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Groin Tendon Injuries

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Injuries to the groin, hip, and pelvic area are common in sport, occurring at the rate of 0.69 per 1000 hours of activity. Groin injuries in football have been estimated to be 5% [1], 5% [2], and 6.2% [3], with the injury rate to the adductor tendons estimated by the National Collegiate Athletic Association (NCAA) at 0.25 per 1000 hours.

The symptoms from the groin may be vague and often uncharacteristic. It is therefore important to have a broad list of differential diagnoses available. The injury can involve adductor muscle tendon problems, but other tendons may be involved. Sports hernia, a posterior inguinal wall insufficiency, is probably very common. Other causes may be osteitis pubis, neurally referred pain, hip problems, snapping hip, bursitis, tumors, intra-abdominal problems, etc.

Groin pain may have a diffuse picture and be caused by many different diagnoses. Obviously, specific diagnosis should be used, but, until a given diagnosis is verified, it is acceptable to talk about "groin pain syndrome," though some health care workers still prefer the old nomenclature of "adductor syndrome," "adductor strain," "pain secondary to unstable pelvis," "sports hernia," or "athletic pubalgia."

However, what is the true pathology? If we know this, can we offer effective management? As the so-called sports hernia is an insufficiency of the posterior abdominal wall, we should probably not use the term "hernia," and indeed "athletic pubalgia" may be a better expression.

Tendon Injury Problems in the Groin Area

Without a stable and well-controlled pelvis, it is hard to perform with skill in sports such as tennis, hockey, soccer, squash, rugby, Australian rules football, etc. The pelvis connects the upper and the lower body. Multiple muscles and tendons insert into the pelvis, and a delicate balance exists between these structures to coordinate the movements passing through the pelvis. The hip joints connect the lower limbs with the pelvis. There is a biomechanical balance between the adductors and the abdominals. There is some "give" around the pubic symphysis. The motions involved are about 2 mm in longitudinal shear, and 3 mm in rotation. The cause of a groin problem may be a combination of abdominal hyperextension and thigh hyperabduction with the pivot point at the pubic symphysis [4]. The repetitive contractions of strong adductors may affect this complex, and weaken the posterior abdominal wall.

Muscle tears tend to occur at the musculotendinous junction, a complex area that contains Golgi organs and nerve receptors. The musculotendinous junction contains cells that can elongate rapidly and deposit collagen, and the tendon elongates when this occurs. Variations in the extent of the interdigitations of the tendon into the muscle at the origin and insertion may explain the site of tears.

Injuries to the adductor muscle–tendon unit occur at the insertion of a tendon into bone, the osteotendinous junction. There are many muscles associated with the groin such as the quadriceps muscles being both knee extensors and a hip flexor (the rectus femoris). The sartorius muscle is a hip flexor and rotator, as well as a knee flexor and rotator. The hamstring muscles (biceps femoris, semitendinosus and semimembranosus) are both hip flexors and knee rotators. The adductors (adductor magnus, adductor longus, adductor brevis, gracilis, and pectineus) are hip adductors, hip flexors, and hip rotators. There are variations in the shape and extent of the adductor longus tendon. (See Chapter 1.) Depending on the position of the hip, the posterior part of the adductor magnus can work as an extensor the hip joint. The gracilis can also flex and medially rotate the knee joint. The abductors and gluteal muscles (tensor fascia lata, gluteus maximus, medius, and minimis) are hip abductors,

hip extensors, medial and lateral hip rotators, and hip flexors.

The piriformis, gemelli, obtoratorius externus and internus, and quadratus femoris are both lateral hip rotators and hip abductors when the hip is flexed. The iliopsoas muscle is primarily a hip flexor but also a lateral hip rotator and a flexor of the lumbar spine. All the above muscles are also active as stabilizers of the hip joints and the pelvis, and thereby the trunk. This is especially evident when they work eccentrically. Using this approach, the importance of the adductors as a major muscle group, and not only "adductors" of the femur in the nonweightbearing situation, becomes evident.

