and only rarely primary. Predisposing factors include a broad pelvis (female soccer players), training on banked surfaces, or roads with a slope and high intensity of training.⁴² Bursitis is caused by a break of synovial fluid through the bursa. This can happen under pressure or via a congenital communication from the articular cavity into the bursa.³⁸ Bursitis most commonly occurs at the greater trochanter but an "internal" variety can occur at the iliopsoas tendon. The bursa of the greater trochanter minimizes the friction between the greater trochanter and the iliotibial band which passes over the bursa. Bursal inflammation may be caused by several conditions, such as chronic micro trauma, arthritis, regional muscle dysfunction, and overuse or acute injuries.⁴² A typical symptom is lateral hip pain, occasionally radiating along the distal lateral thigh. It also may be associated with snapping or clicking sensation. Sometimes, point tenderness over the greater trochanter is associated with crepitus on hip flexion and extension. Other symptoms, such as pain at the extremes of hip rotation, abduction, or adduction, and pain of contraction of the hip abductors against resistance are also symptoms. Treatment for the various locations of bursitis is similar and included rest, stretching of the involved tendons, and nonsteroidal anti-inflammatory medications. Occasionally steroid injection maybe useful.⁴³ Surgical management may be offered following failed conservative management. The surgical includes the releasing of the iliotibial band by a cruciform incision with or without debridement of the trochanteric bursa.⁴⁴

Snapping Hip Syndrome

Snapping hip syndrome is a benign condition characterized by an audible snap or click that occurs on flexion and extension of the hip and pain during physical activities.⁴⁵ In general, females are more often affected.⁴⁵ There are three types of snapping to distinguish the external (lateral), internal (medial), and intra-articular one. The most frequent one is the external snapping. The external type is caused by a snapping of the iliotibial band, tensor fasciae latae, or the gluteus maximus muscle snapping over the greater trochanter during a hip flexion.⁴⁶ The internal type is caused by the displacement of the iliopsoas tendon over the iliopsoas eminence or the femoral head.⁴⁷ The intra-articular type is commonly caused by an intra-articular hip derangement (i.e., labral tears, hip impingement, loose bodies, fracture fragments, torn pieces of labrum, and synovial chondromatosis) which can lead to an effusion that consequently produces an internal snapping.⁴⁵ In case this condition is painful or causes a bursitis, the treatment involves rest, nonsteroidal anti-inflammatory medications, ice, stretching and strengthening exercises of iliotibial band, and, in some cases, steroid injections. If the conservative treatment is not successful, surgical management may be necessary. This nonconservative treatment includes open or arthroscopic surgical release of the iliotibial band.⁴⁵

Osteitis Pubis

Osteitis pubis is caused by repetitive trauma. This injury is often seen in soccer players. It may appear as a component of the sports hernia because tensions from the adductor muscles are implicated sometimes. Symptoms during playing soccer are pain with kicking, running, jumping, or twisting.⁴⁸ The risk factors typically are excessive training, muscular imbalance, and exercising on hard surfaces.⁴⁸ Typical clinical findings are tenderness over pubic symphysis aggravated by pelvic compression and painful hip abduction. Should nonoperative treatment be ineffective, curettage of the pubic symphysis is a viable option.⁴⁹ A retrospective study presents the results of curettage of the pubic symphysis in 23 athletes with osteitis pubis that was refractory to initial nonoperative therapies. The result shows that 61% of patients had a follow-up with no pain and full activity of the operated hip.⁴⁹

This kind of simple surgical treatment frequently has a significant benefit, especially to those athletes wishing to return to play on their previous levels. After more or less 5 months, 70% of the patients returned to full physical activity and 61% were pain free at the time of review.⁴⁹ Recovery with nonoperative management can take an extended period of time, often unsatisfactory for professional athletes.⁵⁰

Hip Fractures

Hip fractures are unusual injuries in soccer players. Fractures of the proximal femur as displaced intracapsular fractures are a surgical emergency.⁵¹ Most frequently, the pubic ram is involved in this type of fractures. Stress fractures of the pubic ram account for 1 to 2% of all stress fractures. Symptoms are deeply felt pain in the groin and possibly the perineum which occurs also at rest and at night.⁵¹

Femoroacetabular Impingement and Cam Deformity

Femoroacetabular impingement (FAI) is a common cause of hip and groin pain in many soccer players aged 20 to 50 years.⁵² Genetic and acquired causes as etiological factors have been postulated and studied but the etiology remains controversial. Some studies suggest that genetic factors may have a role in the development of FAI but there is no conclusive evidence that FAI is transmitted genetically.^{33,53} Risk factors for an impingement are activities with a high range of motion of the hip or an abnormal anatomic configuration of the hip.⁵⁴ Structural deformities of the hip often limit the activity of soccer players.⁵⁵ The cam-type femoroacetabular impingement deformity occurs frequently in young male soccer players. Some studies find out that male soccer players have a higher prevalence of radiographic cam FAI in confront to female soccer players.⁵⁵ Abnormal hip morphology can limit motion which is a result of an abnormal contact between the proximal femur and the acetabular rim. This is caused by repetitive impact of the proximal portion of the femoral neck against the acetabular labrum and its adjacent cartilage.⁵⁴ Two types of femoroacetabular impingement can be distinguished the cam and pincer one.⁵⁴ These two types of FAI

