

Groin Pain in Athletes

Assessment and Management

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Introduction

Groin pain represents a difficult diagnostic and management problem for both the patient and therapist.

Groin pain accounts for 5% of sports medicine injuries, however this injury causes significant disruption (missed games/competition) secondary to the chronicity of many of the conditions.

The list of differential diagnoses is long and the diagnosis can be confusing as many diagnoses have overlapping symptoms and signs.

Often multiple diagnoses coexist which makes the definitive diagnosis even more difficult. The awareness that multiple diagnoses may be present has to be appreciated in the management and this is often the reason for treatment failure.

There is a **paucity of evidence based medicine regarding groin pain**. Much of the literature (see references attached) relies upon the association between symptoms and signs and findings in diagnostic imaging, with a diagnosis confirmed by surgery in many cases, or with the resolution of the problem after some therapeutic intervention (this research is “as good as it gets”).

Definition: Groin pain in the athlete refers to discomfort noted around the area of the lower abdomen anteriorly, the inguinal regions, the area of the adductors and perineum and the upper anterior thigh and hip.

Groin pain may originate from bones, joints, bursae, muscles, tendons, fascial structures and nerves. It may present insidiously (more commonly) or acutely. It may herald a

localized injury in the groin, a disease process (prostatitis, endometriosis etc) in the pelvis or be referred (lumbo- sacral spine, SIJ etc) from an adjacent structure.

A thorough understanding of the regional anatomy and bio-mechanics of the lumbo-sacral spine, pelvis and hip is essential to both diagnose and treat groin pain.

A thorough understanding of the particular techniques (e.g. kicking) and demands of various sports or activities in which groin injuries are common is essential(soccer, Australian rules football, military training etc).

The more common conditions that cause “groin pain” in athletes will be briefly discussed.

Osteitis Pubis

The pathophysiology of osteitis pubis (OP) is contentious. Is it a stress reaction/fracture of the pubic body/symphysis pubis secondary to shear forces across the symphysis pubis? Is it an enthesopathy from above (rectus/conjoint tendon) and /or below (adductors) that spreads to involve the subchondral bone? Is an imbalance or loss of synergy between the abdominals and adductor muscles a significant factor?

OP is an injury with significant morbidity (analogous to ACL injury) and may be career threatening. OP is poorly understood and treatment at present is at best empirical. OP often presents late and diagnosis is often delayed. Other pathologies (hernia, adductor tendinopathy etc) may also coexist. There is potential for secondary pubic instability particularly if the athlete presents late.

Symptoms

1. Pain that emanates from the area of the symphysis pubis (SP) and often refer into the area of the lower rectus abdominis, the upper adductors and the perineum suggests OP.
2. The pain is usually insidious and may be felt unilaterally or bilaterally.
3. Vague pain associated with “tightness/stiffness” of the adductors during or after activity is an early warning sign of OP.
4. The pain is felt during warm up, may or may not improve with activity and be considerably worse when the athlete cools down (half time/end of competition).When OP is advanced the athlete often says they are unable to walk the morning after the game.
5. Loss of power sprinting (so called “top gear” by athletes) and long kicking secondary to pain inhibition is a cardinal symptom.



Figure 1. Ostia pubis results from muscles above and below the pelvis pulling on the pelvic bone and creating stress

Physical Signs

1. Tenderness of the SP (pubic body/bodies or the symphyseal cleft) is a cardinal sign.
2. Adductor muscle guarding (ie.spasm of the adductor muscles on passive hip abduction) is commonly present.
3. Positive “squeeze test”. That is, pain provocation by isometric hip adduction (at 0,20,40,60 degrees hip flexion). Pain may be modified by pre-contraction of lower abdominals (transversalis).
4. PS stress tests which include single leg squatting, hopping, passive hip extension (the “cross-over sign” is where pain is reproduced contralateral to the test leg and is considered a poor prognostic sign), passive hip abduction.

