

Evaluation of Chronic Pelvic Pain (Athletic Pubalgia-Sports Hernia and Other Pain Conditions)

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The groin pain syndrome (GPS) is an increasing problem in many sport activities requiring cutting, change of direction, and kicking such as soccer, football, ice hockey, handball, and rugby [1]. Indeed, its yearly incidence in some sport activities like soccer of 10–18% continues to increase due to many risk factors such as high loads and short recoveries [2]. A recent study reported a GPS incidence in soccer of up to 2.1/1000 h of total exposure [3]. Still in soccer, it is important to remember that the majority of injury surveillance studies in football are based on the so-called time loss concept [3]. In these type of studies, the injuries are recorded only if a player is unable to participate in soccer training and/or competition [4]. A recent study shows that the “time loss definition” is able to record only one-third of the GPS injuries in male soccer players [5]. Therefore, the “time loss injury” approach may be inappropriate to check the GPS incidence, and the recorded data may represent only the “tip of the iceberg” of a much more widespread problem [5]. Indeed, it is not uncommon for soccer players to continue training despite the pain due to GPS so as not registering any time

loss injury. For this reason, the overuse is consolidated as an important element in most cases of GPS [3].

In agreement with the “Groin Pain Syndrome Italian Consensus Conference on terminology, clinical evaluation and imaging assessment in groin pain in athlete” (GPSICC) [6], the GPS can be defined as follows:

Any clinical symptom reported by the patient, located at the inguinal-pubic-adductor area, affecting sports activities and/or interfering with activities of daily living, and requiring medical attention.

Always in agreement with the GPSICC [6], the GPS can be subdivided into three main categories:

1. GPS of traumatic origin, in which the onset of pain was due to any acute trauma, and this hypothesis is supported by medical history, clinical examination, and imaging.
2. GPS due to functional overload, characterized by insidious and progressive onset, without an acute trauma, or a situation to which the onset of pain symptoms can be attributed with certainty.
3. Long-standing GPS (LSGPS) or chronic GPS, in which the cohort of symptoms reported by the patient continues for a long period (over 12 weeks) and is recalcitrant to any conservative therapy.

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42.1 The Long-Standing Groin Pain Syndrome

In the case of LSGPS, in which several clinical situations overlap, often to make a correct diagnosis represents a challenge [1, 7, 8]. The LSGPS assessment requires clinical experience and a solid knowledge concerning the possible differential diagnoses [1].

The typical patient who complains of LSGP is a subject with a long history of groin pain (more than 3 months), who has already performed several clinical and imaging assessments and who, above all, has already performed unsuccessfully many types of conservative treatments. In this case, an inguinal disease must be strongly suspected [7, 9]. The term “inguinal pathologies” in accordance with GPSICC [6] includes a vast range of conditions, i.e.:

- (i) Inguinal hernia
- (ii) Posterior inguinal wall weakness
- (iii) Conjoint tendon lesion
- (iv) Inguinal ligament lesion
- (v) Rectus abdominis distal insertion lesions
- (vi) External obliquus, internal obliquus, and pyramidalis lesions
- (vii) Rectus abdominis-adductor longus common aponeurosis lesions
- (viii) Pre-aponeurotic capsule lesions

This series of clinical conditions may cause a situation of “groin disruption” [9]. In the most part of the cases, this situation of groin disruption is caused by the presence of a cam-FAI syndrome [7, 10]. Cam-FAI is an abnormal conformation of femoral head. In other words, cam-FAI is an osteochondral bump at femoral head-neck junction, leading to a diminution of the normal femoral head-neck offset [11]. Cam-FAI syndrome is identified by measuring the alpha angle on the Dunn-view X-ray, as showed in Fig. 42.1. An alpha angle measuring 55° or greater is considered radiographic evidence of cam-FAI [12]. Cam-FAI syndrome can cause both hip articular cartilage and labral lesion and a limitation of hip joint intra-rotation [13, 14]. Recently, cam-FAI



Fig. 42.1 In the squeeze test 1, the operator asks the patient to perform an isometric adduction with the resistance placed at the level of the patient’s knees. This test shows a sensitivity and specificity equal to, respectively, 0.85 and 0.45. Since the likelihood ratio value is equal to 1.5, this test used alone results to be rarely useful

has been shown to be associated with GPS, especially in young high-level athletes [13, 15]. This association may be explained by the fact that the athlete suffering from cam-FAI generally shows a limitation of hip range of motion (especially in internal rotation) [13, 14]. This limitation of ROM may be compensated by a hypermobility of the symphysis joint. This hypermobility of the symphysis may stress the posterior inguinal wall causing the onset of inguinal pathology [6, 13, 14]. The inguinal pathology shows a low rate of positive outcome with conservative treatment [16]; in these cases, it is necessary to consider a surgical treatment. Nowadays, the most utilized surgical treatments in inguinal pathology are:

