

## **GROIN PAIN IN SPORT**

Despite its relatively common occurrence, groin pain remains one of the most poorly understood conditions in clinical sports medicine. Theories abound as to the causes of sport-related groin pain but many commonly held beliefs are largely unsupported by scientific data. Patients often become despondent after seeking several opinions from different highly respected "experts" only to receive conflicting information as to the diagnosis and the most appropriate form of management.

Why does groin pain continue to pose such a diagnostic challenge? Part of the explanation lies in the anatomical complexity of the groin region. The groin is a highly mobile area where large forces are generated by structures originating from different body regions (lower limbs, abdomen/pelvis). Pain can emanate from several different joints (lumbar spine, sacroiliac hip and symphysis pubis), muscle groups (adductors, hip flexors, gluteals, abdominals and lumbar extensors) and neural structures (obturator nerve, ilioinguinal nerve, genitofemoral nerve). The real diagnostic challenge however lies not in the structures themselves but in complex interaction between them. The biomechanics around the pelvis is such that dysfunction of any one particular anatomical structure can plausibly lead to dysfunction in just about any other one of the structures. This means that once an individual has had groin pain for a certain period of time, it is likely that they will have evidence of multiple interdependent pathologies.

The role of the clinician is therefore to take careful history and perform a systematic examination in order to identify the main areas that dysfunction and provide the athlete with realistic and targeted rehabilitation goals.

### **Anatomy**

***Hip abductor muscles:*** these muscles connect the central pubic bone of the pelvis to the medial thigh. They move the lower limb towards midline of the body and are used in activities such as kicking across the line of body. Importantly, the abductors stabilize the lower limb during activities which require balancing on one limb, such as a soccer player reaching with one foot to stop a ball in the air. These muscles are prone to injury such as strain, tear and even complete rupture.

***Hip flexor muscles:*** these muscles flex the hip forward during running and kicking activities. The most important hip flexor is the iliopsoas (combined) muscle. The psoas muscle originates from the upper lumbar spine and travels in the posterior part of the abdomen and beneath the inguinal ligament to attach on the upper part of the thigh. The iliacus originates from inside the pelvis to join psoas as it travels towards the thigh. The iliopsoas connects the lumbar spine

directly to the lower limbs and also crosses over the front of the hip joint. It is fair to say that any type of groin pain is likely to have some effect on the function of the iliopsoas. The reverse is also true. That is, dysfunction of the iliopsoas can contribute to many forms of groin and pelvic pain.

**Gluteal muscles:** the gluteal muscles provide power and stability during hip joint movements. The gluteus maximus is an extensor of the hip and contributes to stability during pivoting on one leg. Gluteus medius and minimus are important in abducting the hip (taking the lower limb away from the midline). They are important stabilizers of the pelvis and weakness of these muscles is thought to contribute to pain in the hip and groin region. In sport, the gluteal muscles are important for the transference of power between the lower limbs and the trunk.

**Abdominal muscles:** there are several different abdominal muscles which can play a role in groin pain. The rectus abdominis, oblique abdominals and transversalis abdominis muscles all contribute to normal pelvic function and to stability around the trunk and pelvic region. Weakness, dysfunction or tightness of any of these muscles can contribute to groin pain. The weakness of the lower abdominal muscles can be implicated in a condition known as 'athlete's hernia' (see below).

**Lumbar extensor muscles:** muscles such as the quadratus lumborum run along either side of the lumbar spine and have attachments to the posterior aspect of the pelvis. The quadratus lumborum is prone to reactive tightness, that is, pain or dysfunction in other structures around the pelvic region can cause secondary tightness of the quadratus lumborum. Because of the attachment to the posterior pelvis, tightness in this muscle group results in anterior tilting of the pelvis, placing the structures of the anterior groin under strain.

**Pelvis:** the pelvis is a bony ring with a joint at the front (symphysis pubis) and two joints at the back (sacroiliac joints). The pelvis can be a source of pain when there is instability in the pelvic ring or when the bone itself suffers fatigue, causing a stress fracture. The pelvis also accommodates the hip joint at each side.

## Specific Diagnoses

There is much debate in the sports medicine literature as to whether groin pain is caused predominantly by:

- a single pathology, presenting in different ways;
- one of multiple distinct entities that need to be accurately diagnosed and treated differently, or;
- multiple overlapping pathologies that coexist, resulting in similar presentations that require generally the same treatment, no matter what the presenting symptomatology

This section will describe the distinct pathologies that have been described in the literature and the theories behind each of their causes and treatment.

