

# External oblique aponeurosis nerve entrapment as a cause of groin pain in the athlete

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**Background:** Groin pain in sportsmen is a common management problem. The results of surgical exploration in 25 male athletes presenting with groin pain are described.

**Methods:** All patients had had failed non-operative management. All groins were explored via an inguinal incision and the patients were reviewed for the presence of pain, function and their own subjective opinion.

**Results:** Nineteen injuries were unilateral and six bilateral. One patient had an occult inguinal hernia and another had a patent processus vaginalis. In the others, defects were found in the external oblique aponeurosis through which neurovascular bundles containing terminal branches of the iliohypogastric nerve passed. These tears were repaired after division of the bundles. The mean time to referral was 29.3 weeks (range 4–79 weeks). After operation no pain or only mild pain was experienced in 28 groins. All had improved function. Twenty of 23 patients described the operation as good or excellent. The mean time to resumption of sporting activities after operation was 11.6 (range 4–20) weeks.

**Conclusion:** Athletes' groin pain may be due to nerve entrapment in the external oblique aponeurosis. An awareness of this injury may reduce delays in operating leading to an earlier return to sport.

Presented to the Association of Surgeons meeting, Edinburgh, UK, May 1998

Accepted 20 November 1998

British Journal of Surgery 1999, 86, 566–568

## Introduction

Sporting injuries affecting the groin can present a problem in both diagnosis and subsequent management. A number of injuries, such as musculotendinous strains and tears, readily settle with conservative treatment. However, some groin injuries will require operation, such as disruption of the posterior wall of the inguinal canal or the sportman's hernia, which describes a significant weakness or derangement of the posterior wall of the inguinal canal. Open repair with either Bassini or nylon darn techniques results in a return to full sporting activity in 62–93 per cent of athletes with this problem<sup>1–4</sup>.

Gilmore<sup>5</sup> described a triad of features: torn external oblique aponeurosis causing external ring dilatation, torn conjoint tendon, and dehiscence between the inguinal ligament and conjoint tendon. Repair of this disruption including a nylon darn resulted in 97 per cent return to professional football within 10 weeks.

Single or multiple small tears in the external oblique aponeurosis at the site of emergence of small neurovascular bundles containing the terminal branches of the iliohypogastric nerve have been described previously as a cause of groin pain in six athletes, whose groins were explored after failed conservative treatment<sup>6</sup>. This study presents the results of the surgical treatment and reviews the pathophysiology of this condition.

## Patients and methods

Twenty-five men, with a mean age of 26.7 (range 22–37) years, were reviewed following surgical exploration of the groin for pain at a mean follow-up of 20.6 months (range 7–56) months. Fifteen presented with right groin pain, four with left-sided symptoms and six with bilateral groin problems. The principle sport in which the patients participated was rugby or football in 19 patients, and cycling, hockey, marathon running and cricket in the remaining four.

All patients were referred between February 1992 and March 1997 after failed conservative treatment such as physiotherapy and local anaesthetic and steroid injections. One patient had been treated with antidepressants. Because of persistence in treating most of these athletes non-surgically, there was a lengthy delay from the onset of symptoms to referral for a surgical opinion. The mean time from the initial injury to operation was 29.3 (range 4–79) weeks.

Characteristically the patients presented with groin pain increased by sudden movements including kicking, rolling over in bed, coughing and sneezing. On examination there was an area of tenderness just superior to the deep ring. Neither a cough impulse nor dilatation of the superficial ring was found on clinical examination.

Each patient had been investigated before operation by the referring clinician by means of radiographs of the pelvis, ultrasonography, bone scan and, more recently, magnetic resonance imaging. All of these investigations were normal.

Each affected groin was explored under general anaesthesia through an inguinal approach as used for open inguinal hernia repair. Following operation all patients were given a standardized rehabilitation programme as used by Gilmore<sup>5</sup> to aid recovery (*Table 1*).

With the use of a questionnaire all of the patients were asked for their subjective assessment of the operation in terms of pain, function and their overall appraisal of the procedure. The interval from surgery to a full return to sport was also recorded.

## Results

Exploration of the groin revealed an occult indirect inguinal hernia in one patient and a patent processus vaginalis in another. These two patients made an uneventful recovery and returned to full sporting activities after standard treatment.

In the other 23 patients single or multiple tears 1–4 cm long were seen in the external oblique aponeurosis at the sites of the perforating neurovascular bundles, which contain the terminal branches of the iliohypogastric nerve. Following routine exploration of the inguinal canal to exclude any other pathology, these tears were repaired with interrupted nylon sutures after division of the neurovascular bundles. Repair of the transversalis fascia was not required.

