
Sports hernia: the experience of Baylor University Medical Center at Dallas

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Groin injuries in high-performance athletes are common, occurring in 5% to 28% of athletes. Athletic pubalgia syndrome, or so-called sports hernia, is one such injury that can be debilitating and sport ending in some athletes. It is a clinical diagnosis of chronic, painful musculotendinous injury to the medial inguinal floor occurring with athletic activity. Over the past 12 years, we have operated on >100 patients with this injury at Baylor University Medical Center at Dallas. These patients have included professional athletes, collegiate athletes, competitive recreational athletes, and the occasional “weekend warrior.” The repair used is an open technique using a lightweight polypropylene mesh. Patient selection is important, as is collaboration with other experienced and engaged sports health care professionals, including team trainers, physical therapists, team physicians, and sports medicine and orthopedic surgeons. Of the athletes who underwent surgery, 98% have returned to competition. After a minimum of 6 weeks for recovery and rehabilitation, they have usually returned to competition within 3 months.

Sports hernia is a condition that has been poorly understood by clinicians. Meyers et al have documented the widespread public interest in this entity (1). It is estimated that groin pain occurs in 5% to 28% of athletes (2). As originally described, sports hernia occurred more commonly in hockey and soccer players (3), but it is also seen in all sports for a variety of reasons. Although never proven, one commonly mentioned reason for the condition’s frequency is athletes’ shorter off-season time to allow for recovery.

Our experience has confirmed that of others in showing that many athletes who develop acute and chronic injuries to the lower abdominal muscles, pubic symphysis, and adductor musculature—so-called sports hernias—have greatly benefited from care. Over the past 12 years, we have repaired >100 sports hernias at Baylor University Medical Center at Dallas. Our patients have included high-profile professional athletes, competitive college athletes, competitive adult athletes, club players, and weekend warriors. Of those treated, 98% have returned to their competitive level of activity, usually within 3 months. This report reviews this entity, its etiology and pathology, and its diagnosis, repair, and rehabilitation.

HISTORY

Nagging and disruptive groin injuries had been recognized for a long time. In 1966, Cabot reported 202 cases in some 42,000 Spanish soccer players over a 30-year period (4). This entity is now sometimes referred to as “Gilmore’s groin.” Dr. O. Jeremy A. Gilmore from the Groin and Hernia Clinic in London is credited with first describing this entity and a surgical repair to correct it.

DEFINITION

A sports hernia is a painful musculotendinous injury to the medial inguinal floor caused by and exacerbated by vigorous sport or physical exertion. It is not a true hernia because there is no “herniation” or protrusion of a visceral sac (5). However, its repair is very similar to that of an inguinal hernia, and the term has become ingrained. Because the term “athletic pubalgia syndrome” is nearly identical in meaning, the terms are used interchangeably here. However, a surgical procedure intended to correct the abdominal wall injury is called a sports hernia repair.

With athletic pubalgia syndrome, there is disequilibrium between the upward and oblique pull of the abdominal muscles on the pubis against the downward and lateral pull of the adductors on the inferior pubis. This imbalance of forces can lead to injuries of the lower central abdominal muscles and the upper aponeurotic common insertion of the adductor muscles. Although it is occasionally the result of an acute injury, it is more likely the result of repetitive eccentric overload to the abdominal wall stabilizers of the pelvis. It has been postulated that inadequate blood supply or simply failure to heal these repetitive attritional type injuries results in the condition.

RADIOLOGY

The decision for operative intervention remains a clinical one. Experienced clinicians will identify this condition from history and examination. However, the use of radiologic aids in identifying acute, chronic, or other unrelated conditions is very helpful in recognizing some of the more subtle pathology

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in these patients. Plain x-rays, bone scans, computed tomography scans, and especially magnetic resonance imaging (MRI) scans may be necessary to sort out related or associated injuries or pathology.

The group at Thomas Jefferson University Hospital has imaged over 350 patients (6). In their experience, patients with a clinical sports hernia almost always exhibit abnormalities on MRI. The two dominant patterns of injury include the lateral rectus abdominis/adductor aponeurotic injury just adjacent to the external inguinal ring and the midline rectus abdominis/adductor aponeurotic plate injury. Although there is usually some degree of pubic marrow enhancement, including osteitis pubis, these findings do not predict which patients will benefit from surgery. MRI is very useful for identifying adductor injuries.

THE CLINICAL DIAGNOSIS OF SPORTS HERNIA

Sports hernia is diagnosed clinically. In general, sports hernia should be considered in patients who have a deep lower abdominal or groin pain, exacerbated with sport-specific activities and relieved with rest (7). Since it is a diagnosis of exclusion, other causes of pain must first be ruled out: genitourinary, intraabdominal, gynecological, hip/lumbar, or other muscular strains and sprains. There may be palpable tenderness over the pubic ramus, but the most specific sign is tenderness over the medial inguinal floor, or Hesselbach's triangle. The pain may be more severe with resisted hip adduction, but the most specific finding is pain in the inguinal floor with a resisted sit-up.

