

BASSINI'S HERNIAL REPAIR AND ADDUCTOR LONGUS TENOTOMY IN THE TREATMENT OF CHRONIC GROIN PAIN IN ATHLETES

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A prospective study was initiated to evaluate the surgical treatment of chronic groin pain resistant to conservative treatment. Forty-one patients were treated using Bassini's hernial repair and percutaneous adductor longus tenotomy between 1984 and 1998.

All patients were males aged 17 to 34 years and were mainly soccer players. Twenty-seven patients underwent a unilateral and 14 a bilateral procedure.

All patients had resumed their sporting activities on average 6.9 months after surgery (range 6 to 15 months). Thirty-seven performed at the same level and 4 at a reduced level. Only one patient performed at a lower level due to persistent groin pain.

We conclude that, when conservative treatment for pubic pain in athletes fails, a combination of hernial surgery and adductor longus tenotomy can provide successful results.

INTRODUCTION

Although the differential diagnoses for pubic pain in the athlete are numerous (1, 3, 6, 7, 10, 12, 21, 26, 31, 32, 34, 38, 39, 44, 46, 48) (table I), it is generally referred to as a functional pain syndrome caused by overuse of the different elements composing the pubis: the oblique and rectus abdominis muscles, the osseous pubic rami and the adductor muscles (2, 7, 10, 17, 21, 24, 29, 36, 42) (table II).

According to some authors the syndrome, which should probably better be called athletic pubalgia, is caused by an imbalance between the strong adductor muscles and the weaker abdominal muscles (7, 21, 42, 45, 47).

The diagnosis can be made from the history and the clinical examination. Lower abdominal pain is a predominant feature induced almost always by exertion.

The pain is localised at the medial aspect of the upper thigh, the perineal and scrotal region, and the lower abdominal wall. In some cases pain is triggered by coughing, sneezing and the Valsalva manoeuvre. The symptoms can start very insidiously, with pain only after sporting activities. As the condition becomes chronic, even activities of daily living can be severely disturbed (7, 10, 16, 17, 36, 38).

The pain is predominantly unilateral but can also be bilateral.

The clinical findings include Malgaigne's sign (bilateral vaulting of the thigh bow); tenderness on palpation of the external inguinal ring, pubic or peripubic, along the adductor longus tendon near the pubis, direct pubic symphysis tenderness; painful sit-ups; resisted adduction and passive abduction of the thigh.

Although recommended by some authors, herniography and ultrasonography are not routinely performed (12, 14, 15, 23, 41, 43). All patients

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Table I. — Differential diagnosis of pubic pain

<ul style="list-style-type: none"> – Hip Pathology : osteoarthritis, osteochondritis dissecans, loose bodies, labrum rupture, avascular necrosis, inflammatory disease, fractures – Trochanteric and ileopectineal bursitis – Snapping hip – Osteitis pubis – Osteomyelitis – Entrapment of the lateral cutaneous nerve, the genitofemoral nerve, the ilioinguinal nerve – Inguinal and femoral hernias – Spondylolysis and spondylolisthesis – Intervertebral disc disorders – Limb length discrepancies – Tumors – Appendicitis, prostatitis, cystitis, epididymitis – Gynaecological disorders – Varicocele, hydrocele, torsion of the testis, tumors of the urinary tract – Inguinal lymphadenopathy

Table II. — Causes of pubic pain

<ol style="list-style-type: none"> 1. Pathological conditions of the adductor muscles <ol style="list-style-type: none"> a. disorders of the muscle-tendon junction b. adductor tendonitis c. disorders of the adductor insertion 2. Pubic osteoarthropathy 3. Pathological conditions of the abdominal wall <ol style="list-style-type: none"> a. disorders of the rectus abdominis muscle insertion b. sequelae of trauma to the broad abdominal muscles c. abdominal wall insufficiency

should have plain radiographs of the hips, pelvis and lumbar spine.

An MR image may be useful for detecting muscle or pubic symphysis abnormalities. Bone scan may be useful to exclude coexisting abnormalities with overlapping symptoms (24, 33, 45).

