

# Groin pain in the athlete

April 2007

## Special points of interest:

- Groin pain is a common complaint in hockey and soccer.
- Groin pain often has more than one cause.
- One must be diligent to rule out potentially serious causes of groin pain arising from the hip and abdomen.
- Rehabilitation is the mainstay of treatment.
- Recovering from groin pain typically takes longer than most soft tissue injuries.
- Sports hernia should be considered in intractable cases of groin and lower abdominal pain with negative investigations.

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## Overview of groin pain

Groin pain represents 10% of hockey related injuries and 5% of soccer-related injuries. Ten to 18% of soccer players experience a groin strain each year while veteran hockey players are 5 times more likely to have groin injuries and than rookies. The risk of sustaining a second injury is 2 times that of a non injured individual. Groin injuries are often initially misdiagnosed resulting in delayed and prolonged treatment and disability. The groin is the confluence of the upper and lower body and is subjected to significant stresses during sports involving high impact, velocity, pivoting and repetition. It is also the confluence of many organ systems and pain referral patterns making this area of a complex area to examine.

An estimated 27-90% of patients

with groin pain have more than one coexisting injury. This means that one injury usually goes unrecognized. Be on the lookout for serious conditions in children and adolescents such as Legg Calve Perthes disease and slipped capital femoral epiphysis. In adults be aware of hip pathology such as AVN, stress fractures intraarticular pathology such as OA or infection as possible causes of groin pain. Intra-abdominal pathology including genitourinary and gastrointestinal pathology including malignancies, aneurysms appendicitis diverticulosis, inflammatory bowel disease, urinary tract infection, bladder pathology, nephrolithiasis, lymphadenitis, prostatitis scrotal and testicular abnormalities, uterine, vaginal, vulval, ovarian and fallopian tube pathology must also be



Groin injuries are common in soccer

considered. Also consider referred pain from the lumbosacral area due to a herniated disk sacroiliac pathology and myofascial syndromes.

Due to the multifactorial cause of pain in the groin and coordinated approach between specialists may be needed.

## Approach to common causes of groin pain

Most of the common causes of groin pain include strains of the adductors, iliopsoas, sartorius and rectus femoris and osteitis pubis. Avulsion fractures and apophyseal injuries of the hip, iliac crest and femur are more common in children and adolescents. As the apophyseal plates in the ileum do not close until the third decade in some, these injuries may still present in adults. The sportsman's hernia is another reported cause of groin pain which has always been controversial and remains difficult to diagnose. Hip and lumbar spine pathology may radiate to the groin and may delay the diagnosis if one does not keep these areas in mind.

Physical examination must include inspection for symmetry and anatomic irregularity, assessment of the range of motion of the articular structures including the hip joint, examination for leg length discrepancies, evaluation of the patient's gait, performance of tests such as sprints and jumps and other activities that exacerbate the patient's pain, palpation of the affected area for tenderness, examination of the abdomen and genital area as indicated. Investigation of groin pain is determined by the suspected diagnosis after a careful history and physical. In cases with no obvious history of injury, symp-

toms unaffected by activity and minimal or no physical signs, one must be extremely careful to rule out intra-abdominal causes and other serious conditions listed above.

For many muscular injuries which are relatively superficial, US and or MRI are helpful in supporting the diagnosis. Suspected bony pathology would usually require an x-ray and or bone scan and MRI. In the majority of cases adequate relative rest and rehabilitation is required once an accurate diagnosis is made. Groin strains are thought to be recurrent due to a too early return to activity with inadequate rehabilitation.

## Adductor strains



Adequate rehabilitation is essential to prevent recurrences of adductor strains and groin injuries.