After the above-referenced entities have been excluded, the exam begins with a standard hernia examination, careful bilateral scrotal and external inguinal ring palpation. Assuming no inguinal hernia is found, the patient is placed supine, asked to bend the knees and place the heels together. The knees are allowed to passively fall to each side. This allows the assessment of any adductor spasm or tightness. Gentle percussion over the pubic symphysis is performed to assess for the presence of clinical osteitis pubis. Next, the patient is asked to adduct the thighs against the examiner's forearm from fist to elbow, used as a wedge. The tenderness of each adductor tendon is assessed. Maintaining this position of forced adduction, the patient is asked to perform a partial crunch, tightening the abdominal muscles. In this position of forced adduction and abdominal crunch, tenderness of the inguinal floor is assessed by palpation bilaterally. Alternatively, the athlete can suspend the ipsilateral straight leg in external rotation, against resistance, and then perform the abdominal crunch and test the medial inguinal floor for tenderness.

From this examination, tenderness is graded on each adductor tendon, the pubic symphysis, and each inguinal floor using a scale from 0 to 5:

- 0 for no tenderness
- 1 for very slight tenderness
- 2 for mild but definite and reproducible tenderness
- 3 for moderate tenderness ("Yes, that hurts")
- 4 for severe tenderness ("Hey, doc, that *really* hurts")
- 5 for pain that is so severe the patient cannot tolerate palpation

All five points are recorded as X/5. Patients are considered for surgery if they have tenderness or pain of $\geq 3/5$ in the medial inguinal floor that is clearly dominant over adductor tenderness on the ipsilateral side in the absence of any other pathology. If the grade is ≤ 2 unilaterally or bilaterally, or if there is a clear dominance of adductor pathology and injury, other therapy is recommended.

CONSERVATIVE TREATMENT

Patients will be seen at various times following their injury or their first awareness of a problem. They may be under the care of a licensed trainer, licensed physical therapist, orthopedic/sports medicine specialist, or other practitioner. Some may have already been through 6 weeks of care under a trainer or physical therapist; some may have just "shut it down" for 2 to 3 weeks; and others may have been playing with pain for 6 months.

When physical therapy is indicated, Kachingwe and Grech (7) recommended soft tissue mobilization techniques to the lumbar and hip regions; joint mobilization/manipulation techniques to the pelvis, sacroiliac joints, and/or hips; neuromuscular reeducation; and manual stretching. Athletes who underwent physical therapy averaged 7.7 sessions over 6 weeks. Kachingwe and Grech proposed a reasonable algorithm for managing these athletes. If athletes have 4 or more months before they are scheduled to return to the sport and recall hearing or feeling an acute lower abdominal "rip," then they should undergo surgical repair. If they do not recall an inciting injury or if the pain is more centered in the adductors, they should undergo a 6-week trial of rehabilitation. Finally, if they are not high-performance athletes, they should undergo physical therapy. If after a prolonged period of rest and rehabilitation, these athletes are still bothered by the condition and unable to exercise, train, or compete satisfactorily, surgery should be considered (7).

SURGICAL TREATMENT

Athletes with a grade 4/5 or 5/5 score on medial inguinal tenderness usually require surgery. Those with medial inguinal tenderness of 3/5 are considered equivocal. Since sometimes symptoms are vague and change over time, these patients are asked to return for an exam in 6 or more weeks.

The success of surgical repair in returning appropriately selected athletes to competition has been shown in the literature and in this author's experience. In a prospective randomized study in 66 soccer players with sports hernias, patients were randomized into four groups: 1) surgical repair, 2) physical therapy 3 times a week for 4 weeks, 3) daily strengthening, and 4) control. Only the surgical group had a significant reduction in symptoms at 6 months (8).

Surgery consistently reveals an attenuated inguinal floor. In approximately 10% of patients, a cord lipoma will be found. Also, a large majority of athletes have tears or disruptions of the external oblique fascia, especially where the branches of the ilioinguinal and iliohypogastric nerves exit the fascia. Tension and trauma to these nerve fibers have undoubtedly contributed to the pain these patients experience.

Nam and Brody provided an excellent review of the therapy for sports hernia. They included large reviews of patients who underwent surgery, including both open and laparoscopic repair. Most studies reported that 90% to 100% of patients returned to full activity in 6 months (2). The open types of repair include Bassini and modified Bassini repairs; modified Shouldice, an approximation of the external oblique; Meyers' "pelvic floor repair" with or without adductor longus release (9), an approximation of the external oblique with ablation of the ilioinguinal nerve; modified Lichtenstein, an approximation of the external oblique with Lichtenstein; and modified Bassini with mesh.

