



Results of surgical treatment of athletes with sportsman's hernia

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Chronic groin pain in athletes is a difficult diagnostic and therapeutic condition. Between March 2004 and December 2009, 241 male athletes (mean age : 25.8 years , range : 16- 41) in whom chronic sportsman's hernia was diagnosed, were surgically treated using a standardised technique. In this retrospective study, charts were analyzed for preoperative duration of symptoms and prior treatment. Perioperative complications were noted. Patients were contacted and were asked to answer a telephone questionnaire : 162 patients agreed to be questioned as part of the current study. A surgical intervention with reinforcement of the posterior inguinal wall and tenotomy of the adductors has lead to satisfactory results in over 90% of athletes with chronic groin pain who failed to improve with conservative treatment.

Keywords : groin pain ; athletes ; sportsman's hernia ; surgical repair.

INTRODUCTION

Although groin pain and/or pubalgia are common problems among young male athletes, there is very little evidence based knowledge on the diagnosis and treatment of these conditions. Because of the complex local anatomy and the nonspecific symptoms it is often difficult to elucidate the exact cause of the pain. Sportsman's hernias are described as chronic groin pain in athletes, i.e. associated with a bulging of the posterior wall of the inguinal canal (6,14). This was confirmed by Polglase *et al*, who stated that a deficiency of the

posterior wall of the inguinal canal was present in 85% of athletes who underwent surgical exploration for chronic groin pain of unknown causes (15). Sportsman's hernia is probably a component of a more extensive pattern, which involves several concurrent pathologies such as osteitis pubis, an indirect hernia and tendinopathy of the conjoint and adductor tendons (6,10). In fact, the most common causes for chronic groin pain in athletes are adductor strains and osteitis pubis (11).

Approximately 5% of patients attending sports clinics have groin symptoms (9,21). In our country this most commonly occurs in soccer players. Renström and Peterson reported that 5% of all soccer injuries are located in the groin region, but sportsman's hernia can also be found in many other sports associated with fast and short accelerations, rotations and side to side motions, such as hockey, rugby, cricket, etc (1,5,6,16).

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Table I. — Differential diagnosis of chronic groin pain in athletes

Causes of chronic groin pain
Ilioinguinal neuralgia
Tear of the acetabular labrum
Avulsion injury
Stress fracture of the femoral neck or pubic bone
Sports hernia
Periostitis
Iliopsoas strain or bursitis
Obturator nerve entrapment
Osteonecrosis of the femoral head
Slipped capital femoral epiphysis
Snapping hip syndrome
Lumbar spine referred pain
Genitourinary problems

Although the objective physical examination findings are sparse, a good clinical examination is very important (10). Many other injuries in the same region need to be excluded before the diagnosis of sportsman's hernia can be made and surgery can possibly be considered (Table I). Typically groin pain with sportsman's hernia will develop during exercise, will be aggravated by sudden movements and will persist after the game (5,6,11). The pain can be localized at the adductor region, perineum, rectus muscle, inguinal ligament and testicular region (5,20). During a period of inactivity, the pain will disappear, but it will relapse when sporting activity is resumed (10). Sportsman's hernias occur almost exclusively in men (5,13,20).

This retrospective study was designed to evaluate the results of the surgical treatment of sportsman's hernia.

MATERIALS AND METHODS

Preoperative evaluation

Clinical examination typically reveals a painful palpation of the conjoint tendon and the pubic tubercle. In some cases the experienced clinician can find a dilated and hypersensitive outer inguinal ring. Resisted forceful sit-ups and hip adduction are painful (20). A full examination of the abdomen, pelvis and both hips is mandatory. As hip impingement and a coexistent labrum tear is one

of the most important differential diagnoses in athletes, we always check for range of motion and pain with FADIR (flexion, adduction, internal rotation) and FABER (flexion, abduction, external rotation) tests. The Valsalva maneuver is carried out while digitally palpating the inguinal ring to rule out inguinal herniation. When in doubt about abdominal pathology the athlete is referred to the general surgery department. Additional detailed high standard investigations are unable to produce a spot diagnosis, but they are necessary to rule out other causes of sport induced groin pain (10). A standard radiograph of the hip and pelvis is performed to rule out osteoarthritis, fractures or avulsions. We consider Magnetic Resonance Imaging as the most useful investigation for all musculoskeletal disorders around the hip joint such as stress fractures, avascular necrosis, osteomyelitis, tendinitis and bursitis. A dynamic ultrasound can reveal a slight bulging of the posterior wall of the inguinal canal during exercise. This valuable examination is investigator-dependent and has a high false positive outcome. Technetium bone scan often shows increased isotope uptake at the enthesis of the conjoint tendon or adductors.