Diagnosis

History and Symptoms

The diagnosis is often made from the history. The "common groin pain" history reported by an athlete can precisely pinpoint the time of onset of pain. The problems often arise during preseason training, and are much more common in males. Patients often report pain during the activity, localized to the pubic region, but often radiating proximally and distally, and often bilateral. Especially in chronic cases, it may mimic nerve entrapment and spinal conditions, and problems in the abdominal organs and sacroiliac joints.

When the pain is *adductor-related*, it is more medial in the groin, and may radiate along the adductor muscle group. When the injury is *iliopsoas-related*, the pain is localized more anteriorly in the proximal thigh, more laterally in the groin. It sometime radiates along the anterior aspect of the femur, and at times involves the lower abdomen lateral to the rectus abdominis. Myotendinous pain in the *lower abdomen* is most prominent around the conjoint tendon insertion on the pubis, and may radiate into the adductor region and the testes [5]. Chronic injuries related to the *rectus femoris* or the *sartorius* are less common. They are usually located at the proximal end of the muscle and tendon close to the insertion.

Examination

Physical examination will often support the suspected diagnosis. There is often pain on resisted adductor motion, and typically there is progression towards chronicity. Physical examination should be focused on the region indicated by the history. An assessment of the patient's gait and posture is useful. The region should be inspected for swelling, discoloration, and other abnormalities. The range of motion of the hip joints, lumbar spine, and the knee joints should be assessed. Various functional tests to evaluate balance and pelvic stability can be performed, including one-leg balance test, exercises on a soft surface, and lunging. Physical examination should include systematic palpation and functional testing of the muscles and ligaments based on the anatomy and biomechanics, with evaluation of flexibility of the lumbar spine and the knee.

Diagnostic Aids

- Plain radiographs are usually the first choice in most conditions involving the pelvis and the hip joints.
- Tomography and computed tomography (CT) are an important supplement in the case of fractures and can be very helpful in preoperative planning.
- A technetium-99 m triple-phase bone scan can be helpful, as increased uptake can be seen in stress fractures, bone neoplasms, bone infections, and osteoarthrosis. In patients with enthesopathy of the adductors and rectus femoris insertion, a bone scan will often show increased uptake.
- Magnetic resonance imaging (MRI) has obvious advantages, including the lack of ionizing radiation, high sensitivity, capability to show soft tissue, and multiplanar imaging capability. T2 weighted images can evidence muscular and musculotendinous injuries as high signals showing muscle strains, inflammation, or ruptures.
- Ultrasound is another possibility in many patients with soft tissue problems in the pelvic region, as it is cheap, fast, and offers the opportunity of dynamic real-time scanning.

Adductor Muscle Tendon Injury

Adductor strain, especially of the adductor longus, is common in soccer [1]. The mechanism is most commonly eccentric adductor muscle contraction with concomitant hip external rotation-adduction. Fatigue, overuse or acute overload of the adductor muscles during sports activities can lead to injuries. The adductor muscles act as stabilizers of the hip joint, and are therefore at risk if the load on the hip joints and the pelvis is no longer balanced. Injuries influencing the stability of the hip joints and the pelvis might thus precipitate overuse problems of the adductor muscles.

Diagnosis

- Diagnosis is made from the history. The typical complaints are pain and stiffness in the groin in the morning and at the beginning of athletic activity. Pain and stiffness decrease, and sometimes disappear after warm-up, but may reappear when the athlete gets tired or after sport has ceased.
- The athlete usually can run in straight lines and at a moderate speed with no pain, but with increasing speed

FIGURE 16-1. Resisted adduction may cause discomfort. (See color insert.)

and sudden changes of direction, groin pain ensues. Activities causing pain typically include sprinting, cutting movements, kicking the ball, and sliding tackles.
- The diagnosis verified by the resisted adductor stress test, performed with the athlete supine with the hips abducted (Figure 16-1), with pain localized to the groin. Groin pain on full passive abduction, often with a decreased range of abduction, is also frequent.
- The diagnosis suggested by the localized tenderness (Figure 16-2) at the origin of the adductor longus and/or the gracilis on the inferior pubic ramus. Tenderness over the pubic symphysis and sometimes at the insertion of the rectus abdominis on the pubis are often seen with adductor-related groin pain.

