

Targeted Injection can Improve Groin Pain Management in Osteitis Pubis: A Narrative Review

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SUMMARY

Introduction. The strategy of choice for the treatment of groin osteitis pubis is conservative treatment, and the treatment effectiveness increases when it relies on an individualized multimodal rehabilitative management. Osteitis pubis is a very common occurrence among athletes: it makes up 5-13% of injuries in male soccer players and 4-5% in female athletes, and it is frequently hard to locate and diagnose.

Methods. A literature review using online databases was carried out regarding the use of steroid injections for groin pain and sport related pubalgia. Articles were extracted from PubMed, Google Scholar, Medline, UpToDate, Embase and Web of Science, combining the terms “groin pain”, “pubalgia”, “injection in groin pain”, “adductor pain”, “adductor rectus syndrome” and “injections in pubalgia” as keywords for the research.

Results. The search yielded numerous papers, and 21 full-text articles were considered useful and screened. The review included trials and systemic or narrative reviews, recent guidelines and any report thought of with good methodological quality.

Discussion. The use of corticosteroid injections in the treatment of athletes with other myo-aponeurotic injuries has been reported to reduce pain and return an athlete to preinjury activity. Guided peritendinous infiltrations was already proposed as a valid minimally invasive option for fastening recovering from GPS during the conservative treatment of osteitis pubis and should be considered before approaching the area surgically.

Conclusions. Given the elevated occurrence of osteitis on groin pain imaging of chronic painful pubis, patients who present this inflammatory condition may benefit from the creation of tailored protocols of muscle strengthening exercises and early mini-invasive procedures, as per common clinical practice evidence and US guided injections performed in early stages could faster recovery and rehabilitation outcomes.

KEY WORDS

Groin pain; US guided steroid injections; pubalgia management; rectus adductor syndrome; osteitis pubis.

INTRODUCTION

According to literature “*Osteitis pubis is a common cause of chronic groin pain, especially in athletes*” (1). The strategy of choice for the treatment of groin osteitis pubis is conservative treatment, and the treatment effectiveness increases when it relies on an individualized multimodal rehabilitative management (2). Osteitis pubis is a very common occurrence among athletes: it makes up 5-13% of injuries in male soccer players and 4-5% in female athletes, and it is frequently hard to locate and diagnose (2).

Falvey *et al.* explain that the underdiagnosis of osteitis pubis is due to its non-specific symptoms and the complex anatomy of the groin, gluteal and greater trochanter triangles region; they propose a systemic patho-anatomical approach based on the accurate knowledge of the groin region, on anamnesis and diagnostic maneuvers (3).

To limit the differential diagnosis, the “Doha agreement meeting on terminology and definitions in groin pain in athletes” agreed that the heterogeneous taxonomy of groin injuries hindered the diagnostic process, and it developed

a clinically-based taxonomy to standardize the terminology (4). Along with Doha’s conference, the “Italian Consensus Conference on terminology, clinical evaluation and imaging assessment in groin pain in athlete” attempted to normalize groin pain syndrome (GRPS) terminology and defined it as “Any clinical symptom reported by the patient, localized in the inguinal pubic adductor, which affects sporting activity and/or interferes with Activities of Daily Life (ADL), and which requires medical treatment” (5). In addition to specific taxonomy, the usage of particular clinical examinations may ameliorate the GRPS diagnostical process; in fact, an MRI study will precisely evaluate the presence of muscle tears or complete/partial tendon lesions (3). The most urgent goal of the therapy is to reduce pain and recover the joint range of motion and strength through specific physical exercises (2). The return to sports practice is usually expected within two months for acute clinical pictures, six months for the chronic ones. If chronic groin pain persists, then surgical tenotomy is opted for, which guarantees a return to sport in 50-55% of cases (1, 6). However, physical therapy and rest may not be resolutive in some patients (5, 7).

