

Surgical treatment of chronic groin pain in athletes

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Abstract

Purpose Conservative treatment of chronic groin pain is prolonged and recurrence is quite common. Coexistence of sports hernia and adductor tendinitis/tendinosis in a single patient is noted in the literature. In our study we evaluated our operative treatment that should enable pain elimination and fast return to sports activities.

Methods We performed a prospective study over a six-year period. Ninety-nine (99) patients, all male, with chronic groin pain, resistant to conservative treatment, underwent a surgical procedure.

Results Seventy athletes with sports hernia returned to sports in an average 4.23 weeks (range three–16). Adductor tendinosis symptoms were present in 24 patients (2 %) with sports hernia. Twenty-four patients that had an additional adductor tenotomy performed returned to sports in an average 11.6 weeks (range ten–15). Five patients with isolated adductor tendinosis (7 %) returned to sports in an average 13.4 weeks (range 12–16). All athletes except two (2.8 %) treated for sports hernia were satisfied with the results of treatment and could continue their previous level of activity.

Conclusion Any surgical procedure used for treating chronic groin pain should address the common causes of pain in

this region. Adductor tendinosis can be present in up to 24.2 % of cases with sports hernia or may be isolated in 7 % of cases with chronic groin pain and must be treated by tenotomy. Resection of the genital branch of genitofemoral nerve and ilioinguinal nerve neurolysis should also be performed in patients with sports hernia.

Introduction

Groin disruption, Gilmore's groin [1], groin pain syndrome [2], and sportsman hernia are all terms used in literature to describe the syndrome commonly encountered in athletes. It consists of the pain in pubic region that is chronic, aggravated by athletic activity, and is found especially in soccer and hockey players. Despite a suitable period of rest and conservative therapy the pain tends to reoccur upon resumption of sport activities [3]. A number of conditions have been described as cause of this syndrome and there is some discrepancy in literature regarding the causes and their individual frequency in the athletic population. Numerous studies have identified the cause of groin pain as sports hernia, adductor tendinopathy, obturator nerve entrapment, and osteitis pubis [4]. Conservative treatment is prolonged and the recurrence is quite common.

Gilmore [1], as one of the first to describe this condition, pointed out three typical surgical findings: a torn external oblique aponeurosis causing dilatation of external inguinal ring, torn conjoined tendon and dehiscence between the torn conjoined tendon and the inguinal ligament. Enthesopathy at the site of insertion of the abdominal and the adductor muscles to the pubic bone has been described as another important cause of groin pain [5, 6]. The adductor longus and the gracilis are generally affected as well as the rectus abdominis, the pyramidalis and the lateral aponeurosis of the abdominal external oblique, although not as frequently [5, 7, 8].

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Frequent coexistence of sports hernia and adductor tendinitis/tendinosis in the same patient [9] is noted in the literature. Practice and some anatomical studies on fresh cadavers recognise the existence of a common adductor rectus anatomical and functional unit. Tissue contraction during embalming procedures distorts our perception during anatomical studies of the pubic region [10]. The conjoint tendon is commonly described in literature as fusion of transversus and internal oblique muscles that inserts on to the pubic tubercle. However there are some reports claiming that these tendons do not actually insert on pubic tubercle but on rectus sheath well above the pubic tubercle. Therefore constant straining in athletes does not always produce shearing at the tubercle and symphysis level but more commonly produces shearing at the level of external inguinal ring [7, 11]. Such findings correlate with intraoperative findings of Gilmore and other authors performing herniorraphies for sportsman hernias claiming that the cause of pain is an abnormality in the external inguinal ring. External inguinal ring dilatation and posterior wall weakness produces nerve entrapment. Entrapment of genitofemoral nerve occurs at two levels, possibly at the level of posterior inguinal wall where it penetrates, and the level of external inguinal ring [12–14].