There were no postoperative complications. Following repair of the tears, subjective pain was much improved (*Table 2*): no pain was experienced in 20 groins and eight had only mild pain which did not interfere with sporting activities. In only one patient was the pain not improved. However, all patients returned to sport with 20 athletes

**Table 1** Rehabilitation programme

Week 1	Stand upright and walk 20 min on first day after operation Thereafter walk gently four times each day
Week 2	Walk 30 min twice a day for 4 days Gentle jogging for rest of week
Week 3	Straight line running Gentle sit-ups Adductor exercises
Week 4	Sprinting in straight lines Increase sit-ups Swimming (crawl)
Week 5–6	Kick, play

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**Table 2** Results of operation

	<i>n</i>
Pain (no. of groins)	
None	20
Mild, but improved	8
No improvement	1
Function (no. of patients)	
Returned to full sporting activities	20
Improved, but playing at lower level	3
No improvement, unable to play sport	0
Patient satisfaction (no. of patients)	
Excellent	9
Good	11
Satisfactory	3
Poor	0

competing at the same level as before injury. This included all those who underwent bilateral exploration. Three others, who were unable to compete before surgery, returned to sport but at a lower level.

The mean time to resumption of sporting activities for all patients following operation was 11.6 (range 4–20) weeks. Those who underwent bilateral groin exploration had a faster return to sporting activity with a mean postoperative recovery time of 6.8 (range 4–12) weeks.

Twenty of the patients rated the result of the operation as good or excellent.

## Discussion

The operative pathology seen in these patients consisted of single or multiple tears in the external oblique aponeurosis at the site of the emergence of neurovascular bundles containing the terminal branches of the iliohypogastric nerve. These tears varied from 1 to 4 cm in length. Such a tear may produce a nerve entrapment syndrome as no other pathology, such as occult hernia or a tear in the conjoint tendon as described by Gilmore<sup>5</sup>, was found in these patients.

Surgical repair of these tears in the external oblique aponeurosis resulted in the return of all patients to sporting activities in a mean time of just over 11 weeks. The apparent faster recovery of those with bilateral injuries may be the result of a more rigorous postoperative rehabilitation as these athletes were all playing first class rugby or semiprofessional football.

Most of the athletes had prolonged unsuccessful non-surgical treatment for a mean period of over 6 months. This has been noted previously<sup>5</sup>. There are a number of conditions causing groin pain which can be treated conservatively with success, such as strains of musculo-tendinous units or inguinal ligament enthesopathy<sup>7</sup>, but earlier recognition of surgical causes of groin pain in the athlete may reduce delays in returning to sport.

Other nerve entrapment syndromes have been described previously. Kopell *et al.*<sup>8</sup> described an entrapment neuropathy of the ilioinguinal nerve which causes groin pain in a similar area to that experienced by the patients in this series; entrapment of this nerve together with the genitofemoral nerve, which also causes groin pain, has been treated successfully by nerve section<sup>9</sup>.

There are a number of other sporting injuries affecting the groin which have been reported to respond well to open surgical intervention, such as Gilmore's groin and groin disruption<sup>1-5</sup>. Laparoscopic mesh repair may permit an earlier return to sport than an open mesh technique<sup>10</sup>, but this study was not randomized and laparoscopy may result in missed pathology. Other surgical causes of groin pain in the athlete include inguinal hernias; direct hernias are more common, comprising 56 per cent of cases, and these respond well to herniorrhaphy<sup>11</sup>.

As with cases of groin disruption, investigating these athletes with radiological imaging can be fruitless. The present patients had often undergone plain radiography of the pelvis and hips, ultrasonography, bone scans and magnetic resonance imaging which, while excluding other causes of groin pain, did not show any abnormality. Herniography may be of value if a hernia is suspected<sup>11-13</sup>, but there can be a high false-positive and -negative rate<sup>14</sup>. Improvements in diagnosis may be made with the use of dynamic magnetic resonance imaging, which can demonstrate sac herniation while the patient performs a Valsalva manoeuvre<sup>15</sup>.

These findings suggest that external oblique aponeurosis entrapment of the iliohypogastric nerve is a cause of

groin pain in the athlete, for which surgical treatment results in a return to sport. An awareness of this problem as well as other surgical causes of groin pain may avoid delays in resumption of sporting activities.

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