A targeted groin injection is a common and minimally invasive procedure, performed to successfully treat groin pain, which has also proved its effectiveness in the treatment of osteitis pubis and different enthesopathies. The injections are used to deliver steroids, and sometimes local anesthetics or glucose for prolotherapy, to the peritendinous or periosteous space, directly to the site that causes the pain, with the patient positioned in a “frog-leg” orientation, supine with the hip flexed at 45° (8). This kind of injection is a well-founded anesthetic and analgesic technique; moreover, nowadays, new technological devices can help physician to learn and to administer it (8). Even though it is still not clear which type of conservative intervention is superior, several studies have proved that a single injection is able to increase patients’ satisfaction, relieve groin pain and reduce time or recovery or delay more invasive interventions. Although injections should represent a treatment of choice in the case of different acute tendinopathies or joints pain, in our research we focused on the efficacy of targeted different injections in the treatment of groin pain in sportsmen.

The aim of this narrative review is to analyze the mini-invasive treatments of acute, sub-acute and chronic groin pain patients and to understand their current use, application and success in treating this significant widespread pathology in sportsmen.

METHODS

A literature review using online databases was carried out regarding the use of steroid injections for groin pain and sport related pubalgia. Articles were extracted from PubMed, Google Scholar, Medline, UpToDate, Embase and Web of Science, combining the terms “groin pain”, “pubalgia”, “injection in groin pain”, “adductor pain”, “adductor rectus syndrome” and “injections in pubalgia” as keywords for the research. Only papers in the English language and regarding human studies were taken into consideration. Non-English language studies were excluded. Scientific publications up to March 2023 were included. Only papers contributing to focus on steroid injections for groin pain or pubalgia were included. All reference lists of the relevant studies were then screened to identify any missing publications. The search and the study selection were performed by all investigators working independently. At the first level, the titles and abstracts of identified studies were screened. At the second level, the full texts were retrieved and assessed. Ethical approval and patient informed consent were not required because this was a review of previously published studies and did not involve direct contact with patients or alterations to patient care. Any discrepancies were resolved by the first author (LDL) through consensus. The following data were extracted from each eligible study: first author’s name, publication year, study design, intervention protocol type, and any other relevant data.

RESULTS

The search yielded numerous papers, and 21 full-text articles were considered useful and screened. The review included trials and systemic or narrative reviews, recent guidelines and any report thought of with good methodological quality (**table I**).

Table I. Trials systemic or narrative reviews, recent guidelines and report thought of with good methodological quality.

| Article | Study design | Study protocol | Summary of findings |
|---|--|---|--|
| Jacobs MLYE, Scheltinga MRM, Roumen RMH. Persistent pain relief following a single injection of a local anesthetic for neuropathic abdominal wall and groin pain. Scand J Pain. 2021;21(3):628-632. doi: 10.1515/sjpain-2021-0034 | This report is an overview based on earlier studies from a center of expertise for neuropathic abdominal wall and groin pain syndromes | A total of 10 studies including 834 patients fulfilled study criteria | When a patient is suspected of having a neuropathic abdominal wall or groin pain syndrome, a single TPI using a local anesthetic agent should be administered as long-term pain relief may occur |