Chronic groin pain can also be caused by compression of the cutaneous branches of nerves found in this anatomical area. Akita et al. examined the cutaneous branches in the inguinal region in 54 halves of 27 adult male cadavers [13]. From their results it is evident that the courses of the genital branches vary considerably, and it may have a very important role in chronic groin pain produced by groin hernia. Entrapment by the ligaments may be a reasonable candidate for the chronic groin pain suffered by athletes. Entrapment of the branches of the ilioinguinal and genitofemoral nerve is caused by posterior wall weakness of inguinal canal and is also identified as a potential cause of chronic groin pain by some authors [5, 15, 16].

Other, rare causes of groin pain are osteitis pubis, femoroacetabular impingement, stress fractures, avulsion fractures, bursitis, snapping hip syndrome, traumatic myositis ossificans, hip joint pathology, referred lumbosacral pain, nerve entrapments/irritations, intra-abdominal disorders and genitourinary abnormalities [1, 9, 17, 18].

Material and methods

We performed a prospective study over a six-year period (2004–2009). Between 2004 and 2009, 99 patients, all male, with chronic groin pain, resistant to conservative treatment, underwent a surgical procedure. They all suffered from chronic pain of varying intensity in the region of lower abdominal wall. Nonoperative treatment was undertaken over a period of three months but was unsuccessful. The mean age of the athletes involved was 23.9 years (range 17–

42 years). Sixty-eight patients were competitive athletes or professionals, and 31 patients were recreational athletes. The majority of them (79) were soccer players.

Preoperatively, after a careful history was taken all athletes underwent a thorough physical examination. The palpation of the pubic bone and its muscle insertions was performed. Each muscle group was tested individually with the iliopsoas test, adduction test and rectus abdominis test. The inguinal canal was palpated for external ring dilatation, tenderness over the conjoint tendon and pubic bone and posterior wall weakness. Furthermore we evaluated each patient hip (testing ROM and impingement test was also performed). Following physical examination we performed an X-ray of pelvis and ultrasonography of adductor muscles and inguinal canal on every patient. Dynamic ultrasound examination was performed for each patient by a single examiner. In patients with symptoms of adductor tendinosis, osteitis pubis and femoroacetabular impingement MRI was performed. Patients with symptoms attributed to osteitis pubis or femoroacetabular impingement were excluded from the study.

All patients underwent surgery under general or regional anaesthesia. We performed reinforcement of the posterior wall of the inguinal canal using transverse fascia a two-layered imbrication (Shouldice technique), ilioinguinal nerve neurolysis and resection of the genital branch of genitofemoral nerve. After opening the external oblique muscle aponeurosis, ilioinguinal neurolysis was performed, the spermatic funiculus identified and the genital branch of the genitofemoral nerve identified and resected. The next step was preparation of the posterior wall of the inguinal canal. After division of transverse fascia careful dissection of both parts of the divided transverse fascia is obligatory. Using nonabsorbable running suture, plication of the transversalis fascia is performed in two layers. The next step is additional reinforcement of the posterior inguinal wall by suturing the lower part of the transverse and internal oblique muscles to the inguinal ligament and also in two layers using running suture.

In 24 athletes with sports hernia and adductor tendinosis and in five athletes with isolated adductor tendinosis, bilateral adductor longus tenotomy was performed concomitantly. A 3-cm long incision was made distally and parallel to the groin crease, above the adductor tendon. The fascia was split longitudinally and the adductor longus identified, since we no signs of pathological granulation tissue were found, complete tenotomy was performed. Our recommended protocol for postoperative rehabilitation was:

- On the first day—walking
- On the third day—isometric strengthening exercises and stretching

- On the tenth day—straight line jogging and biking
- From day 14 running is allowed. From the third week running with accelerations and changes of directions is allowed; jumping also.
- If pain does not recur after four weeks, return to full sports is allowed.

In athletes with additional adductor tenotomy, the rehabilitation program was prolonged and lasted eight to 12 weeks.

