EDITORIAL

Pubic inguinal pain syndrome: the so-called sports hernia

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Sports hernia (SH) is a controversial condition which presents itself as chronic groin pain. It is responsible for significant time away from work and sports competition, with an incidence of between 0.5 and 6.2% [1–3]. Groin injury is common in soccer and ice hockey players, but SH can be encountered in a variety of sports, and even in normally physically active people [1, 3]. For this reason, we think that it is more appropriate to speak of pubic inguinal pain syndrome (PIPS).

Over the past decade, the number of sports-related injuries has increased as a function of increased athletic activities, and the demand for an early return to work and competitive sports puts pressure on the doctor for immediate diagnosis and treatment [1–3].

The anatomy involved, diagnostic criteria and treatment modalities are inconsistently described in the medical, surgical and orthopaedic literature. In fact, there is no evidence-based consensus available to guide the decision-making, and most of the studies are level IV investigations [1, 3, 4].

A literature search for SH produces a list of various conditions which may or may not include the real disease: "athletic pubalgia," incipient hernia, osteitis pubis, "Gilmore's groin," "hockey groin syndrome" and "Ashby's inguinal ligament enthesopathy" are several of the terms that have complete or partial overlap with SH and pubalgia; this is another reason to unite the terminology as PIPS [4].

The difficulty in giving a correct definition of this obscure cause of chronic groin pain is due to its unclear aetio-pathophysiology. The majority of the published studies and reviews articles include young adult soccer players as the most frequent victims of SH; however, runners, American football players and ice hockey players frequently suffer groin injuries [1, 5]. It does appear that kicking sports and those involving rapid changes of direction while running predispose an athlete to this condition. Chronic groin pain may originate from the muscles, tendons, bones, bursas, fascial structures, nerves and joints, both in the athletes and in the general population [2, 6].

A deficiency of the posterior inguinal wall is the most common operative finding in these patients [7, 8]. A weakened posterior inguinal wall develops an imbalance between the adductors and lower abdominal musculature in these athletes. The strong pull of the adductors, particularly against a fixed lower extremity, in the presence of relatively under-conditioned abdominal muscles creates a shearing force across the hemipelvis, resulting in attenuation or tearing of the transversalis fascia and/or overlying musculature [1–3, 8–10].

Malycha, Lovell et al. reported an incidence of incipient direct hernia of 50% in their series of 189 athletes. The herniography study revealed a symptomatic impalpable hernia in 51% of male and 21% of female patients, and another study reported a hernia in 84% of elite athletes with groin pain [2, 11].

Gilmore has described a more extensive injury and he has coined the term "Gilmore's groin." The injury, which has primarily been described in soccer players with chronic groin pain, consists of a torn external oblique aponeurosis, a torn conjoined tendon, with avulsion of the conjoined tendon and inguinal ligament, and the absence of a hernia [2, 3, 11–13]. Some have disputed Gilmore's description of

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the injury as overly complex. Zimmermann suggested that a tear in the conjoined tendon may be the cause of the bulge in the posterior inguinal wall and the occult hernia may be a cause of footballer's groin pain. Gullmo refers that pain in these circumstances may be caused by a distension of peritoneum or stretching of the ilioinguinal nerve [2–4, 14, 15]. There has been recent interest in neurogenic groin pain: Lovell et al. have studied the clinical presentation of inguinal neuralgia in a series of athletes with groin pain [1, 3, 4, 15, 16]. Obturator neuropathy has been described in a series of 32 patients, but the nerve entrapments in the inguinal region include those of the genitofemoral and ilioinguinal nerves, which cause local pain and neurological dysfunction [1–3, 17, 18].