Athletic pubic pain has been reported in sports such as soccer, rugby, fencing, ice hockey, skating, skiing, hurdles, high jump, long-distance running, horse riding, team handball and tennis (1, 4, 7, 10, 16, 21, 26, 38, 42). Female athletes are rarely affected (1, 7, 10, 16, 17, 21, 28).

Groin lesions can be prevented by tendon stretching exercises and flexibility training (1, 4, 7, 10, 38). If groin pain occurs, a thorough differential diagnosis should be made (table I).

Conservative treatment is advised by many authors (1, 7, 10, 21, 28, 36, 38). Once chronic groin pain is diagnosed and conservative measures fail, surgery is recommended (1, 7, 10, 19, 20, 21, 27, 28, 36, 38, 42). Reports on surgery for chronic groin pain in athletes involve either adductor tenotomy or hernial surgery (1, 7, 10, 16, 19, 20, 21, 23, 36, 42).

The aim of this study is to demonstrate that when conservative treatment fails, a combination of hernial surgery and adductor longus tenotomy can provide successful results.

MATERIALS AND METHODS

This study was designed to evaluate the long-term results of adductor longus tenotomy and Bassini's hernial repair, either unilateral or bilateral.

Between 1984 and 1998, forty-one patients with chronic groin pain resistant to conservative treatment were treated surgically. They were selected after careful screening of all the differential diagnostic possibilities.

Twenty-seven patients underwent a unilateral procedure, 14 patients had a bilateral repair to deal with bilateral complaints.

The mean age at the time of operation was 27 years (range 17-34 years).

Thirty-five patients were soccer players, three patients long-distance runners, one was a basketball player, one a referee and one a recreational cyclist.

Thirty-six patients were engaged in competitive sports, five were injured during intensive recreational sports activities.

All patients had symptoms of more than 6 months duration. Pubalgia was considered chronic if conservative treatment was unsuccessful for at least 6 months.

Eight patients only experienced pain during sports activities, 24 had pain on minimal efforts, 9 had permanent pain and discomfort.

Seventeen patients localised the pain mainly to the groin, 10 had groin and abdominal pain, 11 only had abdominal pain, 2 had groin and thigh pain, and 1 had low-back pain (table III).

TECHNIQUE

All patients underwent a Bassini repair (5) with percutaneous division of the adductor longus tendon at its pubic insertion.