- Shouldice repair
- Open-suture repair technique
- Lichtenstein repair
- Transabdominal pre-peritoneal repair (TAPP)
- Total extraperitoneal repair (TEP)
- Trans-inguinal pre-peritoneal repair (TIPP)
- Minimal repair
- Inguinal ligament release procedure [17]

Sometimes, these procedures may be completed with a triple or selective neurectomy of ilioinguinal, iliohypogastric, and genital branch of femorogenital nerves [18]. Following surgical

repair, independently of the surgical technique used, most of the series report that >90% of athletes return to full sport activity within 2–4 months after surgery [19]. Given the relationship between cam-FAI syndrome and inguinal pathologies, the problem arises if an athlete shows both pathologies, if the surgeon must limit the surgical intervention only to the inguinal pathology, or if he/she must also consider a second surgery intervention concerning the cam-FAI. This problematic had already been raised by other authors [13, 14].

42.2 Pubic Osteopathy and Adductor Tendinopathy

The symphysis instability due to the presence of a cam-FAI syndrome may often cause the association of other three different pathologies: osteitis pubis, longus adductor tendinopathy, and, as already mentioned, inguinal pathologies [6]. First of all, it should be noted that, as established during “The Italian Consensus Conference on FAI Syndrome in athletes” [20], pubic osteitis is not a correct term. Indeed, since this clinical condition is mainly degenerative in nature and not an inflammatory process, the term pubis osteopathy is to prefer. The radiological signs specific for pubic osteopathy are [20]:

- (i) Bone marrow edema
- (ii) Symphysis sclerosis
- (iii) Symphysis irregularity
- (iv) Subchondral cyst
- (v) Central disc protrusion

In the presence of three, over five, of the abovementioned signs confirmed by clinical examination, it is possible to formulate the diagnosis of pubic osteopathy [20]. In cases of association of inguinal pathologies and chronic adductor tendinopathy unresponsive to conservative treatment, a double surgical intervention may be necessary, consisting, as already mentioned, of a mesh positioning or otherwise a surgical reinforcing inguinal canal

posterior wall technique, coupled to adductor longus and partial or total tenotomy [19]. The adductor longus tenotomy presents the multiple vantage to relieve the mechanical stress at adductor and at rectus abdominis level and therefore may be the most optimal management in the case of chronic adductor tendinopathy [19]. Recent studies show that open and laparoscopic inguinal hernia repair, with or without mesh placement, coupled to adductor tenotomy demonstrates a return-to-full-activity rate of 95–100% in 3–4 months [19]. It is important to remember that some electromyographic studies demonstrate that adductor longus muscle shows a minimal activity during sprint [21] or cutting movements [22]. For this reason, some more recent studies demonstrate that the longus adductor tendon tenotomy does not compromise the high-level sports performance [23, 24].

42.3 The Profile of the Patient Affected by LSGPS

In the case of LSGPS, in which several clinical pictures overlap, often to make a correct diagnosis, it is necessary to adopt a clinical reasoning based on the association of the most frequent clinical situations [1, 25]. In one of our case series, in the process of publication, in which we considered 300 patients affected by LSGPS, the most frequent clinical situations and association were the following:

- (a) 84% of the patients showed cam-FAI or mixed forms (pincer and cam).
- (b) 68% of the patients showed inguinal pathologies.
- (c) 46% of the patients had adductor longus tendinopathy (of which 87% showed a bilateral tendinopathy).
- (d) 82% of the patients showed both cam-FAI and inguinal pathologies.
- (e) 31% of the patients showed an association between inguinal pathologies, adductor tendinopathy, and cam-FAI (or mixed form).

42.4 The Clinical Evaluation

Given the complexity of the LSGPS and the frequent overlapping of several clinical situations, the clinical evaluation often appears as a real diagnostic challenge. Recommended clinical tests are shown in Tables 42.1, 42.2, 42.3, and 42.4.

The tests listed in Table 42.2 are shown in Figs. 42.1, 42.2, 42.3, 42.4, and 42.5, while the tests listed in Table 42.3 are shown in Figs. 42.6, 42.7, and 42.8.

