Inguinal-related groin pain in athletes: a pathological potpourri

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Athletes who have pain in the inguinal canal region with no actual hernia present as a common challenge in clinical practice. While the differential diagnosis of groin pain is broad, our editorial focuses on musculoskeletal causes.

A survey of 23 international groin pain experts using the case of a male football player with pain in the inguinal region was performed in 2014. The experts were asked which term they would use to describe the diagnosis.1 The 23 experts used 22 different terms, including inguinal-related groin pain, sportsman’s hernia, incipient hernia, inguinal disruption, posterior wall weakness, Gilmore’s groin and core muscle injury to name but a few.

Following a subsequent expert consensus meeting on terminology and definitions, this group agreed on ‘inguinal-related groin pain’ as the preferred term.2 While there is debate about the appropriate terminology, there is even more uncertainty surrounding the underlying pathology. There are numerous hypotheses on the pathology of inguinal-related groin pain. This ‘pathological potpourri’ causes confusion in the literature and in clinical practice.

Some of the different theories reported in the literature are listed in table 1. We have included an illustration with some of the most prominent theories (figure 1).

**MULTIPLE THEORIES CAN EXPLAIN DIFFERENT TREATMENT CHOICES**

The varying theories on pathoanetiology seem to have influenced treatments. Currently, the literature on inguinal-related groin pain is heavily focused on surgical treatment, with multiple options reported. Surgical approaches can be broadly categorised into two groups that mirror some of the proposed pathologies:

1. Anterior open mesh or non-mesh reinforcement of the posterior wall, with or without neurotomy.
2. Posterior endoscopic mesh reinforcement of the posterior wall, with or without inguinal ligament ‘release’.

A recent multicentre randomised controlled trial comparing open and endoscopic repair
Our previous systematic review on the management of groin pain in athletes found both a lack of high-quality studies, and an association where studies with worse variation in pathological explanations, then we cannot support any further distinction in exact pathology. We, therefore, currently continue to recommend using ‘inguinal-related groin pain’.

To advance the field, we need a broad approach and embrace that there is uncertainty. It is a challenge to try and test the multiple hypotheses. We need to develop an encompassing approach, including: 1. Reliable tests of the suggested pathologies

**Table 1**  Theories on the underlying pathology of inguinal-related groin pain in athletes in chronological order divided into theories on nerve irritation and musculoskeletal (MSK) injuries

<table>
<thead>
<tr>
<th>Nerve irritation theories</th>
<th>Year and authors</th>
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<td>Nerve entrapment</td>
<td>1980; Renstrom and Peterson</td>
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| Posterior abdominal wall weakness/bulge (‘incipient hernia’/‘sports hernia’) | A. 1985; Smedberg et al
B. 1989; Gilmore
C. 1992; Malycha and Lovell
D. 1991; Polglase et al
E. 1993; Hackney
F. 1999; Akita et al
G. 2010; Muschaweck and Berger
H. 2019; Bou Antoun et al |
| F. Nerve irritation of the ilioinguinal and the genital branch of the genitofemoral nerve within the inguinal canal caused by a ‘sports hernia’. Additionally, possible entrapment neuropathy | 1995; Williams and Foster
1999; Ziprin et al |
| A. Insufficient strength of the fascia transversalis to withstand the repeated high intra-abdominal pressure generated by sports activities |
| B. Distension of the peritoneum or stretching of the ilioinguinal nerve |
| C. Bulge in the posterior inguinal wall consistent with an incipient direct inguinal hernia |
| D. Distension of the posterior inguinal canal wall musculature, suggested by the site of maximal tenderness, painful cough impulse and operative findings (an early type of direct hernia/ sports hernia) |
| E. Distension of the posterior inguinal canal wall musculature, suggested by the site of maximal tenderness, painful cough impulse and operative findings (an early type of direct hernia/ sports hernia) |
| F. Nerve irritation of the ilioinguinal and the genital branch of the genitofemoral nerve within the inguinal canal caused by a ‘sports hernia’. Additionally, possible entrapment neuropathy |
| G. A circumscibed weakness of the inguinal canal posterior wall causing a bulge compressing the genital branch of genitofemoral nerve during straining. Additionally, as the canal is widened, the rectus muscle is medially and cranially retracted. This retraction causes increased tension, leading to pubalgia |
| H. During muscular contraction of the abdominal wall, the conjoint tendon lowers and closes the deep inguinal ring like ‘a curtain’, decreasing its diameter. A high insertion of the conjoint tendon leaves the inguinal ring wider and uncovered, thus more exposed to repeated sports-related microtrauma, in particular, the protrusion of preperitoneal fat in the deep inguinal orifice |
| Tear of the external oblique | 1995; Williams and Foster
1999; Ziprin et al |
| Nerve irritation caused by 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 |
| A. Insufficient strength of the fascia transversalis to withstand the repeated high intra-abdominal pressure generated by sports activities |
| B. Distension of the peritoneum or stretching of the ilioinguinal nerve |
| C. Bulge in the posterior inguinal wall consistent with an incipient direct inguinal hernia |
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| Musculoskeletal pathology theories | Year and authors |
| Muscle imbalance causing pain and changes at pubic bones | 1987; Nesovic |
| Muscle imbalance at the level of pubic symphysis due to weak anterior abdominal wall and hypertrophic lower limb muscles causing an excessive functional overload of muscular and tendon insertions on the pubic bone |
| Severe musculotendinous injury | 1991; Gilmore
1998; Gilmore |
| Severe musculotendinous injury, such as a torn external oblique aponeurosis or conjoined tendon torn from the pubic tubercle. Dehiscence between conjoined tendon and inguinal ligament |
| Pubic joint concept | 2000; Meyers
2012; Meyers |
| Pain is due to an insertional shearing injury of the muscular attachments at the pubis, mainly inguinal canal, rectus abdominis and adductor muscles, causing pain at the pubic symphysis |
| Inguinal ligament enthesopathy | 2008; Lloyd et al
2009; Mann et al
2017; Rennie and Lloyd |
| Inguinal ligament enthesopathy at the pubic tubercle. This is due to excessive stress during lateral abdominal muscle contraction. The abdominal core muscles play a pivotal role in the cause of pain as their forces are transmitted through the inguinal ligament onto the pubic tubercle |

**HOW DO WE ADVANCE?**

We recognise that ‘inguinal-related groin pain’ is a vague term. However, if we embrace the current
1. Knowledge of normal findings in athletic populations
2. Acceptance that various pathologies may co-exist and are not mutually exclusive
3. Understanding that there is significant variation between individuals in anatomy and nerve distribution.
4. Open minds.

At present, these are lacking. It will be a complex and time-consuming process to sift through the various potpourri ingredients. We are more likely to progress if we collaborate on projects to improve study power and share ideas. It is important to recognise that the focus here is on underlying pathology, but as with all musculoskeletal pain conditions the biopsychosocial factors will play their role too. This is also something that needs to be explored further.

In summary, simplistic thinking about single pathologies in inguinal-related groin pain is preventing progress. Acknowledging the current pathological potpourri will allow progress and enable more encompassing approaches.

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Figure 1 Potential causes of inguinal pain in athletes.