Table III. — Patient distribution

Patient	Age	Side	Duration	Location	Sport	Type
1	22 yrs 2 mos	Uni	17 mos	Groin	Soccer	Competition
2	25 yrs	Bi	22 mos	Low back	Soccer	Competition
3	31 yrs 7 mos	Bi	20 mos	Groin	Soccer	Recreation
4	19 yrs 3 mos	Uni	24 mos	Gr + thigh	Soccer	Competition
5	38 yrs 1 month	Uni	17 mos	Abdom	Soccer	Competition
6	24 yrs 5 mos	Uni	13 mos	Groin	Soccer	Competition
7	26 yrs 3 mos	Bi	9 mos	Abdom	Soccer	Competition
8	27 yrs 5 mos	Uni	15 mos	Thigh + abd	Soccer	Competition
9	41 yrs 9 mos	Uni	10 mos	Groin	Soccer	Recreation
10	38 yrs 2 mos	Bi	19 mos	Abdom	Cyclist	Competition
11	25 yrs 4 mos	Uni	15 mos	Thigh + abd	Soccer	Competition
12	20 yrs 10 mos	Uni	13 mos	Groin	Soccer	Competition
13	29 yrs 11 mos	Uni	6 mos	Abdom	Soccer	Recreation
14	26 yrs 4 mos	Bi	20 mos	Gr + thigh	Soccer	Competition
15	23 yrs 5 mos	Bi	19 mos	Abdom	Soccer	Competition
16	31 yrs 1 month	Uni	8 mos	Groin	Soccer	Competition
17	29 yrs 10 mos	Bi	14 mos	Thigh + abd	Soccer	Competition
18	36 yrs 2 mos	Uni	25 mos	Abdom	Soccer	Competition
19	37 yrs	Bi	18 mos	Groin	Referee	Competition
20	20 yrs 3 mos	Uni	12 mos	Abdom	Soccer	Competition
21	27 yrs 3 mos	Bi	6 mos	Groin	Soccer	Recreation
22	39 yrs 4 mos	Uni	9 mos	Thigh + abd	Soccer	Competition
23	26 yrs 2 mos	Uni	15 mos	Thigh + abd	Soccer	Competition
24	31 yrs 8 mos	Uni	16 mos	Groin	Soccer	Competition
25	18 yrs 11 mos	Uni	21 mos	Thigh + abd	Basket	Competition
26	29 yrs 6 mos	Uni	6 mos	Groin	Soccer	Competition
27	47 yrs	Uni	21 mos	Thigh + abd	Soccer	Competition
28	28 yrs 4 mos	Uni	13 mos	Groin	Soccer	Competition
29	31 yrs 3 mos	Bi	7 mos	Thigh + abd	Runner	Competition
30	24 yrs 7 mos	Uni	23 mos	Groin	Soccer	Recreation
31	36 yrs 1 month	Uni	15 mos	Abdom	Soccer	Competition
32	34 yrs 5 mos	Uni	6 mos	Abdom	Soccer	Competition
33	28 yrs 3 mos	Bi	19 mos	Groin	Runner	Competition
34	19 yrs 6 mos	Uni	15 mos	Groin	Soccer	Competition
35	23 yrs 2 mos	Uni	10 mos	Abdom	Soccer	Competition
36	25 yrs 4 mos	Uni	21 mos	Groin	Soccer	Competition
37	21 yrs 10 mos	Uni	19 mos	Thigh + abd	Soccer	Competition
38	28 yrs 2 mos	Uni	11 mos	Groin	Runner	Competition
39	30 yrs 9 mos	Bi	17 mos	Thigh + abd	Soccer	Competition
40	20 yrs 3 mos	Bi	21 mos	Groin	Soccer	Competition
41	27 yrs 1 month	Bi	16 mos	Abdom	Soccer	Competition

A para-inguinal skin incision was made. While maintaining careful haemostasis, cleavage of the deep fascia was performed. The obliquus externus muscle was incised and the funiculus, the ilio-inguinal nerve and the iliohypogastric nerve were prepared (fig 1). This was followed by plication of the transversalis fascia and reefing of the conjoined tendon behind the funiculus, with non-

absorbable sutures on the pubis and the inguinal ligaments ending at the internal inguinal ring (fig 2, 3).

Finally, closure of the obliquus externus in front of the funiculus and skin closure were carried out. This repair focuses on protection of the inguinal floor near the internal ring and to a lesser degree on the attachment of the rectus abdominis muscle to the pubis.

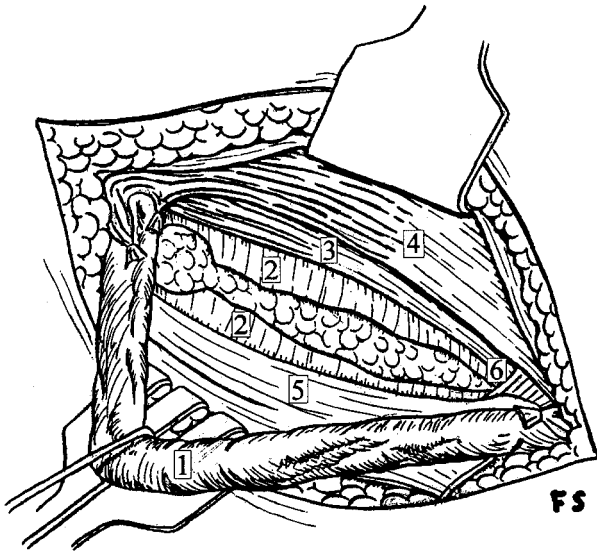


Fig 1

- 1) Funiculus
- 2) Fascia Transversalis
- 3) M. Transversus
- 4) M. Obliquus Internus
- 5) Ligamentum Inguinale
- 6) Conjoined tendon