Adductor strains have an incidence of 10 to 18% in soccer players per year. These include the adductor magnus, brevis and longus. Predisposing factors include decreased range of motion of the hips and lower extremities and biomechanical abnormalities of the lower limb including excessive pronation, and leg-length discrepancies. Ultrasound investigation is often useful initially. MRI usually provides additional functional information regarding the state of the adductor muscle and stage of healing. Treatment is conservative with the goal be-

ing to restore range of motion, prevent atrophy and regain strength, improve flexibility and endurance. Treatment usually consists of, relative rest, ice short-term use of NSAID's as necessary, physical therapy and functional conditioning. Return to sport occurs when at least 70% of full strength and pain-free motion is regained. Rehabilitation takes 4 to 8 weeks in acute strains and up to 6 months in chronic strains. Groin strains are twice as likely in athletes which have previously injured their groins and are 5 X more likely to be present in

veteran hockey players as opposed to rookies. These statistics may indicate that inadequate rehabilitation is causative in recurrences. Groin strains have been found to occur 20 times more frequently during training camp in the National Hockey League as opposed to the regular season. This may imply that weakness of the groin musculature may be a predisposing factor. A strengthening program found that keeping the adductors at 80% of the strength of the abductors significantly reduced the incidence of injuries in hockey players.

*Strains of the adductor muscles are one of the most common causes of groin pain in athletes.*

## Iliospoas strains, tendinosis and iliopsoas bursitis

Strains generally occur at the musculotendinous junction and are usually due to resisted or repetitive hip flexion or hyperextension as in soccer, ballet, dancing, uphill running, hurdling and jumping sports. The pain may be felt deep in the groin and may radiate to the anterior hip or thigh, accompanied by a snapping sensation. The athlete may limp in severe cases. Due to poor localization and reproducibility of the pain

the average time from onset of symptoms to diagnosis is 30 to 41 months, especially in cases of iliopsoas bursitis. One should palpate the femoral triangle adjacent to the femoral artery for tenderness. The pain may be reproduced when the flexed, abducted and externally rotated hip is extended and brought back to the neutral position (the "extension test"). The diagnosis may be confirmed by MRI if necessary. Treatment is conserva-

tive for bursitis and tendinosis including, relative rest, stretching of the hip flexors and rotators, and strengthening of the hip musculature. Some slow to heal cases of bursitis may be helped with corticosteroid injections guided by ultrasound. Address any biomechanical abnormalities before returning to sport. A tight or weak iliopsoas can result in significant back pain.

## Hamstring strains and ischial tuberosity avulsions



Excessive stress on the stretched hamstrings, typical in gymnasts hurdlers and dancers predisposes them to injury.

These are most common in dancers, gymnasts, hurdlers, runners, water skiers and other athletes who place excessive stress on the stretched hamstrings. Muscle fatigue is thought to increase the risk of injury. Ischial tuberosities may not fuse until the third decade making some of these injuries apophyseal injuries rather than muscle strains. In these cases patients present with posterior thigh pain with possible radiation to the groin. Pain on direct palpation over the muscle insertion on the ischial tuberos-

ity is usually present. It must be remembered that the adductor magnus also originates from the ischial tuberosity and this muscle must also be considered in the differential diagnosis. Imaging studies of use include ultrasound and MRI. There is an 18% false negative rate for intra-or mid substance hamstring strains reported on MRI. Treatment consists of relative rest ice, flexibility and strengthening exercises. Possible follow-up MRI or ultrasound may be performed before progressing to full functional activities.

Initial treatment may require nonweightbearing status followed by a prolonged course of therapy. Surgery is indicated for a complete avulsion of the ischial tuberosity with displacement of more than 2 cm. Can hamstring strains be prevented? There is evidence in some studies that strengthening and flexibility programs protect the hamstrings from mid substance tears in soccer players. It is uncertain whether these programs are also useful for preventing strains at the musculotendinous junction.

## Sartorius and rectus femoris strains

Sartorius strains usually occur with the hip extended and the knee flexed when the sartorius undergoes a sudden contraction. The origin of the sartorius, the ASIS, closes its apophyseal plate around age 21 to 25. This means that you may be dealing with an apophysitis rather than a sartorius strain in some adults. The diagnosis is made through proper history and clinical exam including provocative muscle testing. Treatment is conservative and follows standard physiotherapy regimens.