Management

- Active rest, namely carrying out activities that do not cause pain. Painful activities should be avoided.
- Early passive range of motion exercises and the use of crutches after the first few days.
- Strengthening of the abdominal, hip adductor, and hip flexor muscles is important, with unresisted isometric contractions progressing to resisted isometric exercises. Eventually, dynamic exercises may be started within the patient's threshold of pain.
- Restoring muscle strength and balance around the pelvis is extremely important to avoid relapse or development of chronic injury when the adductors are involved,
- Proprioceptive exercises to restore pelvic balance and coordination should be combined with a careful stretching program.
- Functional activities can then start, with closed chain exercises and crossover activities.
- A water training program can be helpful.
- Nonsteroidal anti-inflammatory drugs (NSAIDs) can sometimes be tried during the first 2 to 7 days.
- Deep massage may be beneficial.
- Sport-specific exercises can be initiated when the initial exercise program can be performed without pain and the muscle coordination is adequate, before a gradual return to sport. It may take 4 to 8 weeks, or even longer, before attempting to return to sport-specific training, depending on the extent of injury.

How effective is the exercise program for this chronic injury? A prospective, randomized clinical trial found that a specific exercise program to be highly effective in the management of adductor-related groin pain [6]. The trial included 68 male athletes, with 75% of the patients training more than 3 times a week, and an average injury duration of 9 months, with 75% of them having ceased to participate in sport. One group received physiotherapy without specific training. The second group received a training program including static and dynamic exercises aimed at improving the muscles stabilizing the pelvis and the hip joints, in particular the adductor muscles. Both groups received the same amount of physiotherapy, and after the treatment period they received identical instructions about sport-related rehabilitation before returning to sports participation. At follow-up 4 months after end of treatment, 79% of the patients in the exercise group versus 14% in the physiotherapy group were without pain at clinical examination and could participate in sport at the same or a higher level of activity before the injury, without groin pain. The patients' subjective assessment was in accordance with the objective outcome measures. Hence, an active training program can improve strength

FIGURE 16-2. Localized tenderness at the adductor insertion may support the diagnosis. (See color insert.)

and coordination and relieve pain. Most patients can be managed successfully with the abovementioned training program combined with management of concomitant injuries.

- A steroid injection may occasionally be of value.
- Surgery is the last resort. The most common surgical procedure is tenotomy of the adductor longus, which is indicated only in truly chronic cases with longstanding problems. The procedure usually produces around 80% good results [7]. The adductor longus tendon should be released 2 to 3 cm distal to its attachment on the pubis, and multiple longitudinal tenotomies should be performed in the osteotendinous area [4]. Others suggest a tenotomy of the gracilis tendon close to its attachment combined with a rectus abdominis plasty or a tenotomy of both the adductor brevis and the gracilis combined with lengthening of the adductor longus.

Other Muscle Tendon Injuries

The iliopsoas muscle contributes to pelvic stability, and is involved constantly in most sports activities. The precise functions of the iliopsoas muscle are not yet fully understood, but the muscle works as pelvic stabilizer as well as a stabilizer for the lumbar spine. One reason why the muscle is at risk could be that its workload includes both eccentric and concentric work. When the injury is iliopsoas-related, the pain is localized anterior of the proximal thigh, more laterally in the groin, may radiate to the anterior aspect of the femur, and sometimes produce some lower abdominal pain lateral to the rectus abdominis. Iliopsoas-related groin pain is:

- Produced when palpating the muscle through the lower abdomen combined with pain at passive stretching of the muscle using the Thomas test [5].
- Frequently, the muscle is also tight, and palpation just distal to the inguinal ligament is often painful. Palpation is performed above the inguinal ligament and lateral to the rectus abdominis. The iliopsoas can also be palpated in the area just below the inguinal ligament lateral to the femoral artery and medial to the sartorius muscle, the only area where the iliopsoas is directly palpable. The Thomas test should be performed to assess the tightness of the iliopsoas, and to ascertain whether passive stretching is painful.
- Incomplete extension of the hip when performing the Thomas test is a sign of a tight iliopsoas muscle. Pressure by the examiner's hand to extend the hip further is a test for pain on passive stretching. The abovementioned tests for the iliopsoas were all found to be reproducible.
- Muscle weakness and pain when flexing the hip joint against resistance at 90° is often found. Sitting with the legs stretched and then elevating the heels might result in pain since the only active hip flexor in this position is the iliopsoas. This is the Ludloff's sign.

Management includes stretching and both concentric and eccentric strengthening combined with pelvic stabilization and balance exercises. Supplementary physiotherapy, including massage and trigger point stimulation, might also be helpful. If the treatment is not progressing satisfactorily, a steroid injection can be helpful. The injection can be ultrasound guided. If ultrasound is not available, the injection can be made in the area under the inguinal ligament, lateral to the femoral vessels and nerve, and medial to the sartorius muscle.

Myotendinous Pain Localized to the Lower Abdomen

This pain syndrome is most prominent around the conjoint tendon insertion at the pubic bone and may radiate into the adductor region and to the testes. Muscle-tendon injury may occur in this region but the most common cause is "sports hernia."

"Sports hernia"

This injury has become a common diagnosis, and encompasses terms such as "sports hernia," "sportsman's hernia," "incipient hernia," "Gilmore's groin," "pubic pain," and "athletic pubalgia." The lesions seem to be nonspecific and difficult to describe precisely. The pathologic findings at surgery are described as "thinning of the fascia," "loose-feeling inguinal floor," "tendency to bulge," or "weakening of the transversalis fascia."

The diagnosis is supported by:

- History, which may include an often insidious onset and deep seated pain which may radiate. There is testicular pain in 30% of patients. Kicking a ball may cause sharp pain.
- In 40% of patients, physical examination may reveal tenderness located in the adductor region. Patients may also show tenderness in the inguinal canal, especially at the posterior wall. Cough impulses may cause discomfort.
- Herniography may verify the diagnosis, which includes contrast leaking intra-abdominally. A hernia can be found with herniography in 25% of athletes with longstanding, unclear groin pain [8].
- Lesions of the symphysis may be the result of strain of tendons, ligaments and fascias. This may predispose for an inguinal hernia as well.
- Gwanmesia et al. [9] examined 32 herniograms: Of these, 25 well identified groin hernias. Twenty-one patients had surgery, and 19 hernias were confirmed. Sixteen patients had no hernia. Herniography is con-

sidered a safe and reliable technique for occult groin hernia.
- MRI depicted well the anatomy [10] in a study of 20 patients, 11 of whom had occult hernias at herniography. MRI revealed 8 occult hernias, and identified 3 cases of osteitis pubis. Hence, herniography is the primary tool for diagnosing hernias. If no herniae are found, MRI scanning may be indicated.

Management

- Nonoperative management is rarely successful in patients with a true sports hernia, but not all hernias are symptomatic. Therefore, diagnosis can be difficult. It is always wise to initially treat groin pain conservatively, avoiding painful activities for some weeks with gradual return to activities thereafter. If the pain continues despite these measures and no other problem is detected, sports hernia is the likely cause.
- Surgery can be effective. Gilmore's groin is a groin disruption with torn external oblique aponeurosis, torn conjoint tendon, conjoint tendon torn from the pubic tubercle, dehiscence between conjoined tendon and inguinal ligament, and no actual hernia present [2]. Most of his patients (98%) were males. Management of painful sports hernia is through operative repair of the weak posterior inguinal wall. A variety of open surgical procedures have been described to reinforce the posterior wall, either by plication and tightening of the existing tissue or by reinforcement with mesh. Recently, laparoscopic procedures have been developed, with placement of a synthetic mesh over the defect superficial to the peritoneum.

