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Ultrasound-Guided Athletic Pubalgia Prolotherapy: A Novel Treatment

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Abstract

Research background: Athletic Pubalgia is a common, debilitating sports condition encountered by athletes who participate in competitive sports requiring pivoting movements. Athletic Pubalgia is often multifactorial with several pathologies overlapping to cause groin pain. Soft tissue disruptions at the insertions of adductor longus and rectus abdominis to the pubic symphysis are often encountered. Prolotherapy is the method of injecting an irritant solution into a joint space, ligament or tendon insertion site. The solution is thought to induce a regenerative response in the affected area through several mechanisms, including the induction of inflammation and vascular reconfiguration. **Research objectives:** The use of prolotherapy to treat Athletic Pubalgia has not been reported. The aim of this study was to assess ultrasound-guided prolotherapy as a therapeutic option in the treatment of Athletic Pubalgia. **Methods**: A case report, with informed consent (human material or human data were performed in accordance with the Declaration of Helsinki), involving a 24-year-old female presenting with Athletic Pubalgia. The patient presented with severe chronic right groin pain sustained while playing camogie. Conservative management options, including rest and rehabilitation with physiotherapy had failed to control this pain. Through dynamic ultrasound scanning, focal lesions were identified in the insertions of rectus abdominis and adductor longus to the pubic symphysis. Prolotherapy with 5% dextrose to the affected areas was performed. Assessment of analgesic and rehabilitation response was planned. **Results:** A sustained analgesic effect was observed at clinical follow-up at 6 weeks. Patient returned to full sporting activity. **Conclusions:** Ultrasound-guided prolotherapy has not yet been described as a treatment option in Athletic Pubalgia. In this case report, it was an effective pain-relieving therapy with improved rehabilitation. Larger studies are required to evaluate its efficacy.

Keywords

Groin Pain, Athletic Pubalgia**,** Prolotherapy, Ultrasound, Sports Medicine

1. Introduction

Groin pain is commonly encountered amongst people who play active sports, with an estimated incidence of 10% [1]. Groin anatomy is complex and there are many structures which can be injured and cause pain. A host of terms have emerged to describe groin pain in athletes, including "Sports hernia" and "Gilmore's groin". The confusing taxonomy of athletic groin pain was the subject of an expert agreement meeting on terminology and definitions [2]. Agreement was found that disabling pain affecting the pubic region, as a result of athletic endeavours should be labelled as Athletic Pubalgia (AP) [2].

Though no unique pathological definition exists for AP, Ellsworth *et al.* describe the condition as "the disruption and/or separation of the more medial aponeurosis of the rectus sheath from the pubis, usually with some degree of adductor tendon pathology" [3].

Ultrasound-guided corticosteroid injections have previously been trialled as a management option in AP [4], but prolotherapy to the affected region has not been described to date.

Prolotherapy is the injection method of an irritant solution into a joint space, ligament or tendon insertion site, mainly targeting chronic musculoskeletal pain [5]. The irritant solution is thought to induce a regenerative process through several proposed mechanisms, including induction of the inflammatory response, anabolism, cellular proliferation and vascular reconfiguration [6] [7]. The aim of this study was to assess the role of ultrasound-guided prolotherapy in the treatment of Athletic Pubalgia.