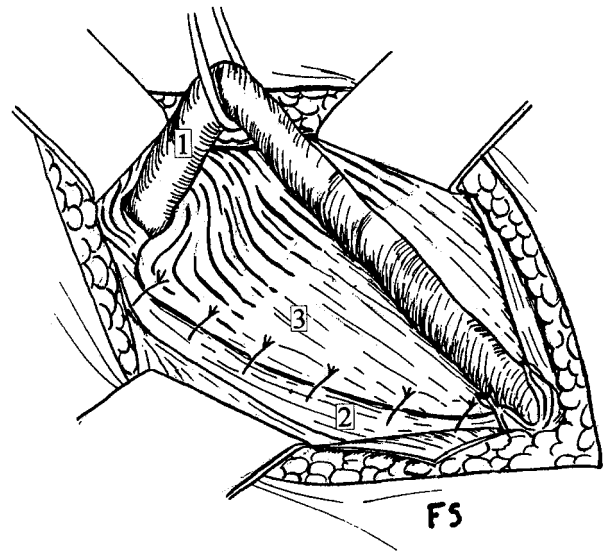


Fig 3

- 1) Funiculus
- 2) Ligamentum Inguinale
- 3) M. Obliquus internus

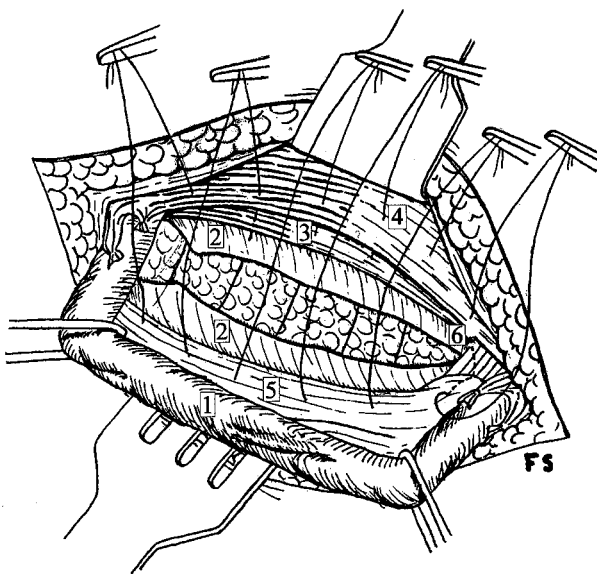


Fig 2

- 1) Funiculus
- 2) Fascia Transversalis
- 3) M. Transversus
- 4) M. Obliquus Internus
- 5) Ligamentum Inguinale
- 6) Conjoined tendon

In the same session percutaneous division of the adductor longus muscle was performed by flexing the hip 90° and abducting it maximally, localising the adductor longus lateral to the gracilis tendon.

Although no typical hernias or other pathological conditions of the inguinal canal were noted at the time of surgery, there was an insufficient fascia transversalis, bulging into the inguinal canal like an impending direct hernia. This was also described by other authors at the time of surgery or at herniography (13, 14, 16, 27, 36, 41).

POSTOPERATIVE TREATMENT

Postoperatively, complete rest and adductor stretching exercises were prescribed during the first two weeks. In the third and fourth postoperative week, intensive active and passive adductor stretching exercises were combined with ice rubs.

From the second postoperative month the patients were allowed to swim, run and cycle, and strengthening exercises for the straight and oblique abdominal muscles were started in combination with further adductor stretching.

By the third month training in group was started and after ten to twelve weeks competition was allowed with further physiotherapy.

RESULTS

All patients returned for follow-up at 6 months after their initial operation and they all returned for follow-up in 2001. A history was taken and they underwent a clinical examination. The mean follow-up was 12 years and 6 months (range 16 years and 5 months to 3 years and 1 month). The mean age at follow-up was 36 years 2 months (range 22 years and 4 months to 47 years.).

The results were rated excellent, good, fair or poor according to the scores on history and examination.

The results were rated excellent if the athletes regained their previous level of sports without experiencing discomfort. Good results implied return to the preoperative sports activity level with a slight discomfort, and fair results performance at a lower level with discomfort. No serious short-term complications were noted. One superficial infection subsided with local treatment. One haemorrhage at the adductor section site was also treated conservatively.