Results

Patients were discharged from day one to five (mean 1.27) after the operation. No immediate postoperative complications were observed. Seventy athletes with sports hernia returned to sports after an average 4.23 weeks (range three–16). Fifty-three athletes with sports hernia (75.7 %) returned within four weeks. Another 13 (18.6 %) returned to sports in six weeks because of prolonged pain in the area of the adductor insertion. Four athletes returned in eight weeks (5.7 %) and two failed to return after two months (2.8 %); one athlete had osteitis pubis and the other had acetabular impingement syndrome. Adductor tendinosis symptoms were present in 24 patients (24.2 %) with sports hernia. Twenty-four patients that had additional adductor tenotomy performed returned to sports in average 11.6 weeks (ranging ten–15). Five patients with isolated adductor tendinosis (7 %) returned to sports after an average 13.4 weeks (range 12–16) (Table 1). The results of VAS evaluation of preoperative pain was 6.49 for groin pain and 7.2 for both groin pain with adductor tendinosis and isolated adductor tendinosis. Postoperative VAS scores at four-, eight-, 12-weeks and one year after the surgery were, respectively, 1.24, 0.84, 0.5, 0.2 for groin pain, 2.1, 2, 1.6, 0.3 for groin pain with adductor tendinosis and 2.5; 2; 1.4; 0.4 for isolated adductor tendinosis.

All athletes except two (2.8 %) treated for sports hernia were satisfied with the results of treatment and could continue their previous level of activity. One suffered from osteitis pubis and the other one had acetabular impingement syndrome.

Table 1 Results

Cause of groin pain	Number of patients	Return to sports (weeks)	VAS preop. (0–10)	VAS 4 weeks (0–10)	VAS 8 weeks (0–10)	VAS 12 weeks (0–10)	VAS 1 year (0–10)
Sports hernia	70 (71 %)	4.2	6.49	1.23	0.81	0.54	0.217
Sports hernia+adductor tendinosis	24 (24 %)	11.6	7.2	2.12	2	1.62	0.54
Adductor tendinosis	5 (5 %)	13.4	7.2	2.5	2	1.4	0.4

Discussion

Chronic groin pain produces debilitating symptoms in athletes; conservative treatment is often prolonged and in a number of patients fails and presents them with the prospect of an end to their career. The highest incidence of chronic groin pain is observed in soccer, rugby and ice hockey.

As seen in both the literature and our own experience chronic groin pain is a complex overuse syndrome with a number of potential causes which can sometimes be very difficult to pinpoint as a single entity. Numerous papers agree on multiple causes of groin pain. As described by Gilmore, one of the first authors to identify this entity the most frequent finding in such patients is the disruption of external oblique muscle aponeurosis and disruption of conjoined tendon from pubic tubercle.

A group of authors treating chronic groin pain pinpointed the disruption of posterior inguinal wall as the main cause of pain—the sports hernia. Very frequently different and multiple pathological findings coexist in a single patient. Muschaweck et al. in their paper discuss complex causes of pain in sports hernia describing genitofemoral nerve entrapment along with posterior wall weakness. Akita et al. studied cutaneous branches in the area of groin and their anatomical course and concluded that the ilioinguinal and genital branches of the genitofemoral nerve may be the most critical nerves in the aetiopathology of chronic groin pain. Adductor tendinosis is also frequently present as the leading cause of pain in this region and a number of papers deal with adductor tenotomy reporting good results in the treatment of chronic groin pain [9, 16].

The cause of all of these conditions is chronic repetitive stress at the abdominal–adductor junction, which are inseparable, and during surgery for chronic groin pain should be considered and treated.

This range of findings reported in the literature on the subject of chronic groin pain is suggestive of common aetiology overuse syndrome that develops in predominantly one direction but does not exclude the coexistence of other pathological conditions that are found in this area. Therefore we would dare to imply that overuse injuries caused by repetitive stress and muscle imbalance tend to progress towards chronic injuries of the groin that can manifest themselves in a range of predominantly occult hernias, adductor tendinosis, and nerve entrapment syndromes.