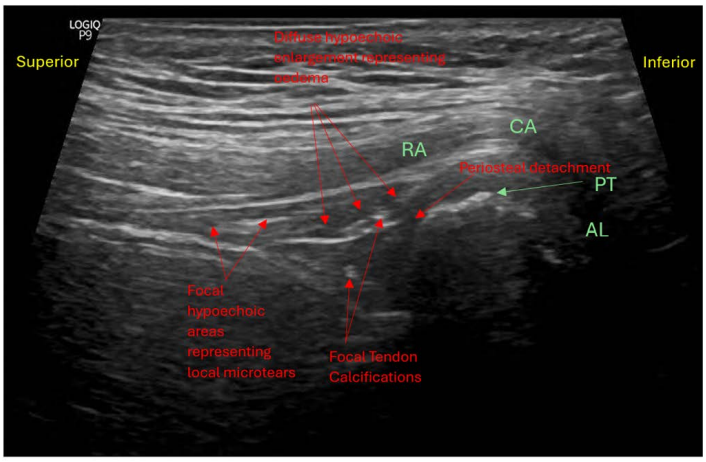
2. Case Report

A 24-year-old female athlete presented complaining of severe chronic right groin pain sustained while playing camogie. It was described as a "burning-type" pain and was intermittent in nature. Pain was exacerbated by resisted trunk flexion, playing sport and relieved by rest. There was physical point tenderness above the pubic tubercle on the right side. Pelvic X-ray was normal. Inflammatory blood tests were normal. Conservative management with rest and physiotherapy had failed to adequately resolve pain. The pain was limiting the patient's activities of daily living and was precluding her return to sporting activity: as an elite athlete, this had a significant effect on her mental health.

Dynamic ultrasound (US) scanning of the affected right groin area revealed diffuse hypo-echoic enlargement of the right common aponeurosis and focal calcifications of the inferior rectus abdominis and superior adductor longus tendons at their insertions to the pubic crest. Further anechoic clefts were observed in this

region, representing localized soft tissue tears and periosteal detachment.

With patient consent, ultrasound-guided prolotherapy to the insertions of rectus abdominis and adductor longus to the pubic crest was performed with the patient in the supine position. After skin sterilization, the linear ultrasound transducer was placed in a longitudinal orientation at the level of the rectus abdominis and adductor longus insertions to the pubis. The needle was advanced from inferior to superior "in-plane" under direct ultrasound visualization, until the needle was positioned at the inferior insertion of rectus abdominis and superior origin of adductor longus (Figure 1, Figure 2).



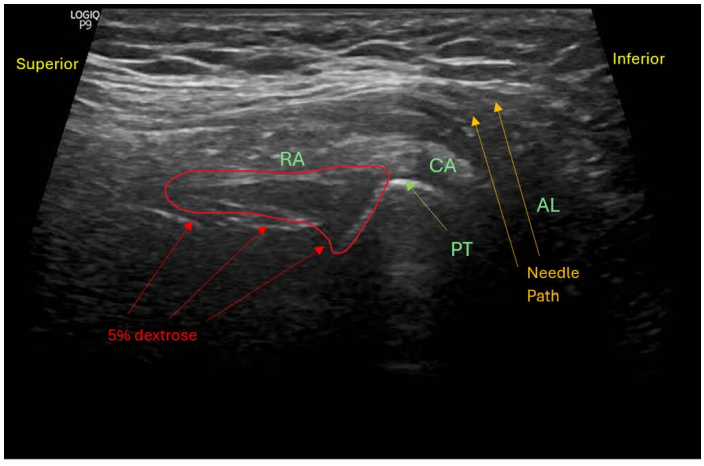
AL – adductor longus

RA – rectus abdominis

CA – common aponeurosis

PT – pubic tubercle

Figure 1. Pre-intervention.



AL – adductor longus

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Figure 2. Intervention.

After confirming the needle tip position, 5 mls of 0.25% Chirocaine was initially injected, which provided immediate pain relief. Following this, 10 ml of 5% dextrose was injected with good visualization of distribution of the solution. No immediate sequelae were reported by the patient, and none were observed by the clinician. A sustained analgesic effect was reported when followed up in the pain clinic at six weeks.

Her decreased levels of pain allowed the patient to make a staged return to sporting activities in the subsequent weeks. As a result, she described a gross improvement in her mood.

3. Discussion

In this case report, with informed consent, a 24-year-old female presented with Athletic Pubalgia. The patient presented with severe chronic right groin pain sustained while playing camogie. Conservative management options, including rest and rehabilitation with physiotherapy had failed to control pain. Through dynamic ultrasound scanning, focal lesions were identified in the insertions of rectus abdominis and adductor longus to the pubic symphysis. Prolotherapy with 5% dextrose to the affected areas was performed. A sustained analgesic effect was observed at clinical follow-up at 6 weeks. Patient returned to full sporting activity.

This case report is the first reported application of ultrasound-guided prolotherapy to treat Athletic Pubalgia. It offers a novel approach in the non-operative management of this common sports injury and may reduce the need for surgery and overall rehabilitation time. Our case report suggests ultrasound-guided prolotherapy in Athletic Pubalgia in combination with a targeted physical therapy rehabilitation protocol may be an effective management strategy for patients with Athletic Pubalgia. This approach could decrease the need for oral analgesia and other invasive therapies, such as corticosteroid injections, which have more systemic implications [8].