Results

The diagnosis of sports hernia may be difficult, and requires an experienced clinician. Early surgical intervention is usually successful, and 85% to 90% of patients return to full activity within 2 to 3 months [11,12]. A successful return to sports following an open procedure is possible in about 90% of athletes. Brannigan et al. [13] followed 100 consecutive groin repairs in 85 young athletes treated with Gilmore's repair: 96% of them returned to competitive sports in 15 weeks. Recent preliminary reports suggest that laparoscopic surgery with implantations of a polypropylene mesh may allow return to full sports activity in <1 month.

The "hockey groin syndrome," with tearing of the external oblique aponeurosis and entrapment of the ilioinguinal nerve, is a cause of groin pain in professional hockey players. Ilioinguinal nerve ablation and reinforcement of the external oblique aponeurosis successfully treats this incapacitating entity. In a 12-year study, 22 NHL ice hockey players with debilitating groin pain underwent surgery with exploration of the inguinal nerve and reinforcement of the external oblique aponeurosis with a Gore-Tex graft. Subsequently, 85% were able to continue their careers in ice hockey [14].

Meyers et al. [4] evaluated 276 patients. Of these, 138 had adductor pain and 38 had other abnormalities. One hundred seventy-five pelvic floor repairs were carried out. Of the 157 patients who had received a rectus abdominis muscle reattachment, 97% returned to their earlier levels of performance. A distinct syndrome of lower abdominal/adductor pain in athletes, "athlete's pubalgia," is correctable by strengthening the anterior pelvic floor.

Osteitis Pubis

This entity was first described by Beer in 1924 as causing groin pain in activities such as kicking a football. Osteitis pubis presents with pain at the pubic symphysis that can be referred to the surrounding area to include the lower abdomen, hip, groin, scrotum, or perineum. Its etiology is unknown. However, abnormal biomechanics of the pubic symphysis has been implicated as the probable cause. Pubic symphysis motion in normal subjects is restricted to less than 2 mm. In one radiographic study, all patients with more than 3 mm of mobility had pubic symphysis pain. It is probable that stiffness and restricted motion of the hips and sacroiliac joints contribute to increased motion and stress being placed on the pubic symphysis.

The diagnosis is made by plain radiography, and can be assisted by technetium-99m isotope bone scanning, which will show increased uptake at the pubic symphysis on the delayed views, indicating increased bone turnover. However, Fricker et al. [15] reported poor correlation between radiographic changes and clinical symptoms, with some symptomatic patients having no radiographic changes or isotope uptake on bone scan. In addition, radiographic changes and bone scan isotope uptake did not correlate well with the duration or intensity of symptoms. MRI will normally clarify the diagnosis.

Management

The initial management consists of a program of varied exercises. Therapies which may help to speed recovery up have been advocated, but have not been scientifically validated. The first line of management is reduction of activity levels. Cyclic activities such as running should be substituted with non-painful activities such as swimming, and appropriate stretching and strengthening exercises of the surrounding joints and musculature should be instituted. Particular attention should be paid to hip range of motion, and adductor stretching and strengthening. Shock-absorbing footwear may also play an important role in reducing the shear forces across the symphysis. Corticosteroid injection under fluoroscopic guidance

may be effective. The management is basically conservative, as the condition is mostly self-limiting. Full recovery for men occurs on average in 9 months, and in women in 7.5 months [15].

Groin Pain of Neural Origin

Peripheral nerves may become entrapped after direct trauma or inflammation. The nerves most commonly affected are the ilioinguinal, genitofemoral, and lateral cutaneous femoral nerves. The femoral, obturator, and iliohypogastric nerves may also be involved, though rarely.