### **Athletes' Hernia**

The athletes' hernia refers to weakness of the posterior wall of the inguinal canal which does not result in a visible bulge but which causes pain during activities such as kicking, running and straining. This condition is thought to occur commonly in power sports and running sports. This has usually been treated in the past by a reinforcement of the posterior wall of the inguinal canal, which is similar to a normal hernia repair operation.

The method of diagnosing athletes' hernia is also a matter of dispute in the medical literature. Some authors believe that this condition cannot be detected by clinical examination while others believe that careful history and examination can result in this diagnosis. When performed by a skilled musculoskeletal ultrasound practitioner, ultrasound of the groin comparing both sides during provocation manoeuvres (designed to increase intra-abdominal pressure) has become the preferred investigation for this condition.

Critics of the athlete hernia diagnosis contend that the anterior groin pain is a result of biomechanical abnormalities, rather than an anatomical weakness. They point to studies which demonstrate abnormal ultrasound findings in asymptomatic individuals. They also point to similar 'pathological findings' in both those that respond well to surgical treatment and those who gain no benefit from surgery.

The success rate of surgery for athletes' hernia is variable with between 63% - 97% achieving resolution and return to competitive sport. Athletes who do not respond well with surgery for this condition are often subsequently provided with a different diagnosis for their groin pain.

### **Adductor Tendinosis**

Conditions involving pain where tendon attaches to bone are common at various sites throughout the body. Pathology at the insertion of the abductor tendons onto the pubic bones are well described in the medical literature. Patients report pain with running and kicking activities. There is often tightness and tenderness at the site of insertion and pain with resisted adduction of the hip. Unfortunately, adductor tendon pathology often coexists with other dysfunction around the pelvic region. This is further confused by the fact that MRI and ultrasound studies will often report changes at the adductor attachment, when the patient is completely asymptomatic in the region. There is no doubt however, that abductor tendon tendinopathy does exist in various grades. The most graphic evidence of this is the less common but most severe presentation of complete rupture of the abductor tendon from the pubic bone, which occurs from time to time in explosive sports.

Adductor tendon injuries may be treated in isolation if the symptoms are very localised and imaging is consistent with the clinical picture. Treatment will usually consist of soft-tissue release therapy, strengthening of the adductor muscles and simultaneous attention to any other strength or flexibility deficiencies in the pelvic region. In recalcitrant cases, an injection of corticosteroid around the adductor origin followed by use of a proximal thigh counterforce strap for all running activities will often be successful.

Occasionally, where all conservative measures have failed, adductor tenotomy (surgical release of the tendon from the bone) may provide relief. While adductor tenotomy has been shown to leave a strength deficit in some studies, this was not associated with adverse performance indices.

### **Osteitis Pubis**

The symphysis pubis is the fibrous joint at the front of the pelvis. The adductor muscles attach either side and the abdominal muscles attach along the top of the pubic bones. The symphysis is subjected to significant shearing forces during change of direction running and kicking activities. The shearing forces can be increased by biomechanical limitations, such as tightness of internal rotation of the hip.

Clinical features of osteitis pubis included pain in the pubic region, radiating into the medial thigh of one or both sides. The pain may be felt in the thigh only but on other occasions may actually be felt in the lower abdominal region. If there is co-existing instability at the symphysis, the patient may report clicking in the region, when rolling over in bed. Initially the pain will warm up with activity and be quite tolerable. The pain will also often initially respond well to anti-inflammatory medication. As symptoms become more severe however the athlete becomes

disabled by pain with running and kicking activities and the pain becomes recalcitrant to conservative measures.

Plain x-rays will often show a "moth-eaten" appearance at the symphysis secondary to the inflammatory process taking place in the joint. Regional bone scan demonstrates increased uptake in the pubic bone and MRI will often show bone oedema.

Treatment of this condition is extremely difficult. Most experienced sports physicians would advocate a conservative approach to the treatment of osteitis pubis, while warning the athlete that prolonged rest and prolonged absence from sport is likely. The condition may take up to nine months to resolve. Treatment modalities include strengthening exercises for the muscles around the pelvis and lumbar spine, addressing biomechanical deficiencies such as capsular tightness of the hip joints and rest from aggravating activities. Other treatments that have been advocated include injections of corticosteroid into the symphysis, injections of sclerosant over the joint and surgical debridement of the joint. There is very little sound scientific evidence for any specific treatment modalities in osteitis pubis and most clinicians rely on personal experience and that of their colleagues.