Several mechanisms for AP have been suggested [9] [10]. These include the disruption of the conjoint tendon or transversalis fascia because of excessive perpendicular pulling from adductor musculature on a fixed lower extremity [9] [10]. Globally, it can be accepted that AP is caused by a soft tissue disruption in the groin area due to shearing forces across the pubic symphysis, which are created by an excess of any of the hip movements but particularly by aggressive thigh abduction/adduction [3]. Femoro-acetabular impingement has been associated with AP and may be a predisposing factor [10].

Radiographical investigations are useful in diagnosing this AP [1]. Initial imaging of tendons with ultrasound (US) is recommended and characteristic sonographic features of AP are described. MRI is recommended to evaluate implicated bones and joints [1]. Ultrasound's value in visualising and diagnosing soft tissue pathology has been well described by Kakkos *et al.* in the context of achilles tendinopathy [11]. This case report utilizes US as a diagnostic tool in AP, which may provide a real-time, patient centred, more readily accessible radiological investigation when compared to MRI or herniography. Further, US has been shown

to be a more time-effective option and is generally more acceptable to patients when compared to MRI [12] [13].

On dynamic US scanning of the injured area, our patient displayed all of the sonographic features of Athletic Pubalgia as described by Balconi *et al.* [1]. Adductor tendon injury was marked by oedema, calcification and rupture. Oedema was marked by a diffuse hypoechoic common aponeurosis while localised tendon microtears and periosteal detachment were observed as focal anechoic clefts [14]. Calcifications were observed as hyperechoic foci.

Five percent dextrose is thought to induce a regenerative process through several proposed mechanisms, including anabolism, cellular proliferation and localised vascular reconfiguration [6] [7]. The dextrose does this in a concentration-dependent manner. The threshold concentration of dextrose required to induce local inflammation is 10%. Concentrations of 10% dextrose and above activate the inflammation cascade by increasing the osmotic pressure. Concentrations below 10% contribute to musculoskeletal cell proliferation and influence amino acid transport and protein synthesis with no toxicity to cells [7].

Several studies have validated dextrose prolotherapy by demonstrating 5% dextrose to be superior to 0.9% saline in neuropathic pain [15]. An enhanced neurogenic anti-inflammatory effect was observed by Wu *et al.* when 5% dextrose was injected into the perineural space compared to 0.9% saline in patients with mild-to-moderate carpal tunnel syndrome [15]. In patients with moderate-to-severe lower back pain, Maniquis *et al.* observed a superior analgesic effect when 5% dextrose was injected into the epidural space when compared to 0.9% saline [6].

4. Conclusion

The aim of this study was to assess the role of prolotherapy in the treatment of Athletic Pubalgia. In this case, we observed a measurable improvement in a patient's pain and rehabilitation following ultrasound guided prolotherapy treatment. This minimally-invasive intervention has not been described to date in the context of Athletic Pubalgia and may offer an alternative to surgical and other invasive interventions such as corticosteroid injections. In this case report, it was an effective pain-relieving therapy with improved rehabilitation. Larger studies are required to evaluate its efficacy.

Learning Points

- Athletic Pubalgia is a commonly encountered injury in sport, especially those involved in pivoting sports such as soccer and basketball.
- While rest, rehabilitation and physical therapy remain the cornerstones of management, ultrasound-guided prolotherapy may offer be a new, minimally-invasive treatment approach for patients with refractory Athletic Pubalgia and decrease the need for surgical intervention.

IRB: Research Ethics Committee, University Hospital Limerick, Limerick, Ireland.

Funding

Not applicable.

Conflicts of Interest/Competing Interests

There were no other competing interests involved in this research. There was no support from any organisation for the submitted work and no other relationships or activities that could appear to have influenced the submitted work.

Availability of Data and Material/Data Transparency

This case report is an honest, accurate, and transparent account of the case being reported. No important aspects of the report have been omitted. Any queries should be directed via email to the corresponding author. Requests for reprints should also be addressed to the corresponding author.

Ethics Approval

This study is fully compliant with the ethical guidelines of the Research Ethics and Clinical Trials Committee of the University of Limerick Hospitals Group.

Consent to Participate

The patient described consented to participation and publication of the report as described.

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