Investigations

1. Plain film of pelvis (assess SP and SIJ in particular) including “flamingo views” (greater than 2mm movement constitutes pubic instability). X rays may reveal characteristic changes of widening of the cleft and erosive changes of one or both margins of the SP. It must be appreciated however that the delay in ossification of the

adolescent SP (which is fully ossified by age 22-26 years) can cause much confusion in diagnosis.

2. Bone scan typically shows increased uptake on the delayed views of one or both margins of the SP. Significant dose of ionizing radiation and MRI can yield the same diagnostic information.
3. MRI may supersede Bone scanning in demonstrating bone stress. A relationship between parasymphyseal bone marrow oedema and chronic groin pain (presumed OP) has been demonstrated. The specificity of this finding is an area of controversy.
4. ?CT scanning. Controversial investigation as it involves a significant dose of ionizing radiation in a very radiosensitive anatomical region (gonads). I believe it should not be used for diagnosis for this reason. May be indicated in preoperative planning perhaps for those undergoing debridement/curettage or a fusion.
5. Dynamic Ultrasound. Only indicated if concomitant pathology (sports hernia, enthesopathy) suspected.

Management

Early accurate diagnosis should be followed by prompt removal of athlete from activities that cause pain which usually means exclusion from group training and competition. Oral NSAIDS may have a role in the early phase of treatment. Some respond, others do not.

Cortico-steroid injection into the SP is contentious. Most practitioners and authors do not recommend it, however one study suggests it may have a role in the early phase of treatment.

Many surgical procedures have been performed. Various procedures include debridement/curettage of the symphyseal cleft, bilateral adductor tenotomy, bilateral tenotomy of the conjoint tendons and wedge resection of the SP or fusion of the SP. Only one study in athletes with radiological evidence of SP instability suggests surgery is helpful. **Most clinicians and authors believe OP should be treated conservatively.**

An Adelaide physiotherapist, Mr. Anthony Hogan, has developed an excellent approach to the rehabilitation of OP. Several important points are emphasized,

1. No pain during exercise. Stop at onset of pain.
2. Respect pain post exercise.
3. Facilitate abdominals/adductors as PS stabilizers (concept of abdominal/adductor synergy). Pre-contraction of transversalis is essential.
4. Regain effective muscle length without stressing PS.
5. Maintain adequate fitness (swim, bike, and rower) by cross-training.
6. 5 reassessment criteria are used to judge progress and determine what activities to do next.

Prognosis

Varies according to which paper is quoted in the literature. Average time to return to sport is generally quoted as 9 months but this varies according to the severity of the OP, if serious potentiating biomechanical factors are present and also the type of sport the athlete is returning to. A general rule of thumb is that the longer the diagnosis is delayed and the athlete trains/plays with groin pain the worse the prognosis.

Sports Hernia

Athletes who participate in sports that require repetitive twisting and turning at speed (Australian Rules football, soccer etc) may be at risk of developing a “sports hernia”. The sports hernia comprises a spectrum of pathologies which involve disruption of the tissues forming the inguinal canal but without development of a clinically detectable hernia. Tearing of the conjoined tendon is the most commonly described operative finding. Other pathologies described include a torn external oblique aponeurosis causing dilatation of the superficial inguinal ring, weakening of the transversalis fascia with separation from the conjoined tendon and tearing of the external oblique aponeurosis. **These findings reflect a spectrum of injury to the inguinal canal in athletes who have persistent groin pain.**

Symptoms

1. Usually unilateral and insidious onset. However one third may describe a sudden tearing sensation.
2. The pain is typically localized to the conjoined tendon but may involve the inguinal canal laterally. Some athletes describe in the lower abdomen above the inguinal canal or pain radiating to their adductor region and/or perineum but this may also herald a concomitant pathology (e.g. osteitis pubis).
3. The pain increases with sudden movements, acceleration, twisting, turning and kicking and may be provoked by coughing and sneezing.

Signs

1. Local tenderness over the conjoined tendon, pubic tubercle and mid inguinal region is common and may be exacerbated by resisted sit ups.

2. A tender, dilated superficial inguinal ring may be palpated (in males examine by invaginating the scrotum). By definition, a clinically detectable hernia is not present, so physical findings are often subtle.