can occur as separate entities, but it has recently been shown that combined impingement occurs in the majority of cases (86%).⁵⁴ In case the chondral injury results from cam-type impingement, this is more severe than those which result from pincer type.⁵⁶ Pincer-type impingement involves an abnormal morphology of the acetabulum which causes an impingement of the labrum between the femoral neck and acetabulum. The consequences of this may be crushing, degeneration, and eventual ossification of the labrum.⁵⁶ Cam impingement is the result of the contact between an abnormally shaped femoral head and a normal spherical acetabulum during moving the hip in flexion and internal rotation. This abnormal contact displaces the labrum toward the capsule and the result may be an avulsion of the labrum.⁵⁶ A very popular theory for the development of cam-type deformities is that there is a correlation between a high volume of impact activities during adolescence and the development of cam-type deformities.⁵³ A study with 63 soccer players (age, expressed as mean \pm standard deviation [SD], = 23.1 \pm 4.2 years) confirmed this. The results indicate a relationship between the frequency of football practice during skeletal growth and the presence of a CD in adulthood.⁵⁷ A cross-sectional study with 89 elite soccer players and 92 controls shows that the cam-type deformities are more prevalent in soccer players than in their nonathletic peers. Cam-type deformity develops during adolescence and is influenced by high-impact sports practice.⁵⁸ Symptoms of FAI are hip and groin pain, limitation of ROM and snapping or clicking sensations. A cross-study about the ethnic differences in cam deformity including 445 male soccer players found out that East Asians have a significantly lower prevalence (18.8%; $p \leq 0.032$) of cam deformity in confront to white and black soccer players. Moreover, α angle > 78 degrees is more prevalent in white (33.3%) compared with black soccer players (17.8%; $p = 0.041$) and it is absent in East Asian players. So there may be ethnic differences in both acetabular morphology and femoral bony.⁵⁹ Furthermore a cross-sectional study in which seasonal screening data of two professional soccer clubs were used showed that decreased HROM in professional soccer players is associated with more hip- and groin-related symptoms and with previous injuries, independent of the presence of a cam deformity.²⁷ Another study with a total of 22 asymptomatic semiprofessional soccer players (range: 18–30 years) and 22 male amateur soccer players (control group, range: 18–29 years) found out that semiprofessional players have a higher prevalence of FAI in the kicking leg compared with amateur soccer players. Conservative treatment of femoroacetabular impingement includes physical therapy and early use of nonsteroidal anti-inflammatory drugs (NSAIDs) and the use of cortisone injections is common practice for in-season athletes. As surgical management, an arthroscopic approach is very effective with relatively high rates of reported patient satisfaction. Patients with an indication for that kind of treatment are typically young and active patients with minimal arthritis and a no salvageable labral defects.

Labral Tears

Labral tears are associated most common with major trauma, such as posterior hip dislocations or breakdown of

surrounding structures; however, underpinning mechanisms are unclear.⁶⁰ Other causes for labral tears in soccer players are FAI coupled with specific repetitive dynamic movements, hip hyper mobility, dysplasia, and degeneration.⁶¹ Symptoms of labral tears are anterior hip or groin pain, painful episodes of anterior-medial snapping or clicking, hip instability, locking or decreased internal rotation and button pain.⁶¹ The acetabular labrum is a thick rim of dense fibrous tissue which can degenerate and tear. These processes can cause a flap which can interfere with the joint and give a deep, painful clunk during a range of activities. A retrospective review was conducted of clinical records of hip and groin injuries under the care of a single-experienced sports medicine consultant. The result of this study was that the majority of hip joint pathologies was related to femoroacetabular impingement (40%) and labral tears (33%).⁶⁰

Dislocation

A complete dislocation of the hip is uncommon in soccer players, subluxations are more frequently.⁶² Dislocation of the hip occurs only with a major trauma. Subluxation occurs common in adolescents with congenital hyper laxity syndrome. In primary dislocations, those occurring in the posterior direction are more frequently in confront to anterior dislocations which account for only 8 to 15% of the total number.⁶² Symptoms are clunking, snapping, or popping in the groin region. Usually there is hyper mobility and poor pelvic girdle muscle strength observed in the clinical examination, but the examination may also be normal.⁶²

Conclusion

Groin pain is a complex pathology that can keep a football player away from the fields for a long period of time. It is the third type of injury among football players after muscle tears and knee sprains. Despite a high prevalence of groin pain in athletes, diagnosis and management of the underlying pathological processes remain a challenge for surgeons, radiologists, and physiotherapists alike. A multidisciplinary approach is essential for these patients allowing prompt diagnosis and initiation of treatment thus facilitating more rapid return to play and preventing potential long-term sequelae of chronic groin pathology. It is necessary to use the same criteria recently illustrated in an expert consensus conference to standardize the pathology study methods.²³ The most common cause of groin pain is a muscle, tendon, or ligament strain, particularly in athletes who play sports such as hockey, soccer, and football. Less commonly, a bone injury or fracture, hernia, bursitis, osteitis pubis, hip-related diseases, kidney stones or testicle pain. The diagnosis can be difficult and always requires a thorough medical history and adequate physical examination. Diagnostic tests can be helpful but can also lead to an overtreatment if the high number of false positives is not considered. Conservative treatment is the first choice but in some cases and in certain pathologies, surgical treatment appears to be more effective than previously considered.

Conflict of Interest

None declared.

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