Eleven patients (27%) were free of complaints after three months, 21 (51%) became pain free within three to six months, 5 (12%) after more than six months and 4 (10%) still experienced mild discomfort, which did not prevent them from engaging in intensive sporting activities.

One of these four patients complained of stiffness on the opposite side, which made him a candidate for a contralateral intervention. Only one of these four patients performed at a lower level, although acceleration and long-distance running caused no problem.

All patients resumed their sports activities on average 6 months postoperative (range 6-15 months), 37 (90%) at the same level and 4 (10%) at a lower level. Of these 4 patients, one had to discontinue his athletic activities temporarily because of a foot fracture ; another patient is 54 years old but is still running 6 kilometers a day and cycling

60 kilometers a week ; the third patient experiences pain on acceleration but has no complaints on long-distance running. Groin pain recurred two years postoperatively in the fourth patient, after he had been pain free for one year.

There was no difference in postoperative pain or activity level between patients with pubic pain predominantly radiating into the groin and patients with pubic pain predominantly radiating into the adductor region. There was no correlation between the preoperative duration of the complaints and the length of the postoperative rehabilitation period.

One patient had a fair result due to persistent groin pain after surgery. Nearly all patients had excellent (88%) or good (10%) results. There were no poor results.

DISCUSSION

Sudden onset of groin pain in athletes is associated with few diagnostic problems. There is a group, however, with insidious onset who develop long-standing groin pain and a protracted course with an obscure injury, which is resistant to conventional conservative measures. Various surgical techniques have been described for the treatment of chronic groin pain in athletes, refractory to conservative measures.

Akerman and Johansson (1) reported a return to full athletic activity in 62.5% (n = 16) of the athletes who underwent adductor longus tenotomy for chronic groin pain.

Christel *et al* (7) claimed a success rate of 74% using the Nesovic technique in patients with predominantly groin pain, while 15% did not improve because of associated adductor tendon pathology. They recommended a combined technique for associated lesions, as we did in our study.

Hackney *et al* (14) mentioned excellent results in 87% (n = 15) of the patients who had surgery on the posterior inguinal canal. The main goal of the repair was to reconstitute the internal ring.

Hermans (17) reported 95% (n = 69) excellent and good results using a technique which broadens the insertion of the rectus abdominus muscle by suturing it to the inguinal ligament.

Imbert (14) achieved 92% (n = 177) excellent and good results with the Nesovic technique ; the adductor longus was sectioned in a number of patients.

Jaeger (20) obtained 86% (n = 30) excellent and good results using the Nesovic technique.

Malycha and Lovell (26) reported a 93% (n = 44) return to full sports activity with 75% excellent results ; improvement was obtained in 23% of the patients.

Martens *et al* (27) mentioned 93% (n = 81) excellent and good results using a tenotomy and fascia plasty.

Polglase *et al* (35) reported excellent and good results in 94% (n = 64) of their patients ; 62.5% were completely satisfied and 31.5% were partially satisfied with a Bassini-type repair.

In our series 90% (n = 10) of the patients who underwent a bilateral intervention had excellent results. Only one patient (2%) in the unilateral group (n = 27) failed to regain his preoperative sports activity level ; three (7%) required a second intervention on the controlateral side, and four (10%) still experienced mild discomfort on sporting activities.

CONCLUSION

Pubic pain in athletes can usually be treated conservatively (1, 7, 10, 21, 28, 36, 38).

If conservative treatment fails, chronic groin pain can be successfully managed with a standard Bassini repair combined with percutaneous adductor longus tenotomy after careful selection of the patients. This had already been demonstrated by Christel *et al* (7) and Hackney (14).

In our series, a bilateral or unilateral Bassini repair combined with an adductor longus division showed 88% excellent, 10% good and 2% fair results.

In conclusion, we believe that chronic pubic pain can be successfully treated with the above mentioned technique when conservative treatment fails. We feel this is a safe technique with minimal complications and a high degree of patient satisfaction. Careful selection of the patients is mandatory.

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