Investigations

Dynamic Ultrasound by an experienced operator is the modality of choice which demonstrates a defect in the medial posterior inguinal wall seen which manifests as a “bulge” during a valsalva maneuver.

Herniography/diagnostic laparoscopy formerly used is now considered too invasive a test.

Treatment

A trial of conservative treatment is indicated particularly in the non-elite athlete. Professional sportspeople often are referred early for surgical management as conservatism in this group invariably fails. Surgery is usually most effective with return to full activities in 10-12 weeks. There are a variety of surgical techniques, most of which are minor variations of a standard hernia repair.

Adductor Strain/Tendinopathy

The adductors act as important stabilizers of the hip joint. Adductor-related groin pain can be acute, primarily as a strain of the myotendinous junction secondary often to a powerful contraction (kicking etc) or can be chronic with tenderness over the adductor insertion at the pubic bone. Accurate clinical assessment is essential in choosing the correct treatment.

(i) Acute Adductor Strain

The gracilis and the adductor longus are particularly exposed to traumatic strain when maximal extension of the knee is combined with flexion, abduction and external rotation of the hip joint (for example as is typically seen in tackling in soccer). Acute strain may occur at the myotendinous junction or the proximal enthesis.

Symptoms

1. The athlete often describes the feeling of a “pull” in the muscle with sudden pain and may or may not be able to continue depending on the grade of the strain.
2. Adductor pain, spasm and stiffness worsen as the athlete cools down.

Signs

1. Bruising on the medial side of the thigh is common.
2. A tender swelling or defect may be palpable.
3. Pain/spasm on passive hip abduction and pain on resisted adduction.

Investigations are rarely necessary. Ultrasound or MRI may define the lesion but are rarely necessary when the history and examination findings are clear.

Acute strain of the tenoperiosteal attachment (proximal enthesis) should be rested until pain and local tenderness have settled, with gentle stretching and strengthening to follow over a period of weeks. Running/sprinting should be introduced as symptoms permit, with rapid changes of direction and kicking introduced towards the end of recovery.

Muscle strain at the myotendinous junction can be managed more aggressively, provided bleeding has stopped and the risks of muscle haematoma, calcification, or myositis ossificans have been addressed appropriately. Stretching, strengthening and return to activity follow standard practice guidelines for the management of muscle injury.

(ii) Adductor Tendinopathy/Enthesopathy

Symptoms

1. In many cases the athlete does not recall an acute “pull” and the onset is insidious. These patients typically report pain and stiffness in the groin region in the morning after and at the beginning of athletic activity.
2. The pain is often more diffuse. It often is felt at the origin of the adductors and radiates down the adductor muscle group. The pain and stiffness decrease and sometimes disappear after a period of warming up but reappear towards the end of or after the activity.
3. Characteristic activities that provoke pain include sprinting, cutting, kicking and making a sliding tackle.

Signs

1. Tenderness of the origin of the adductors.
2. Groin pain on resisted hip abduction.

Investigations

Ultrasound is the investigation of choice. Abnormalities on U/S consisted of hypoechoic areas, discontinuity of tendon fibres and tendon swelling. Correlation with surgery and surgical outcomes suggest reasonable specificity of the lesions diagnosed by U/S.

Treatment

This patient is often difficult to treat because the athlete can for at least a period of time, continue to participate in sports activity. **Conservative methods** include relative rest, ice, massage, therapeutic ultrasound. Oral NSAIDS and/or corticosteroid injections may have a role but there is no sound literature supporting their use. A graduated stretching and strengthening program is recommended. Research by Dr Per Holmich has demonstrated that for chronic (median 9 months) adductor pain strengthening (but not stretching) and exercises to improve postural stability is significantly more effective than other physiotherapy strategies (involving stretching, massage, heat or cold and ultrasound therapy).

Surgery (adductor tenotomy) is reserved for recalcitrant cases. Surgical success depends on an accurate diagnosis and optimal rehabilitation (8-10 weeks).