Prior to surgery at Baylor University Medical Center at Dallas, most patients are seen by other clinicians, therapists, and trainers who are experienced in the diagnosis and treatment of sports injuries and who have considerable experience caring for athletes with sports hernias. We use a modification of the Lichtenstein technique, or open mesh repair. In the process of approaching the inguinal floor, we carefully examine the external oblique. Its fibers are usually attenuated, especially at the external inguinal ring. Occasionally tears or dehiscence of its fibers is also found at the point of the superficial exit of the iliohypogastric or ilioinguinal nerves. We take care to ablate branches of the ilioinguinal or iliohypogastric nerves that are stretched out by attenuated external oblique or might become entrapped or irritated by the floor repair. In addition, we carefully identify and protect branches of the genitofemoral nerve. The genital branch of the genitofemoral nerve will accompany the external spermatic vessels located on the undersurface of the inguinal cord. A polypropylene mesh is sutured in place beginning at the medial inguinal floor, extending the mesh over the lateral rectus abdominus and for a centimeter down over the pubis. From here we use a running monofilament suture along Poupart's ligament to a point just lateral to the "neo" internal ring made in the mesh. From the same point medially, we run the suture along the conjoint tendon, continuing along the internal oblique to a point lateral to the internal ring. A tension-free mesh repair is obtained. Finally we repair the external oblique, correcting any tears or disruptions identified.

SURGICAL REHABILITATION AND RECOVERY

Following surgery, patients are asked to return to the clinic at 1 to 2 weeks and at 6 weeks. They are advised to enter into a "2-week, 2-week, 2-week" recovery program. The first 2-week period involves moderate cardiovascular conditioning for at least 30 minutes each day. At first, the activity may be walking. If patients have access to an elliptical machine, treadmill, or recumbent bicycle, these are excellent means to achieve the same goal. By the second 2-week period, most of the postoperative pain has resolved. During that period, patients are asked to continue their cardiovascular program and to increase the duration and resistance if possible. They are also asked to begin mild to moderate strength conditioning, depending on their sport or preferred method of training. Finally, during the last 2-week period, the athletes are asked to continue to increase the cardiovascular training and the

strength conditioning and to begin some sport-specific activity. This is frequently running, jogging, or light sprinting. Their goal by the end of the 6 weeks is to be able to begin running, cutting, and opening up in some way appropriate to their sport. This 6-week period is ideally supervised by an experienced trainer or physical therapist. However, many athletes do not have access to these resources, and independent reconditioning has also been quite successful, often with frequent calls to the surgeon's office.

THE BAYLOR EXPERIENCE

To date we have operated on 100 athletes for this condition at Baylor University Medical Center at Dallas, and 98% of the athletes have returned to their sport at a competitive level. They usually return in less than 3 months, occasionally in 3 to 6 months. We perform only the modified Lichtenstein repair using a lightweight or ultra-lightweight polypropylene mesh. We routinely inject and instill 0.5% Bupivacaine into these wounds.

All patients are followed until they return to the sport at preinjury status, which will take from 3 to 6 months. Once they return to their desired activity level and are satisfied that the "sports hernia" pain has resolved, they are considered a successful repair. This is, of course, a much shorter follow-up than used for inguinal hernia repair. In that repair, recurrences or failures may be experienced well after 6 months.

The two known failures had resolution of their abdominal wall complaints. However, each had a dominant adductor injury that did not resolve with repair of the abdomen.

These cases are not purely surgical successes; patient care is provided in collaboration with experienced sports health care professionals.

1. Meyers WC, McKechnie A, Philippon MJ, Horner MA, Zoga AC, Devon ON. Experience with "sports hernia" spanning two decades. *Ann Surg* 2008;248(4):656-665.
2. Nam A, Brody F. Management and therapy for sports hernia. *J Am Coll Surg* 2008;206(1):154-164.
3. Gilmore J. Groin pain in the soccer athlete: fact, fiction, and treatment. *Clin Sports Med* 1998;17(4):787-793.
4. Cabot J. Osteopatia dinamica del pubis. *Proceedings of the XVI World Congress of Sports Medicine*. Hanover, Germany: Deutscher Aertze-Verlad, 1966:359-364.
5. Gilmore OJA. Groin disruption in sportsmen. In Kurzer M, Kark AE, Wantz GE, eds. *Surgical Management of Abdominal Wall Hernias*. London: Martin Dunitz, 1999:151-158.
6. Shortt CP, Zoga AC, Kavanagh EC, Meyers WC. Anatomy, pathology, and MRI findings in the sports hernia. *Semin Musculoskelet Radiol* 2008;12(1):54-61.
7. Kachingwe AF, Grech S. Proposed algorithm for the management of athletes with athletic pubalgia (sports hernia): a case series. *J Orthop Sports Phys Ther* 2008;38(12):768-781.
8. Ekstrand J, Ringborg S. Surgery versus conservative treatment in soccer players with chronic groin pain: a prospective randomised study in soccer players. *Eur J Sports Traumatol Rel Res* 2001;23(4):141-145.
9. Meyers WC, Foley DP, Garrett WE, Lohnes JH, Mandelbaum BR. Management of severe lower abdominal or inguinal pain in high-performance athletes. PAIN (Performing Athletes with Abdominal or Inguinal Neuromuscular Pain Study Group). *Am J Sports Med* 2000;28(1):2-8.