Table 42.1 Palpation test and clinical exploration for clinical evaluation of inguinal diseases

Test	Sensitivity	Specificity	PPV	NPV	LR	Result
Pubic insertion of rectus abdominis	0.93	0.30	0.81	0.58	1.3	Rarely useful
Pubic tubercle	0.92	0.89	0.96	0.80	8.4	Moderately useful
Linea pectinea	0.91	0.88	0.96	0.76	7.6	Moderately useful
External inguinal ring	0.97	0.95	0.98	0.90	19.4	Conclusive

Legenda: *PPV* positive predictive value, *NPV* negative predictive value, *LR* likelihood ratio; the interpretations of the *LR* values are shown in Table 42.4

Table 42.2 Specific tests for adductor muscles

Test	Sensitivity	Specificity	PPV	NPV	LR	Result
Squeeze test 1	0.85	0.45	0.48	0.83	1.5	Rarely useful
Squeeze test 2	0.86	0.46	0.48	0.84	1.6	Rarely useful
Squeeze test 3	0.86	0.45	0.48	0.85	5.7	Sometimes useful
Squeeze test 4	0.65	0.46	0.45	0.65	1.2	Rarely useful
Adductor longus origin palpation	0.93	0.89	0.96	0.79	8.5	Moderately useful

Legenda: *PPV* positive predictive value, *NPV* negative predictive value, *LR* likelihood ratio; the interpretations of the *LR* values are shown in Table 42.4

Table 42.3 Specific test for the hip

Test	Sensitivity	Specificity	PPV	NPV	LR	Result
FABER test	0.90	0.93	0.98	0.72	12.9	Conclusive
FADIR test	0.93	0.42	0.86	0.61	1.6	Rarely useful
DIRI test	0.58	0.90	0.96	0.36	5.8	Moderately useful

Legenda: *PPV* positive predictive value, *NPV* negative predictive value, *LR* likelihood ratio; the interpretations of the *LR* values are shown in Table 42.4

Table 42.4 Interpretation of *LR* values

LR positive	LR negative	Change in the probability of disease	Result
>10	<0.1	Big	Conclusive
5–10	0.1–0.2	Moderate	Moderately useful
2–5	0.2–0.5	Small	Sometimes useful
<2	>0.5	Minimum	Rarely useful
1	1	Not any	Useless



Fig. 42.2 In the squeeze test 2, the operator asks the patient to perform an isometric adduction with the resistance placed at the level of the patient's ankles. This test shows a sensitivity and specificity equal to, respectively, 0.86 and 0.46. Since the likelihood ratio value is equal to 1.6, this test used alone results to be rarely useful



Fig. 42.4 In the squeeze test 4, the operator asks the patient to perform an isometric adduction with the resistance placed at the level of the patient's ankles keeping his/her legs flexed. This test shows a sensitivity and specificity equal to, respectively, 0.65 and 0.46. Since the likelihood ratio value is equal to 1.2, this test used alone results to be rarely useful



Fig. 42.3 In the squeeze test 3, the operator asks the patient to perform an isometric adduction with the resistance placed at the level of the patient's ankles keeping his/her legs open. This test shows a sensitivity and specificity equal to, respectively, 0.86 and 0.45. Since the likelihood ratio value is equal to 5.7, this test used alone results to be sometimes useful



Fig. 42.5 The adductor longus origin palpation test shows a sensitivity and specificity equal to, respectively, 0.93 and 0.89. Since the likelihood ratio value is equal to 8.5, this test used alone results to be moderately useful



Fig. 42.6 Flexion-abduction-External Rotation test (FABER). The FABER test also known as the Patrick test, is used to assess labral damage, or FAI



Fig. 42.8 The Dynamic Internal Rotation Impingement tests (DIRI). The DIRI is performed in supine position with the involved leg flexed to 90° at the hip and knee but the hip is passively taken through an arc of hip adduction and internal rotation



Fig. 42.7 Flexion adduction internal rotation test (FADIR). During the FADIR test the hip and knee are passively flexed to 90° and the adducted with hip in internal rotation

Adductor Clinic Assessment Pitfalls

Since all the squeeze tests (except squeeze test number 3) show a low likelihood ratio value, they must be interpreted in a global manner. In a clinical situation of adductor tendinopathies, the patient generally shows a pain value (on a VAS scale) increasing, respectively, at the squeeze tests 1, 2, and 3. The growing pain sensation is explained by the fact that the resistance arm is progressively increased, and in the squeeze test 3, in addition to the arm of greater resistance, a passive stretching of the adductors is added. The squeeze test 4 is more specific for gracilis muscle tendinopathy. In any case, the most suggestive test for adductor tendinopathy is the adductor longus origin palpation test

42.5 Conclusions

The LSGPS represents often a real diagnostic challenge made difficult by the frequent overlapping of different clinical situations. Moreover, these different clinical conditions are often linked to each other by a cause-effect relationship. One of the most distinctive aspects of LSGPS is the patient's poor responsiveness to any form of conservative treatment. It is very important for the clinician to be able to recognize the different clinical situations and their different role in the etiopathogenesis of pain reported by the patient. Furthermore, since the LSGP can have both a parietal and a musculoskeletal origin, for a correct diagnosis, a multidisciplinary approach would be strongly recommended.

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