| Article | Study design | Study protocol | Summary of findings |
|--|--|--|---|
| Jose J, Buller LT, Fokin A, Wodicka R, Subhawong T, Lesniak B. Ultrasound-guided Corticosteroid Injection for the Treatment of Athletic Pubalgia. <i>J Med Ultrasound</i> . 2015;23(2):71-5. doi: 10.1016/j.jmu.2014.11.003 | A series of 12 cases | Retrospective analysis | Ultrasound guided actions in pubalgia |
| Topol GA, Reeves KD. Regenerative injection of elite athletes with career-altering chronic groin pain who fail conservative treatment: a consecutive case series. <i>Am J Phys Med Rehabil</i> . 2008;87(11):890-902. doi: 10.1097/PHM.0b013e31818377b6 | Consecutive enrollment of elite performance-limited athletes with chronic groin/abdominal pain who failed a conservative treatment trial | The treatment consisted of monthly injections of 12.5% dextrose in 0.5% lidocaine in abdominal and adductor attachments on the pubis | Athletes returned to full elite-level performance in a timely and sustainable manner after regenerative injection therapy using dextrose |
| Kim DS, Jeong TY, Kim YK, Chang WH, Yoon JG, Lee SC. Usefulness of a myofascial trigger point injection for groin pain in patients with chronic prostatitis/chronic pelvic pain syndrome: a pilot study. <i>Arch Phys Med Rehabil</i> . 2013;94(5):930-6. doi: 10.1016/j.apmr.2012.12.011 | Prospective, unicenter trial | Myofascial trigger point injection for groin pain in patients with chronic prostatitis/chronic pelvic pain syndrome | US-guided trigger point injections are safe and effective for both diagnosis and treatment when the cause of groin pain is suspected to originate from muscles |
| Schilders E, Bismil Q, Robinson P, O'Connor PJ, Gibbon WW, Talbot JC. Adductor-related groin pain in competitive athletes. Role of adductor entheses, magnetic resonance imaging, and enthesal pubic cleft injections. <i>J Bone Joint Surg Am</i> . 2007;89(10):2173-8. doi: 10.2106/JBJS.F.00567 | Retrospective review analysis | Consecutive series of twenty-four competitive athletes with groin pain secondary to adductor longus dysfunction | A single enthesal pubic cleft injection can be expected to afford at least one year of relief of adductor-related groin pain in a competitive athlete with normal findings on a magnetic resonance imaging scan |
| Byrne CA, Bowden DJ, Alkhatay A, Kavanagh EC, Eustace SJ. Sports-Related Groin Pain Secondary to Symphysis Pubis Disorders: Correlation Between MRI Findings and Outcome After Fluoroscopy-Guided Injection of Steroid and Local Anesthetic. <i>AJR Am J Roentgenol</i> . 2017;209(2):380-8. doi: 10.2214/AJR.16.17578 | Cohort study | Correlation between MRI findings and outcome after fluoroscopy-guided injection of steroid and local anesthetic | Fluoroscopy-guided corticosteroid symphyseal injection is a safe and effective treatment of sports-related groin pain. It is more frequently associated with a complete recovery in patients who display an isolated superior cleft sign on MRI |
| Schilders E, Talbot JC, Robinson P, Dimitrakopoulou A, Gibbon WW, Bismil Q. Adductor-related groin pain in recreational athletes: role of the adductor entheses, magnetic resonance imaging, and enthesal pubic cleft injections. <i>J Bone Joint Surg Am</i> . 2009;91(10):2455-60. doi: 10.2106/JBJS.H.01675 | Review of a consecutive case series of twenty-eight recreational athletes | Clinical reassessment five minutes after cleft injection | Most recreational athletes with adductor enthesopathy have pain relief at one year after enthesal pubic cleft injection |
| Topol GA, Reeves KD, Hassanein KM. Efficacy of dextrose prolotherapy in elite male kicking-sport athletes with chronic groin pain. <i>Arch Phys Med Rehabil</i> . 2005;86(4):697-702. doi: 10.1016/j.apmr.2004.10.007 | Consecutive case series | Twenty-two rugby and 2 soccer players with chronic groin pain | Dextrose prolotherapy showed marked efficacy for chronic groin pain in this group of elite rugby and soccer athletes |