Study population

A total of 241 male athletes, with a mean age of 25.8 years (range : 16-41) were operatively treated for sportsman's hernia at our hospital between March 2004 and December 2009. All patients were preoperatively diagnosed in the same hospital by one orthopaedic surgeon (G.D.). Charts were analyzed for duration of symptoms, prior treatment and perioperative complications. Conservative therapy such as rest, physiotherapy, anti-inflammatory medication and corticosteroid infiltrations was used as the first line of treatment. The mean duration of preoperative pain and conservative approach was 11.1 months (range : 1-132). Patients were contacted and asked to participate in a telephone questionnaire. One hundred and sixty-nine patients could be reached at an average follow-up of 3.9 years (SD 1.7) : 7 of them refused to cooperate with the study for personal reasons. The remaining group of 162 athletes included 155 soccer payers, 4 tennis- and 2 basketball players and one figure skater.

All surgical procedures were performed by a general surgeon and an orthopaedic surgeon (G.D.) following the technique described below. The surgical technique remained unchanged over the study period. Post-operatively, a standard rehabilitation program (Table II) was started under supervision of a physiotherapist.

Table II. — Standard postoperative rehabilitation program

Week	Rehabilitation program
1-2	Circulation enhancement, mobilisation and walking
3	Light adductor stretch, Exercise bike without resistance, aquatraining
4	Intensive walking
6	Light jogging, to start with 5 minutes
8	Jogging with intermittent accelerations
10	Sprint and resistance training
12-14	Progressive sport specific training

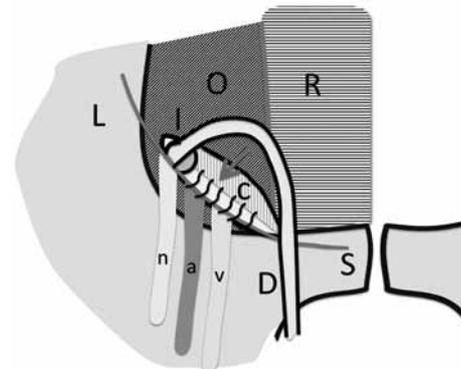


Fig. 1. — Surgical technique : After incision of the external oblique muscle (O) and retraction of the ductus deferens (D), the lateral side of the rectus abdominis muscle (R) and conjoint tendon (C) are sutured to the inguinal ligament (L). Pubic symphysis (S), external inguinal canal (E), femoral nerve (n), artery (a) and vein (v) are displayed.

Surgical technique

The surgery was performed under general anaesthesia. All patients had a bilateral repair of the inguinal wall, combined with a release of the adductors, performed respectively by the general and orthopaedic surgeon.

The adductor longus muscle release was done via a small incision at 2 cm from its insertion on the pubic bone. The chronically inflamed tendon was partially cut at this site while the leg was extended. The degree of release was observed by abduction stress to the operated leg.

The second part was executed by the general surgeon, making two incisions of 3 to 4 centimeters at the level of the inguinal canal bilaterally. The subcutaneous tissue and fascia of Scarpa were incised and the external inguinal canal was uncovered. The external oblique muscle was split along its fibers. The spermatic cord was then identified and the cremasteric muscle was incised. The ductus deferens and spermatic neurovascular bundle were retracted, as well as the ilioinguinal nerve. If present, indirect herniations were repaired by ligation of the herniation pouch and resection of any prehernial lipoma. A running prolene 2/0 suture was used to attach the lateral side of the rectus abdominis sheath to the inguinal ligament (Fig. 1). The internal inguinal ring was tightened by suturing the conjoint tendon to the inguinal ligament, just as far as the epigastric vessels. To strengthen the repair, a second continuous layer was sutured in the opposite direction. The spermatic duct and ilioinguinal nerve were now repositioned and the oblique external muscle was closed. Finally, the fascia of Scarpa and the skin were closed by resorbable suture.

No prosthetic implants nor endoscopic procedures were used in any patient.

Statistical analysis

Two subgroups were analyzed separately and combined : (semi-) professional- (71) and amateur (recreational) sportsmen (91). Differences in age, time of preoperative complaints and time to recovery were analyzed by the Student's-t test, while the Mann-Whitney U-test was used for all non-continuous variables in our independent groups. We compared the use of diagnostic investigations by use of the Chi-Square test.

RESULTS

Our study group consisted of 91 amateur and 71 semi-professional or professional athletes. A significant age difference was found between the two groups, at the time of surgery, with 26.9 years (range : 16-41) in the amateur group and 24.4 years (range : 17-38) in the professional group ($p = 0.001$). The mean time from the onset of symptoms to the surgical procedure was 11.1 months, without any significant difference between amateur and professional players ($p = 0.751$). During that time 80% had been treated with physiotherapy and 77% had had one or more cortisone infiltrations. Only 19% of patients reported temporary improvement from conservative therapy and rest. Again no sig-

Table III. — Preoperative technical investigations

	(Semi-)professionals (%)	Amateur (%)	All (%)
Radiographs	65	48	56
Ultrasound	75	68	71
T ⁹⁹ Bone scan	18	11	14
MRI	61	47	53

nificant difference was found between the professional and amateur athletes. Eight patients already had a surgical treatment, performed elsewhere, for the same complaints.