In a study of 27 cadavers, the course of genital branches around the inguinal region varied considerably [16], and entrapment of any of these branches by the inguinal ligament might cause groin pain. Neural factors may play a role in groin pain produced by groin hernia.

Lee and Dellen [17] studied 54 patients with groin pain related to resection of lateral femoral cutaneous, ileoinguinal, iliohypogastricus, or genitofemoral nerves. Resection of the ileoinguinal and iliohypogastric nerves gave 78% to 83% excellent results. The worst result was achieved with resection of the genitofemoral nerve, with only 50% of patients gaining excellent outcome.

Intra-Articular Hip Problems

A not uncommon hip problem in athletes is labral tears of the hip joint, which often cause a sharp catching pain. Flexion and rotation of the hip usually initiate pain. An intra-articular injection of local anesthetic can be diagnostic. MR arthrogram can be recommended given its accuracy of 91% in identifying a labrum tear. The labrum tear can be managed arthroscopically with excision of the tear or, more commonly, excision of the labrum. Mitchell et al [18], in a prospective study of 25 consecutive hip arthroscopies, found that all of the hips arthroscoped had pathology. Back pain and hip pain were the most common presentations. The only consistently positive clinical test result was a restricted and painful hip compared with the contralateral hip. Of the 17 patients whose flexion, abduction, and external rotation results were reported at the time of examination, 15 (88%) were positive, and 2 (12%) were negative. Plain radiographs were normal in all patients. All but one patient underwent magnetic resonance arthrography. Although specificity of 100% was achieved in that study, the sensitivity was significantly lower, with a relatively high number of false negatives.

Narvani et al. [19] studied the prevalence of acetabular labrum tears in athletes presenting with groin pain. Eighteen athletes who presented to their sports clinic with groin pain underwent clinical assessment and MR arthrography to detect presence or absence of acetabular labrum tears. In 4 of these 18 athletes (22%), the MR arthrogram demonstrated the presence of acetabular labrum tear. Three of them underwent arthroscopic debridement of their acetabular labrum tears and returned to their sporting activities within 8 months. Clicking sensation of the hip was a sensitive (100%) and specific (85%) clinical symptom to predict labral tears. The internal rotation–flexion–axial compression maneuver was sensitive (75%) but not specific (43%). The Thomas test was neither sensitive nor specific.

Other painful intra-articular hip lesions include localized chondral lesions, chondral delamination, and chondral or osteochondral loose bodies. Their optimal management is by hip arthroscopy and debridement. If there is no serious articular cartilage injury, it may be possible to return to sport within 1 to 4 months.

Snapping Hip and Other Related Conditions

Snapping around the hip, either medially or laterally, can be ascribed to a variety of causes. It was first described by Binnie in 1913 and the internal snapping hip by Schaberg et al. [20]. The snapping sensation is audible, and is sometimes associated with pain. When no discomfort or pain is felt with the snapping, the condition is considered of no pathological significance.

One cause of medial snapping hip is impingement of the iliopsoas tendon when it is catching on the pelvic brim, or ileopectineal eminence. Other causes of medial snapping hip can include intra-articular problems in the hip or a snapping iliopsoas tendon. Intra-articular loose bodies caused by trauma, osteochondritis dissecans, or osteochondromatosis can be associated with locking, clicking, and pain. A labral tear may also result in a painful medial snapping hip. The iliopsoas tendon lies in a groove between the iliopectineal eminence and the anterior inferior iliac spine. It crosses over the femoral head and capsule and inserts into the lesser trochanter. When the hip is extended from the flexed and externally rotated position, an audible and sometimes painful snap is felt. Palpation over the hip joint can often reveal a snapping sensation against the fingers.

The snapping iliopsoas can in most cases be treated nonsurgically. A combination of stretching and careful dynamic strengthening exercises can often help the patient. Sometimes a steroid injection is needed. Surgery gives acceptable results by either lengthening the tendon or a tenotomy.