| Article | Study design | Study protocol | Summary of findings |
|---|--|--|---|
| Brennan D, O'Connell MJ, Ryan M, Cunningham P, Taylor D, Cronin C, <i>et al.</i> Secondary cleft sign as a marker of injury in athletes with groin pain: MR image appearance and interpretation. <i>Radiology.</i> 2005;235(1):162-7. doi: 10.1148/radiol.2351040045. | Retrospective image or case record review | Patients study on the basis of radiography and/or MR imaging, also confirmed in each patient during contrast material injection into the central physiologic symphyseal cleft | The secondary cleft sign demonstrated at MR imaging is a marker of groin injury in athletes presenting with groin pain |
| Drager J, Rasio J, Newhouse A. Athletic Pubalgia (Sports Hernia): Presentation and Treatment. <i>Arthroscopy.</i> 2020;36(12):2952-3. doi: 10.1016/j.arthro.2020.09.022 | Cohort open study | MRI can aid in ruling out other pathologies and identify specific findings including tears or strains. Lidocaine injections can be used to localize the source of the pain | If conservative therapy fails to allow an athlete to return to activity, a variety of open or laparoscopic surgical techniques can be used. Numerous studies report a high rate of return to play after surgical management |
| Bisciotti GN, Chamari K, Cena E, Garcia GR, Vuckovic Z, Bisciotti A, <i>et al.</i> The conservative treatment of longstanding adductor-related groin pain syndrome: a critical and systematic review. <i>Biol Sport.</i> 2021;38(1):45-63. doi: 10.5114/biol sport.2020.97669 | Systematic review regarding conservative treatment for longstanding adductor-related groin pain syndrome | Screening 234 articles, 19 studies following the inclusion criteria were included and summarized in this current systematic review and seven different types of therapeutic interventions were described | Conservative treatment for longstanding adductor-related groin pain syndrome is limited and characterized by a low level of evidence. Therefore, our recommendation is to refer only to the few studies with higher level of evidence and at to encourage further research in this area |
| Matsuda DK. Editorial Commentary: Managing Hip Pain, Athletic Pubalgia, Sports Hernia, Core Muscle Injury, and Inguinal Disruption Requires Diagnostic and Therapeutic Expertise. <i>Arthroscopy.</i> 2021;37(7):2391-2. doi: 10.1016/j.arthro.2021.04.027. | Editorial comment | / | In select cases of pubalgia, patients might respond favorably, albeit temporarily, to an intra-articular injection |
| Scholten PM, Massimi S, Dahmen N, Diamond J, Wyss J. Successful treatment of athletic pubalgia in a lacrosse player with ultrasound-guided needle tenotomy and platelet-rich plasma injection: a case report. <i>PM R.</i> 2015;7(1):79-83. doi: 10.1016/j.pmrj.2014.08.943 | Case Report | / | Athletic pubalgia is a syndrome of persistent groin pain due to chronic repetitive trauma or stress involving the pelvic joints structures |
| McCarthy E, Hegazi TM, Zoga AC, Morrison WB, Meyers WC, Poor AE, <i>et al.</i> Ultrasound-guided Interventions for Core and Hip Injuries in Athletes. <i>Radiol Clin North Am.</i> 2016;54(5):875-92. doi: 10.1016/j.rcl.2016.04.008 | Review | Literature analysis and narrative summary | Article reviews ultrasonography-guided interventions for injuries at the core, including the pelvis and hips |
| Julian Ashberg L. Editorial Commentary: The Cause of Groin Pain Is Difficult to Determine: The Elusive "Nether-Nether Region". <i>Arthroscopy.</i> 2021;37(4):1179-81. doi: 10.1016/j.arthro.2021.01.017 | Editorial comment | Literature analysis | Combining a clear history, detailed physical, basic and advanced imaging, as well as diagnostic injection is essential |