Other aetiologies in groin pain in athletes include:

- Muscle and tendon injury; the adductor tendon is often involved, especially the adductor longus. Other muscles likely to be affected include the rectus femoris muscle and tendon. The history is a good guide to identifying muscle and tendon injury [1, 2, 19, 20].
- Osteitis pubis; it is especially common in sports that involve kicking or physical contact. The injury results from repetitive avulsive trauma near the pubic symphysis, usually involving the adductor muscles or gracilis. The history may include a direct blow to the symphysis or pelvic instability from a sacroiliac joint injury [1, 3, 5, 8, 21–24].
- Stress fracture; pelvic stress fracture is common, especially in long-distance runners [23–25].
- Urological diseases (prostatitis, epididymitis, urethritis and hydrocele) [1, 2, 4, 23–26].
- Connective tissue disease (rheumatoid arthritis, ankylosing spondylitis, Reiter's syndrome and other spondarthritides) [1, 2, 5, 7, 25, 26].
- Spinal and hip abnormalities; bone tumours, osteochondritis of the vertebral bodies, disc lesion at L1 or L2).

Since 1991, several studies, all level IV, have demonstrated that, in open and laparoscopic procedures, a posterior abdominal wall deficiency was present 80–100% of the time, and this is also our feeling, but this is not the only intraoperative finding. In our experience, a hypertrophy of the rectus and oblique external muscles is always relieved; a stiff insertion of the rectus sheet, and a "compression" and a "stretching" of all three nerves of the inguinal region (i.e. ilioinguinal, iliohypogastric and genitofemoral) between the muscle and aponeurosis are always demonstrated [1–3, 5, 16].

Typically, patients affected by PIPS are males and the average age at the time of diagnosis is 20–50 years. Diagnostic problems may occur owing to variability in the distribution of the pain and the precise local pathology [1–3, 5, 15, 17]. The majority of patients complain of unilateral inguinal pain, often radiating to the pubic tubercle and inner thigh or across the midline, and may recall the specific event that initiated the pain, but, more often, the onset is insidious, and the patients associate activities such as kicking, sprinting or cutting with the elective pain. The symptoms are exacerbated by activity and temporarily relieved with rest [1, 2, 11, 15, 22]. The pain often manifests as a point tenderness over the pubis at the rectus abdominis muscle origin. Some patients also complain of pain along the adductor longus tendon on forceful adduction, and this can be reproduced on examination by resisted adduction. The classic presentation of inguinal hernia is often absent [1–3, 5, 15, 17].

The history must include questions directed at referred lumbar abnormalities, including back pain, radiculopathy and sensory disturbances [1, 2, 6, 16, 22–24, 27]. Night pain and persistence of pain at the rest may indicate the presence of a neoplasm. Urologic information must be gathered, including urinary symptoms and any testicular lumps or masses [3, 22–24, 28].

The regional examination is crucial for positive and negative findings, and to help the differential diagnosis. Findings include tenderness at the pubic tubercle, pain with resisted hip flexion, internal rotation and abdominal muscle contraction [1, 2, 11, 13]. Examination may reveal an inguinal or femoral hernia, but the most commonly described physical examination finding is a dilated and/or tender external inguinal ring and, often, there is no inguinal bulge or hernia [1, 2, 29]. The symphysis is examined for instability and tenderness, as osteitis pubis is a relatively common entity in the athletic population. Muscle origins, including the adductors, rectus femoris, sartorius and rectus abdominis, are palpated for sites of tenderness, possibly indicating muscle strain [4, 5, 7].

Diagnostic imaging in athletes with groin pain can, at times, provide valuable information and may be helpful in defining other pathologies [3, 7, 9]. Various imaging modalities are used to identify hernias and other pathologies, such as ultrasonography, computed tomography (CT), magnetic resonance imaging (MRI) and herniography [1, 2, 28].

Ultrasonography (US) is a useful non-invasive and a less expensive imaging modality [7]. It provides valuable information about the extent and location of tendinous injuries, demarcating partial tears as local hypoechoic areas with discontinuity fibres within the fibrillary tendon tissue [3, 8]. Surgical findings correlated with ultrasound findings as well, with an incipient direct hernia being most commonly suggested [5, 11, 14]. The commonly cited disadvantages with US is that it is operator-dependent and, therefore, has variable reproducibility.