The correct balance between the abdominal muscles and adductors is absolutely necessary in order to reduce the pathology to a minimum. Imbalance in strength of adductor and abdominal wall muscles is a frequent cause of pathological changes in the groin area [5]. Osteitis pubis may be difficult to distinguish from chronic adductor tendinosis, and these two conditions may occur concomitantly in the same patient. With pain over the pubis, the positive lateral compression test helps distinguish osteitis pubis from other conditions, such as chronic adductor tendinosis. MRI of the pubic region is recommended to distinguish between these two conditions and should be obligatory when choosing between surgery or initial conservative treatment [19].

When treating a patient with chronic groin pain surgically one must take into account all pathological conditions in order not to overlook an important cause of pain that can be present along with posterior wall weakness. In a number of papers the importance of coexisting adductor tendinosis in patients with sports hernia is noted. In other papers coexistence of nerve entrapment neuralgia with sports hernia is also acknowledged [13, 16, 20]. A study conducted by Ekstrand and Hilding studying more than 300 soccer players found the majority of injured patients had more than one potential cause of pain [21].

With the complex anatomy of the groin region at the junction of three regions, findings on fresh cadaver dissections speak in favour of a common aetiology [7, 8], that is, an overuse syndrome of this muscle to bone junction that is dependant on duration and type of sports, and produces different predominant pathological findings [9, 10].

The most common cause of potential failure of surgical treatment in our series of patients was adductor tendinosis which frequently coexists with the signs of sports hernia. According to the literature and our study, treatment of patients with chronic groin pain is complex and surgery has a role. It enables faster recovery and return to sports [5, 16, 20]. Reinforcement of the posterior wall is necessary in the majority of patients after performing physical examination and dynamic ultrasound for signs of occult hernia. Nerve entrapment can cause persistent pain after sportsman hernia surgery and we think it prudent and sufficient to resect the genital branch of the genitofemoral nerve and perform ilioinguinal nerve neurolysis [13, 16, 22]. Adductor tendinosis is sometimes an isolated entity although in our experience it coexists very frequently with posterior wall weakness so we consider it prudent when performing tenotomy to repair the posterior wall if the pain in the area of the groin exists and dynamic ultrasound shows bulging.

The importance of dynamic ultrasound of the posterior wall of the inguinal canal must be pointed out as it is the key diagnostic method to confirm sports hernia diagnosis [8, 20, 23].

When deciding to treat a patient with chronic groin pain surgically in order to avoid recurrence or failure all the common causes of pain should be addressed and these are posterior wall weakness, nerve entrapment neuralgia, and adductor tendinosis. The surgeon should be especially careful when considering the presence of adductor tendinosis because if it is not attended to when it should be surgical treatment will fail and if it is done universally it unnecessarily prolongs rehabilitation time. One must also be aware of presence of osteitis pubis and femoroacetabular impingement which can also lead to failure of surgical therapy; thus, during the clinical examination and imaging it must be considered as a possibility. In order to choose between surgical or conservative therapy in patients with symptoms of adductor tendinosis, osteitis pubis and femoroacetabular impingement an MRI should be obligatory [24, 25].

Conclusion

A simple surgical procedure used for treating chronic groin pain used in our department addresses the common causes of pain in this region. In cases of sports hernia Shouldice repair should be performed with resection of the genital branch of genitofemoral nerve and ilioinguinal nerve neurolysis. When adductor tendinosis is present, in up to 24.2 % of cases with sports hernia or isolated in 7 % of cases with chronic groin pain, adductor tenotomy permits resumption of presurgery level of activity, free of pain.

The dynamic ultrasound is of key importance in making sports hernia diagnosis that can be successfully treated surgically. The terminology used for describing patients with chronic groin pain should be revised as proposed by some. After acknowledging the fact that the cause of pain in this area is complex, because the anatomy of the area is complex we should probably seek for a term that does not carry within itself a bias toward a single cause or a single pathological finding. So sports hernia, hockey groin, Gilmores groin, and adductor syndrome should be replaced by a more universal term that incorporates all these conditions.

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