Before the diagnosis was set, different technical investigations were performed (Table III).

Postoperative complications encountered were persistent bleeding in 8 (5%) and superficial infection in 3 (2%) cases. A major haematoma was surgically evacuated in two cases. Infections were treated with intravenous broad spectrum antibiotics. No neurological complications occurred. In accordance with the rehabilitation program, the mean time to regain sport was 4.4 months, without a difference between professional and amateur players ($p = 0.831$).

Without significant difference between the groups, 69.6% of athletes reported a return to sports at the same or a higher level as before the injury, while 19.9% were able to perform their preinjury sports activity but at a lower level than before. Only 3.7% were unable to return to their previous sport because of a recurrence of symptoms, while 6.8% had stopped participating in their pre-injury sporting activity for other reasons.

At final follow-up (mean 3.9 years, range 1-7) 69.1% did not have any pain or discomfort in everyday life, and 23.5% reported minor complaints; 68.9% were reportedly 'very satisfied', 21.7% 'satisfied', 4.4% 'somewhat dissatisfied', while 1.9% were 'dissatisfied' with the results of the procedure. There were no statistical differences in satisfaction rate between professional or amateur athletes. All factors considered, 65 semiprofessional sportsmen (91.5%) and 85 amateur players (93.4%) would again choose to have the same operation in the same setting.

DISCUSSION

Sportsman's hernia is one of the medical conditions that have not been fully clarified in modern medicine. Despite its prevalence, there is no consensus concerning pathogenesis, aetiology, diagnostic criteria, therapeutic approach and rehabilitation in the literature (4,10,11,14,18).

Current literature does not offer any clear evidence on the effectiveness of non-surgical treatment of sportsman's hernia (18,19). Ekstand *et al* published a prospective randomized study with 66 male soccer players divided in surgical and non-surgical groups. After six months they reported a significant reduction of symptoms in the surgical group, whereas conservative treatment did not lead to positive results (4). Among our patients 19.0% reported some improvement with intensive physiotherapy and anti-inflammatory drugs, but this improvement was temporary or insufficient to return to sports. The current study offers little insight on the value of conservative treatment. All patients in our group had failed various conservative treatment options and finally required surgery in an attempt to again pursue their athletic ambitions. From our experience and the sparse literature available, we propose a period of six to eight weeks of intensive physiotherapy. This period should also be used to confirm the diagnosis by repeated clinical examinations and technical investigations if necessary. If there is a major improvement, further conservative management should be proposed. In professional athletes, time is of critical importance, and care should be taken not to postpone surgical treatment, once the diagnosis is made.

Historically, many operative techniques were described, starting in the eighties with Nesovic

performing a groin reinforcement technique, for a clinical entity he called athletic pubalgia. A very similar pathology and probably the same diagnosis was described by several others, who all designed a personal surgical technique, all based on a reinforcement of the rectus abdominis and oblique abdominal muscles together with the transverse fascia (2,3,8,12,15,16,17). In recent years, the endoscopic treatment of groin pain in athletes has gained popularity. A polypropylene mesh is placed in the preperitoneal space. In this technique no mechanic muscle reinforcement is performed. Although the short term results of endoscopic repair are promising (7,18,21), some authors do not believe in its efficacy (12). While most significant inguinal herniations are treated endoscopically in our hospital, the occult sportsman's hernias are always treated with an open approach. We strongly believe in the pelvic muscle imbalance coexisting with the weakness of the posterior abdominal wall. Cadaveric dissections show an anterior tilt of the pelvis when the Rectus Abdominis muscle is partially cut, subsequently a significant increase in stress in the adductor compartment follows (12). This condition may be the cause of secondary adductor pathology in sportsman's hernias. That is the reason why open suture of the muscles and additional adductor tenotomy are strictly done in our surgically treated athletes with chronic groin pain.

In our group 2 professionals and 4 amateur athletes ended their sports activity because of relapse of the groin pain, a failure rate of 3.7%. Otherwise 19.9% resumed playing at a lower level and 69.6% at the same level or at a higher level than before surgery. Athletes did resume their sports activity after a mean delay of 4.4 months after surgery. The great majority (92.2%) reported that they would have the surgery again in the same situation. This success rate indicates the effectiveness of the surgical technique used.