| Article | Study design | Study protocol | Summary of findings |
|---|------------------|---|---|
| Byrne CA, Bowden DJ, Alkhatay A, Kavanagh EC, Eustace SJ. Sports-Related Groin Pain Secondary to Symphysis Pubis Disorders: Correlation Between MRI Findings and Outcome After Fluoroscopy-Guided Injection of Steroid and Local Anesthetic. <i>AJR Am J Roentgenol.</i> 2017;209(2):380-8. doi: 10.2214/AJR.16.17578 | Cohort study | 104 patients study in open controlled study | Fluoroscopy-guided corticosteroid symphyseal injection is a safe and effective treatment of sports-related groin pain |
| Branci S, Robinson D, Robinson P. Imaging in long lasting groin pain in athletes. <i>Aspetar Sport Med J.</i> 2014;3. Available at: https://www.aspetar.com/Journal/viewarticle.aspx?id=155 | Review | Narrative based on recent literature | Symptoms in this condition appear to be correlated to marked oedema of the pubic bone marrow and parasymphyseal soft tissues or partial disruption of the soft tissues involving the anterior joint capsular, adductor and rectus abdominis tendons (cleft) |
| Olafsen NP, Herring SA, Orchard JW. Injectable Corticosteroids in Sport. <i>Clin J Sport Med.</i> 2018;28(5):451-6. doi: 10.1097/JSM.0000000000000603 | Narrative review | An extensive search of the literature was completed including search terms of corticosteroid, steroid, athlete, and injection, among others. Additional articles were used after being identified from previously reviewed articles | Corticosteroid injections should be used cautiously in athletes and only after a full consideration of the pharmacology, pathogenesis of disease, potential benefits, complications, factors specific to the athlete, and rules of athletic governing bodies. Corticosteroid injections are just one component of a comprehensive rehabilitation plan available to the physician providing care to athletes |

DISCUSSION

As with most causes of groin pain, the treatment of groin pain and/or athletic pubalgia begins with a trial of physical therapy (1, 2). Physical therapy and rehabilitation protocols focus on core strengthening exercises that aim to balance the opposing forces of the abdominal musculature and the hip adductors. In general, 6-8 weeks of physical therapy is employed with anti-inflammatory medications, rest, and deep-tissue massage (1, 2). Unfortunately, groin pain rarely responds promptly to such conservative treatment and often requires more invasive management (9, 10). Surgical repair has consequently historically been advocated when conservative measures fail to alleviate pain. Treatment can be open surgery or laparoscopic surgery and patients can expect to return to play within 6 weeks to 6 months (9). The use of corticosteroid injections in the treatment of athletes with other myo-aponeurotic injuries has been reported to reduce pain and return an athlete to pre-injury activity (8, 11), hypothesizing that ultrasound US-guided

procedures could better alleviate pain and improve function in patients with athletic pubalgia. Because of the potential morbidity and prolonged return to sports-related activity associated with surgical treatment of athletic pubalgia, corticosteroid injections may definitely present a minimally invasive and effective alternative treatment option. Guided peritendinous infiltrations was already proposed as a valid minimally invasive option for fastening recovering from GPS during the conservative treatment of osteitis pubis and should be considered before approaching the area surgically (12). However, the administration of peritendinous infiltrations requires compliance with anti-doping legislation, as peritendinous injections are severely prohibited in-competition. The symphysis pubis is a real hub for muscles such as the rectus abdominis and the adductor muscle complex, and when groin pain occurs, the imbalance between these pelvic muscles, with following micro-traumas and injuries, are thought to be the starting mechanism of osteitis. The deficit that interrupts the distribution of

force through the symphysis pubis seems to alter the biomechanics of the articulation, favoring stress injuries and cartilage degeneration. The pain is induced by repetitive exercises and occurs mainly in the lower abdomen and medial thigh. To date, MR allows a more detailed view of this region and it therefore represents the first-line examination. The typical sign of the chronic phase is the presence of a hyperintense subchondral T2 signal at the level of the symphysis (13) (figures 1, 2). Sometimes the radiograph demonstrates bone resorption, osteophytes or subchondral cysts (acute phase) where standard treatment will not be suitable (13), and other options will be considered, such as physical therapy for pain control, rest, improvement of lumbopelvic stability, exercises to strengthen