Pelvic Stress Fractures

(i) Pubic Rami

Stress fractures of the pubic ramus occur almost exclusively in female long distance runners who have osteopenia (rarely osteoporosis) secondary to prolonged menstrual disturbance often with associated disordered eating (the so called “female athlete triad”). The diagnosis of pubic ramus stress fracture can confidently be made ,even in the absence of evidence on plain radiography, when the following 3 features are present in a long distance runner/military recruit who presents with groin pain,

1. Activity causes such severe groin pain that running is impossible.
2. The athlete develops discomfort in the groin when standing unsupported on the leg that corresponds to the injured side.
3. Deep palpation reveals extreme, exquisite tenderness that is localized to the pubic ramus.

Investigation should include x ray +/- Bone scanning (MRI preferred to limit dose of ionizing radiation).

These stress fractures heal without complication if the aggravating activity is avoided for a period of 8-12 weeks. More importantly the disordered eating/osteopenia needs urgent attention if identified.

(ii) The Femoral Neck

These stress fractures account for 5% of all stress fractures. Early recognition of the symptoms and signs of this injury is important, as X ray findings are often delayed and the potential problems from this fracture are serious. The aetiology involves repeated force above a certain load without sufficient internal bone response time. Loss of shock absorption due to muscle fatigue and limitation of ankle motion by boots may also well play a role.

Symptoms

1. Gradual onset groin pain that is aggravated by exercise.
2. Night pain is present in approximately 20%.

Signs

1. May have pain and restriction at the extremes of hip joint range of motion.
2. Occasionally tenderness to deep palpation of the femoral neck.

Investigations should include an x ray, Bone scan &/or MRI. These stress fractures are classified according to their location in the femoral neck,

1. **Tension side** (distraction side) fractures occur of the superior side of the neck and occur more commonly in older patients. They are more serious as they are more prone to frank fracture and therefore usually require urgent orthopaedic referral for an ORIF.
2. **Compression side** fractures occur on the inferior aspect of the neck and are more commonly seen in younger patients. They usually respond to a period of NWB rest and graduated mobilization thereafter. Rarely the fracture line extends to the superior cortex and an ORIF procedure is indicated.

Prognosis for NOF stress fractures is generally good. However if complete fracture and displacement occurs there is a significant risk of non union of the fracture &/or AVN of the femoral head.

Once again if disordered eating/osteopaenia is identified this must be addressed and treated aggressively.

Pelvic Nerve Entrapments

Obturator nerve entrapment has been described as a cause of groin pain in athletes. This diagnosis relies upon noting exercise induced medial thigh pain over the area of the adductors, particularly after kicking and twisting. There may also be adductor muscle weakness &/or paraesthesia of the medial thigh after exercise. EMG may show chronic denervation changes in the adductor muscles. The compression is thought to result from fascial entrapment of the obturator nerve where it enters the thigh (at the adductor brevis). Treatment requires surgical decompression by dividing the thick fascia overlying the adductor brevis anteriorly.

Lovell discusses the clinical presentation of **ilioinguinal** neuralgia in a series of athletes with groin pain, and noted that the diagnosis is made on finding pain in the area over the iliac fossa, tenderness at the point in the anterior abdominal wall where the ilioinguinal nerve passes through the musculature (near the ASIS) , and that injection of 2-5 mls of local anaesthetic at this site relieves the pain. Treatment usually involves surgical decompression, and neurolysis if necessary.

Entrapment of the **iliohypogastric** nerve by the external oblique aponeurosis may cause groin pain. Tenderness may be found just superior to the deep inguinal ring and the groin pain may be exacerbated by kicking, coughing, sneezing and rolling over in bed. Surgical decompression at the EO aponeurosis is the treatment.

Other less common Causes of Groin Pain

For details please refer to attached reference list.

Suggested Reading

Cochrane review: none exists for Groin pain in athletes

Textbooks

1. Evidence based Sports Medicine, BMJ books. Chap 20 (Peter Fricker. How do you treat chronic groin pain?)
2. Clinical Sports Medicine. Brukner and Khan

Journal Articles

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