The rectus femoris is the only quadriceps muscle that spans two joints. It is therefore subject to more stress and more injuries than the other rectus muscles. Injuries usually result from explosive hip flexion such as kicking and sprinting. Clinically there is tenderness over the anterior thigh or at the AIIS which is often not directly palpable. Provocative tests usually elicits the pain. US or MRI may both be used to confirm the diagnosis, however follow up MRI provides

better information regarding the stage of healing. Conservative treatment is effective for most acute partial ruptures. A small subset may have chronic pain and disability. The estimated time to recovery is 4 weeks to 3 months depending on the degree of injury and comprehensiveness of rehabilitation. Complete tears may require surgical repair. Significant scarring of the rectus femoris has also been addressed surgically with variable results.



The rectus femoris is often torn when contracting from an extended position. A common action in the typical soccer kick.

## Avulsion fractures and apophysitis

These injuries are common in children and adolescents. The epiphysis is the weak link in the muscle-bone-tendon complex in children. Approximately 14-40% of pediatric athletes involved in strenuous activity sustain an avulsion fracture, 90% of these occur between ages 14 to 17. The most common sites involved are; hamstrings at the ischial tuberosity, rectus femoris at the AIIS, sartorius at the ASIS and the adductors at the pubic symphysis. Less common sites are; insertion of the iliopsoas on the lesser trochanter of the femur, the iliac crest at the at-

tachment of the abdominal musculature and the superior pubic symphysis at the attachment of the rectus abdominus. In one study 53% of injuries occurred at the origin of the hamstrings, 22% at the AIIS and 19% at the ASIS. The most common offending sports were soccer accounting for 34% and gymnastics accounting for 27% of injuries. The diagnosis is made by the history and a detailed physical exam. Plain films are not usually helpful before epiphyseal plates fuse and a minimum one needs comparison views.

Ultrasound has been reported to be sensitive and specific for these injuries. Treatment involves relieving tension from the injured muscle bone complex until the pain subsides, gentle range of motion exercises, and progressive strengthening. Limited activity until 50% of normal strength is regained is suggested. Return to sport is usually estimated anywhere from 4 to 12 weeks. Any displacement greater than 2 cm requires an orthopaedic opinion and possible surgical repair.

*Apophyseal injuries and avulsion fractures are common causes of groin pain in children and adolescents.*

## Osteitis pubis

In some sports medicine centres this is the most common cause of chronic groin pain. It may be difficult to distinguish from adductor strains due to the proximity of the insertion of the adductors not to mention that both conditions may coexist. Symptoms are initially indistinguishable from adductor strain. The symptoms are aggravated by jumping and running. Symptoms usually increase when the activity is not curtailed. In a case review 80% of documented cases had adductor pain, 40% had pain at the pubic symphysis,

30% in the lower abdominal area, 12% in the hip, and 8% in the scrotal area. Physical exam usually reveals tenderness over the pubic symphysis. Lack of such tenderness usually excludes the diagnosis. Plain radiographs of the pubic symphysis are abnormal in 76% of asymptomatic soccer players. Bone scanning is easily available and usually quite accurate however false negatives have been reported. MRI shows marrow edema in

the pubic bones early in the course of the condition. The condition can take up to a year to resolve, is usually self-limited but reassurance is necessary due to the time frame for resolution. Avoidance of aggravating activities is mandatory. Physical rehabilitation and correction of biomechanical abnormalities in the lower extremities should be addressed. Steroid injections and surgery are not usually necessary but have provided relief in selected chronic intractable cases.



Sclerosis of the pubic symphysis may be present in cases of osteitis pubis but radiographs may be negative.