### **Hip Labral Tear**

The hip joint is a common source of groin pain. The exact diagnosis is variable and is often specific to certain age groups. I will not attempt to cover all the various pathologies that can occur in the hip joint. For the purposes of this article, I will discuss the topic of hip label tears as this is a well described cause of groin pain in the athletic population, particularly in kicking sports.

The acetabulum is the 'hip socket', situated on either side of the pelvis. Around the edge of the acetabulum is the labrum, a cartilage lip which serves to deepen the socket and provide added stability to the hip. In kicking sports such as soccer and Australian Rules football, there are significant stresses placed on the labrum. This can result in a tear, causing clicking and pain with hip movements.

The athlete will complain of anterior hip pain. It may radiate into the anterior thigh. It will often be associated with clicking and a sensation of tightness in the hip. A recent study has found that 72% of those athletes who have approved in the labral tear, reported low back pain as part of their presenting symptomatology. This is almost certainly due to spasm of the iliopsoas, secondary to the hip irritation.

Examination usually reveals decreased range of abduction, decreased range of internal rotation (at 90° of hip flexion) and positive grinding tests. There is tightness and irritability of iliopsoas and quadratus lumborum. The diagnosis can be confirmed on MRI and an injection of local anaesthetic into the hip joint at the same time adds to the degree of confidence that the MRI findings are related to the symptoms.

Treatment of hip labral tears in elite level athletes usually involves arthroscopic surgery. Athletes who have undergone arthroscopy for this condition will not uncommonly develop subsequent symptoms associated with degenerative changes within the hip joint.

### **Nerve Entrapment Syndromes**

Several nerves have been implicated in the genesis of groin pain. Entrapment of the obturator, ilioinguinal and genitofemoral nerves is well reported in the literature. The athlete will often describe shooting or burning pain in the medial thigh or genital region. The pain may be intermittent and poorly localised. The pain may be aggravated by even light touch in the distribution of the effected nerve.

Local anaesthetic injections can be used as a diagnostic tool in such circumstances.

The pain will often settle with appropriate nerve stretching exercise but occasionally surgical release of the trapped nerve is required.

### **Groin Pain in Children**

Causes of groin pain in children include some entities which are rarely seen, if ever, in adults. The approach to the child with groin pain and has to take into consideration issues such as open 'growth plates' in the groin region, infection and developmental abnormalities.

Slipped femoral epiphysis occurs when the growth plate on the 'ball' of the hip moves out of position. It affects children mainly between 8 years and 15 years. This constitutes a medical emergency and can have dire consequences for the child if not diagnosed and treated promptly.

The hip joint is more prone to viral inflammation in children than in adults. Transient synovitis or inflammation of the hip joint is the most common cause of hip pain in children. It is usually self-limiting and harmless. It is important however to differentiate this condition from septic arthritis where a bacterial infection develops in the hip joint. This is a far more serious condition and requires treatment in hospital with intravenous antibiotics.

For reasons that we do not fully understand, the blood supply to the hip joint can become compromised in children. This can lead to disturbance in the development of the hip with the 'ball' of the hip being misshapen. This condition is known as Perthes disease. There are many different degrees of severity and some cases are undetected until adulthood. If diagnosed in childhood, the child's sporting activities may have to be modified to minimise the chance of exacerbating the condition. In severe cases, surgical intervention is required.

Children have open growth plates at many sites around the body. These sites can be particularly prone to injury. One area that is commonly injured in child athletes is the attachment of the central quadriceps muscle (rectus femoris) at the front of the pelvis (anterior inferior iliac spine). Children involved in explosive activities (sprinting, jumping, kicking) are most at risk. The severity of the injury can vary from a mild strain, where there is inflammation of the tendon attachment to 'avulsion', where the growth plate is pulled off the pelvis by forceful contraction of the quadriceps muscles. Most of these growth plate injuries can be treated conservatively with rest, ice, gentle stretching and strengthening. If there is avulsion of the bony attachment with significant displacement however, surgical reattachment is required.

It is important to remember that problems from the hip joint can present as knee pain in children because of somatic radiation from the hip to the knee.

### **Non-musculoskeletal Causes of Groin Pain**

While the musculoskeletal causes of groin pain can be difficult enough to differentiate from each other, the clinician must be aware that intrapelvic and intraabdominal pathology can also mimic musculoskeletal groin injuries. These non-musculoskeletal causes are beyond the scope of this article. Suffice to say, abdominal examination should be part of the assessment of the athlete with groin pain.

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***References available on request***