the pelvic, abdominal, gluteal, adductor, flexor and extensor muscles of the hip (5, 12). The use of physical therapy with shock waves is particularly important in the rehabilitation process, reducing recovery times (1). In our anecdotal experience, according to common clinical practice for groin pathologies, MR has been the first-choice diagnostic exam thanks to the high spatial resolution it allows and its multiplanarity. This is because it enables the accurate evaluation of the alterations at the level of the pubis and of the myo-structures that originate from it. For diagnostic purposes, T1 and T2-weighted images are to be preferred: the former allows the identification of the anatomical structures, the latter allows the detection of any signal anomalies in tendon and bone structures (8-13).

Research on the usage of MRI for GPS diagnosis confirms the utility of MRI for differentiating the clinical phases of GPS, these being the acute phase (occurring within six months since the pain onset) and the chronic phase (after six months since the pain onset) (9). For instance, bone edema, fluid accumulation in the symphysis, and periarticular edema are all signs of a history prior to six months. Edema is the consequence of the action of impact forces which can cause subarticular micro-trabecular trauma in the long run. On the contrary, sclerosis and subchondral resorption (cysts), bone irregularities and the presence of osteophytes are the confirmation of a history longer than six months (13-15). Conservative treatment in acute phases can be accompanied by injection therapy with drugs such as dexamethasone, betamethasone and methylprednisolone, and anesthetics such as bupivacaine and lidocaine. More specifically, ultrasound guided injections are an easy procedure and are proved to fasten any tendon pain recovery (8, 10).



Figure 1. The typical sign of the chronic phase is the presence of a hyperintense subchondral T1 signal at the level of the symphysis.

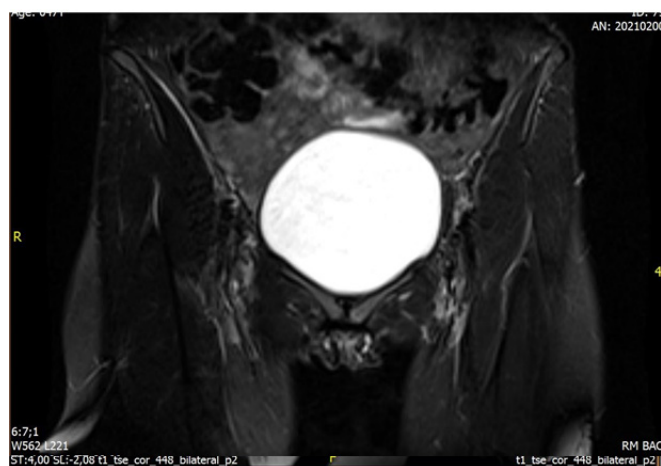


Figure 2. Same patient with hyperintense subchondral at the level of the symphysis.

CONCLUSIONS

Osteitis pubis is an overload disease that frequently tends to become chronic. Therefore, the achievement of a correct diagnosis and the identification of the most suitable therapy are crucial for the treatment of the condition (1, 4, 5, 14, 15).

All authors initially opted for an early conservative treatment combining physical and manual therapy. Then, mostly performed infiltrations and physical therapy such as ultrasound, laser or shock waves sessions to reduce the extent of the inflammation and fasten the pain relief. Given the elevate occurrence of osteitis on groin pain imaging of chronic painful pubis (14), patients who present this inflammatory condition may benefit from the creation of tailored protocols of muscle strengthening exercises and early mini-invasive procedures, as per common clinical practice evidence. Individualized programs would help patients self-manage recurrent myalgia due to overloading training and prevent further tears and inflammations and seems to

be evidence that guided injections performed in early stages could faster recovery and rehabilitation outcomes.

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None.

DATA AVAILABILITY

N/A.

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CONTRIBUTIONS

All authors gave its own contributions refining searching, reading abstract and full text, discussing about them and providing help for the final proof. Any controversial issue was solved by LDL as main author.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.