**THE TORONTO  
CENTRE FOR  
SPORTS MEDICINE  
& PREVENTATIVE  
HEALTH**

5 Broadway Ave. Suite 105  
Toronto, Ontario  
M4P 1T7  
416 480 1460

*Since hip pathology may refer pain to the groin, serious hip disorders may masquerade as groin pain and be missed unless one systematically eliminates the hip as the cause of groin pain in all cases.*



## Hip pathology causing groin pain

Stress fractures of the femoral neck, avascular necrosis, slipped capital femoral epiphysis and Legg Perthes disease are entities which can cause groin pain and have the potential to be missed on initial examination with very serious negative consequences. Stress fractures of the femoral neck present with groin pain which is made worse with weight bearing. There may be a history of overuse or hormonal or nutritional imbalances causing weak bone structures. There is usually pain with log rolling of the affected leg. These should be treated by immediate referral to an orthopedic surgeon with the patient non weight bearing. A more complete discussion of

stress fractures of the femur is available in our Stress Fracture Newsletter of September 2006. Avascular necrosis occurs without history of overuse but with possible history of current or remote steroid use or heavy alcohol consumption. A high index of suspicion is necessary and immediate referral is necessary. X-rays may be negative early on. An MRI is the best imaging tool to rule out AVN. Slipped capital femoral epiphysis in adolescents and Leg Calve Perthes disease in children with complaints of groin or thigh pain and/or who walk with a limp must be ruled out if there is any suspicion that the groin pain is not injury related. Initially x-rays

and an MR are ordered. Articular cartilage injuries of the hip are generally due to trauma. Labral tears are increasingly being recognized as a source of groin pain in athletes. In one series 22% of patients with chronic groin pain were found to have the labral tears. There may be an association of labral tears with developmental dysplasia of the hip. Most tears occur without any history of injury. The most common location is the anterior superior aspect of the acetabulum. An MR arthrogram is the best imaging modality for diagnosis. Treatment usually consists of arthroscopic debridement as with articular cartilage injuries and pathology.

## Snapping hip syndromes

Patients may present with or without pain, complaining of a snapping hip or groin. Snapping hip syndromes are either due to extra-articular or intra-articular causes. The extra-articular causes are divided into lateral and medial causes. Lateral causes (snapping over greater trochanter) may be due to; the

iliotibial band, tensor fascia lata and gluteus medius tendon. The medial cause is usually due to the iliopsoas tendon snapping over the AIIS. Intra-articular causes include articular cartilage abnormalities, ligamentum teres pathology and loose bodies. With a thorough physical exam one should be able

to identify the structures involved. With extra-articular causes, identify the structure and institute appropriate stretching and strengthening as well as correction of biomechanical faults. With intra-articular causes further investigations such as x-ray MRI or MR arthrogram are usually necessary.

## Sports hernia and nerve entrapments

Also called Gilmore's groin or sports hernia. This entity was first described by O.J. Gilmour in 1980. This entity is still controversial. Some believe it is most the common cause of chronic groin pain and others believe it is rare. It is most likely multifactorial in origin. The absence of striated muscle in the posterior inguinal canal is thought predispose to weakness and susceptibility to the hernia formation. It is suggested that strong adduction forces from the adductor muscles cause shearing and stress in this area precipitating the hernia. This diagnosis is elusive because its unfamiliarity among physicians and a paucity of findings. At best only 8% of com-

mon hernias are actually palpable. An enlarged external ring called a "hockey groin" may be palpable but no herniation is actually palpable. The diagnosis involves excluding other causes of groin pain from the surrounding muscles bones, joints and abdominal organs. Athletes that are involved and repetitive twisting motions at high speeds are at particular risk of a sports hernia. There may be a coexisting diagnosis. The history reveals an insidious onset of pain which worsens over time. The pain is generally located near the pubic tubercle and may be maximal on the evening of vigorous exercise and the next morning. The pain may be aggravated by activities

which increase intra-abdominal pressure. When suspecting such a hernia, refer to a surgeon who has expertise with this entity. Surgery usually involves supporting the posterior abdominal wall with a mesh repair. Full activities may be possible within six to 12 weeks of repair. In some cases groin pain originating from the lower abdomen or top of the thigh could be related to a nerve entrapment including the ilioinguinal nerve, iliohypogastric, genitofemoral, obturator nerve, femoral & lateral femoral cutaneous nerves. These are usually difficult to diagnose and require EMG/ NCS studies as well as assessment by either a sport medicine physician, surgeon or neurologist.