CT has a more important role in the diagnosis of other pathological causes of chronic groin pain because it is a

gold standard for the evaluation of most soft tissue diseases, but may fail to detect a reason for PIPS [5].

MRI is superior to CT for musculotendinous imaging and it can clearly identify structures that are crucial in the assessment and differentiation of PIPS (inguinal canal, inferior epigastric vessels, inguinal ligament, deep and superficial rings, spermatic cord). Albers et al. performed a retrospective review of 32 MRIs performed to evaluate "pubalgia" and attenuation of the abdominal wall musculofascial layers was seen in 90% of cases, and this had a 95% correlation with surgical findings. Herniography, despite the good theoretical background, is very infrequently used, and the studies reported a high number of false-positives [1, 5, 12, 28].

The role of laparoscopy in SH is still being evaluated, because it allows an opportunity to examine all of the local hernia orifices, but does not permit an assessment of the anterior wall of inguinal canal, notably the conjoint tendon [4, 6, 12, 26].

This examination of aetio-pathophysiology, clinical findings, investigation and differential diagnoses prove that the management of this obscure condition involves a multidisciplinary approach, with the participation of diagnosis and treatment of the general surgeon, orthopaedic surgeon, urologist, radiologist and nuclear medicine.

Many patients, therefore, undergo prolonged periods of physiotherapy with lengthy spells of rest and numerous radiological investigations before referral to the specialist [3, 5].

Initially conservative management with rest, anti-inflammatory agents (oral, topic or, in some instances, injected), physiotherapy, stretching and strengthening exercises should be advised.

At the end of the treatment, if the benefits do not persist at the moment of restarting activity, surgery is indicated.

There is no consensus to support any particular procedure [4, 13].

Gilmore described the surgical restoration of the torn external oblique aponeurosis and conjoint tendon by modified herniorrhaphy, with placation of the transversalis fascia and repair of the conjoint tendon [1, 2, 9, 30]. Others suggested repair of the torn edge of the external oblique with simple interrupted sutures. This approach reported a good result with return to full sporting activity within 5 weeks [31]. A number of different modified repairs of the posterior wall deficiency have been described:

- Malycha repairs the posterior inguinal wall in two layers: a continuous suture is inserted from the pubic tubercle to the internal ring, followed by a second layer [1, 7, 22].
- Nessovic, Polglase et al. used the conventional Bassini repair [1, 4, 28, 30, 31].

- Hackney reported that Hyde tightens the conjoint tendon by reattaching the insertion of the tendon [2].
- Ishad et al. described an external oblique tear and entrapped ilioinguinal nerve, and also performed an open mesh repair and carried out ilioinguinal nerve ablation [1, 2, 5, 31].

So, the patients with suspected PIPS should undergo open surgery after the period of medical treatment. In our approach, the intraoperative findings are stiff insertion of medial pilaster of the external ring and strong tension of the tendon of the rectus muscles; in this situation, the iliohypogastric nerve is compressed between the rectus and external oblique aponeurosis. Moreover, the superior edge of the external ring is very stiff and determines the compression of the entire cord and, so, of the ilioinguinal and genitofemoral nerves. These patients are treated with partial section of the insertion of the rectus muscles of the pubis, sculpture of a strip of the lower portion of the internal muscle positioned under the cord, the translocation of the entire cord in the subcutaneous space and the positioning of a lightweight mesh on the posterior inguinal wall, fixed with fibrin glue. In this way, all of the nervous components are "released," and the posterior inguinal wall is softly reinforced.

The systematic review of PIPS is limited by the paucity of quality studies in the literature and this condition continues to be an obscure matter [1–5, 12, 16, 28, 31].

There is only one randomised, prospective, controlled study investigating PIPS, and the authors in this study refer that the operative treatment is superior to non-operative management in athletes: appropriate repair of the posterior wall of the inguinal canal has proven to be of therapeutic benefit, offers cure to over 60% of the patients and improvements to a further 20% [10].

We believe that a unique terminology could be useful, such as the same surgery for every case, in order to evaluate the long-term results.

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