Stress Fractures

Many stress fractures probably go unrecognized because the patients treat themselves by resting until the pain improves. Stress fractures of the pubic rami are particlurly common among long-distance running athletes.

There appears to be an association with anorexia and amenorrhea among female athletes. Stress fractures have been reported to occur in 49% of collegiate female distance runners who had <5 menses per year [21]. In addition, of those athletes who were amenorrheic, 47% had an eating disorder.

Stress fractures present insidiously with lower pelvic and groin pain worsened with pounding type activities. The pain is often worse just after running, but will gradually improve with rest. Stress fractures are often related to a sudden increase in the intensity of the athlete's training. Stress fractures are often not evident on plain radiographs because of the lack of callous formation. Therefore, if a stress fracture is suspected, a bone scan or MRI is the investigation of choice.

Stress fractures have been reported in all bones of the pelvis, but the most common area of pelvic involvement is the inferior pubic rami. Stress fractures of the femoral neck are the most serious concern around the pelvis. An unrecognized stress fracture of the femoral neck can go on to complete fracture with the potential for avascular necrosis. This is a potentially devastating problem, so early recognition and management is the key. One study reported on 23 athletes with femoral neck stress fractures [22]. Of the 7 patients that developed complications, 5 had a displaced fracture. This stresses the importance of early recognition and management of these injuries to prevent displacement.

Management of stress fractures about the pelvis, except for femoral neck fractures, is relatively straightforward. This involves a period of 4 to 6 weeks rest from the inciting activities. When the athlete is pain free, a graduated program of return to activities can begin. Any dietary or hormonal issues must be addressed to assist in healing and prevention of recurrence. Management of femoral neck stress fractures is based on the displacement and location of the fracture. All displaced fractures require surgery to anatomically reduce the fracture and fix it with cannulated screws. Nondisplaced fractures can be divided into 2 categories: 1) compression fractures and 2) tension fractures. The compression fractures have a good potential to heal, and can be treated nonoperatively. Activities should be restricted by pain. This usually requires a short period of nonweightbearing to partial weightbearing with crutches to prevent a complete fracture. This is followed by a gradual return to normal pain free activities. No pain should occur either during or after the activity. Progression of healing should be monitored with serial radiographs. Return to light running can usually begin at about 2 to 3 months if there is no pain and the radiographs show healing of the fracture. Tension fractures are best managed surgically using cannulated screws. Tension fractures have poor healing capacity and are more likely to progress to complete fractures. If this occurs, avascular necrosis may develop with devastating consequences. Patients with nondisplaced fractures managed surgically can return to pain-free light running at about 3 months from the procedure.

Conclusions

Many groin problems in athletes are secondary to acute injuries that have not been managed appropriately. Others are caused by muscle imbalances and poor biomechanics and, without proper rehabilitation, have resulted in chronic conditions. In most patients with longstanding problems, a hernia must be excluded.

Athletes should be aware that, if they experience groin pain, they should abstain from the activity causing symptoms until a diagnosis is formulated. If these injuries are mismanaged or, more commonly, ignored, chronic pain will result. If there is any doubt about the diagnosis, these athletes should be referred to a physician with a special interest in these problems. These physicians have often developed a multidisciplinary approach to groin injuries.

In summary, groin injuries involving tendons may not in themselves be serious. However, they may lead to chronic pain and impair athletic ability and performance, especially if not correctly diagnosed and promptly treated. Groin injuries and pain may prevent athletes from participating in sport for long periods. They still constitute some of the greatest problems in orthopedic sports medicine.

Take-Home Message

- Allow rest initially until a diagnosis is made.
- Be aware of various differential diagnoses.
- Teamwork is often beneficial.
- Management must be based on a definite diagnosis.
- Recovery and healing may take time.
- Groin pain can be very difficult for both the patient and the doctor.
- Show respect and patience for groin pain problems.
- Groin injuries may not in themselves be serious injuries. However, they may lead to chronic pain and impair athletic ability and performance, especially if not correctly diagnosed and promptly managed.

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