Because of the scarcity of evidence-based information on sportsman's hernia, our retrospective study, with its inherent imperfections, is of value for ourselves and the many other clinicians treating sportsmen. The investigation by means of a telephone questionnaire resulted in a marked drop out of participants to our study, which in our opinion

does not affect the results. The strengths of our study are the uniformity of the surgery, the standardization of the rehabilitation and the high number of athletes we could include in the study.

Sportsman's hernia can be a frustrating condition for an athlete. It can even be the reason for a premature career ending, before the athlete has reached his full potential. Moreover, it is an obscure condition with a large range of differential diagnoses. Many physicians and physiotherapists are unaware of the condition and, as a consequence, it can remain unrecognized. For all physicians treating athletes, it is imperative to recognize this condition and not to minimize the complaints. Detailed anamnestic information, adequate clinical investigation and appropriate technical investigations are necessary to exclude other pathologies which may lead to similar symptoms. Once the diagnosis of sportsman's hernia is made, a strict time schedule is set in order to motivate the athlete in his conservative treatment. In the select group of well diagnosed athletes that fail to improve with conservative treatment, a surgical intervention with reinforcement of the posterior components of the abdominal wall and tenotomy of the adductors has led to satisfactory results in over 90% of athletes in this study.

REFERENCES

1. **Anderson K, Strickland SM, Warren R.** Hip and groin injuries in athletes. *Am J Sports Med* 2001 ; 29 : 521-533.
2. **Brunet B, Brunet-Geudj E, Genetry J et al.** [Pubalgia : a lumber-room. For a higher austerity in diagnosis and treatment.] (in French). *Instantanés Médicaux* 1984 ; 55 : 25-30.
3. **Ekberg O, Persson NH, Abrahamsson P-A, Westlin NE, Lilja B.** Longstanding groin pain in athletes : A multidisciplinary approach. *Sports Med* 1988 ; 6 : 56-61.
4. **Ekstrand J, Ringborg S.** Surgery versus conservative treatment in soccer players with chronic groin pain : a prospective randomized study in soccer players. *Eur J Sports Traumatol Rel Res* 2001 ; 23 : 141-145.
5. **Farber AJ, Wilckens JH.** Sports hernia : diagnosis and therapeutic approach. *J Am Acad Orthop Surg* 2007 ; 15 : 507-514.
6. **Garvey JF, Read JW, Turner A.** Sportsman hernia : what can we do ? *Hernia* 2010 ; 14 : 17-25.
7. **Genitsaris M, Goulimaris I, Sikas N.** Laparoscopic repair of groin pain in athletes. *Am J Sports Med* 2004 ; 32 : 1238-1242.

8. **Gilmore J.** Groin pain in the soccer athlete : Fact, fiction, and treatment. *Clin Sports Med* 1998 ; 17 : 87-793.
9. **Hackney RG.** The sports hernia : a cause of chronic groin pain. *Br J Sports Med* 1993 ; 27 : 58-62.
10. **Joesting DR.** Diagnosis and treatment of sportsman's hernia. *Curr Sports Med Rep* 2002 ; 1 : 121-124.
11. **Lovell G.** The diagnosis of chronic groin pain in athletes, a review of 189 cases. *Aust J Sci Med Sport* 1995 ; 27 : 76-79.
12. **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 : 2-8.
13. **Moeller JL.** Sportsman's hernia. *Curr Sports Med Rep* 2007 ; 6 : 111-114.
14. **Morales-Conde S, Socas M, Barranco A.** Sportsmen hernia : what do we know ? *Hernia* 2010 ; 14 : 5-15.
15. **Polglase AL, Frydman GM, Farmer KC.** Inguinal surgery for debilitating chronic groin pain in athletes. *Med J Aust* 1991 ; 155 : 674-677.
16. **Renström P, Peterson L.** Groin injuries in athletes. *Br J Sports Med* 1980 ; 14 : 30-36.
17. **Smodlaka VN.** Groin pain in soccer players. *Physician Sportsmed* 1980 ; 8 : 57-61.
18. **Susmalian S, Ezri T, Elis M et al.** Laparoscopic repair of sportman's hernia in soccer players as treatment of chronic inguinal pain. *Med Sci Monit* 2004 ; 10 : CR52-54.
19. **Syme G, Wilson J, Mackenzie K, Macleod D.** Groin pain in athletes. *Lancet* 1999 ; 353 : 1444.
20. **Van Der Donckt K, Steenbrugge F, Van Den Abbeele K, Verdonk R, Verhelst M.** Bassini's hernia repair and adductor longus tenotomy in the treatment of chronic groin pain in athletes. *Acta Orthop Belg* 2003 ; 69 : 35-41.
21. **Van Veen RN, de Baat P, Heijboer MP et al.** Successful endoscopic treatment of chronic groin pain in athletes. *Surg Endoscop* 2007 ; 21 : 189-193.