

Medical Coverage Policy



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Athletic Pubalgia Surgery

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Overview

This Coverage Policy addresses athletic pubalgia (sports hernia) surgery.

Coverage Policy

Surgical treatment for athletic pubalgia is considered experimental, investigational or unproven.

General Background

Groin pain in active individuals and athletes without clinical evidence of hernia or hip pathologic findings is challenging for health care clinicians and aggravating for those experiencing pain. Frequently called sports hernia or athletic pubalgia, many surgeons continue to refute the diagnosis because there is a lack of consensus and clear comprehension of the basic pathophysiologic features of this groin pain syndrome (Zuckerbraun, et al., 2020).

According to the American Academy of Orthopaedic Surgeons (AAOS), athletic pubalgia most often occurs during sports that require sudden changes of direction or intense twisting movements. Although athletic pubalgia

may lead to a traditional abdominal or inguinal hernia, it is a different injury. Strosberg et al. (2016) proposes core muscle injury/athletic pubalgia (CMI/AP) or sports hernia is a syndrome of disabling exertional inguinal and adductor pain commonly seen in high-performance athletes, possibly due to a disruption of the musculature of the posterior inguinal wall. Srinivasan et al. (2002) states athletic pubalgia is a term often used to describe the insidious onset of groin pain in professional athletes. This pain may be caused by a range of musculoskeletal conditions. The diagnosis of occult or sports hernia must be considered in athletes who do not respond to conservative treatment modalities directed at these entities. Included in the differential diagnosis for athletic pubalgia are osteitis pubis, distal abdominal rectus strain or avulsion, adductor tenoperiostitis, and rupture of the adductor longus. A simple adductor muscle strain (i.e., groin pull), or a true hernia that was missed initially on physical examination, should also be considered. Garvey et al (2014) states that athletic pubalgia should be considered as a 'groin disruption injury', the result of functional instability of the pelvis.

How athletic pubalgia and sports hernia is defined, diagnosed and treated varies widely in the literature. Imaging (e.g., ultrasound, x-ray) may be used along with physical exam. Rest, and/or anti-inflammatory medications and/or physical therapy may be recommended. Laparoscopic and open surgical procedures have been proposed for treating athletic pubalgia that is unresolved after failed conservative treatments. Laparoscopic approaches may include totally extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) repair for mesh placement, whereas open surgical techniques include both suture and mesh repair. Procedures may also include muscle or nerve release. There are many concerns when considering surgical treatment for athletic pubalgia: there is no standard definition or terms for the symptom complex in elite athletes; there is no standard defined successful response to conservative treatments and/or surgical exploration and repair; and there is variance in the proposed surgical procedures as well as results in the various surgical approaches.

Literature Review

Laparoscopic and open surgical procedures have been proposed for treating athletic pubalgia that is unresolved after failed conservative treatments. There are many concerns with this proposed treatment: there is no standard definition or terms for the symptom complex in elite athletes; there is no standard defined work-up or defined successful response to conservative treatments and/or surgical exploration and repair; and there is variance in the proposed surgical procedures as well as results in the various surgical approaches. There is a paucity of well-designed evidence evaluating athletic pubalgia surgery compared with conservative treatment as well as studies comparing various proposed surgical techniques. It is difficult to compare one study to another when evaluating the published literature because each study uses different terminology and assigns different definitions to terms such as athletic pubalgia and sports hernia. Serner et al. (2015) reported 33 different terminologies used in 72 studies. Despite the prevalence of the condition, the literature contains contradictory information regarding the etiology, presentation, diagnosis, and management of groin pain in the athletic patient.

Kraeutler et al. (2021) conducted a systematic review of reported terminologies, surgical techniques, preoperative diagnostic measures, and geographic differences in the treatment of core muscle injury (CMI)/athletic pubalgia/inguinal disruption. The review included 31 studies and a total of 1,571 patients. The most common terminology used to describe the diagnosis was "athletic pubalgia" followed by "sports hernia". Plain radiographs and magnetic resonance imaging of the pelvis were the most common imaging modalities used in the preoperative evaluation of a core muscle injury (CMI)/athletic pubalgia/inguinal disruption. Tenderness to palpation was the most common technique performed during physical examination, though the specific locations assessed with this technique varied substantially. The most common procedures performed were an open or laparoscopic mesh repair, adductor tenotomy, primary tissue (hernia) repair, and rectus abdominis (RA) repair. The authors stated "it is clearly evident that there is no consistent definition or treatment for the pathologies identified as CMI/athletic pubalgia/sports hernia/inguinal disruption, thereby confirming our hypothesis." As an example, although the term "sports hernia" is considered a misnomer in that this injury typically occurs in the absence of a true hernia, one study identified in this review defined a sports hernia as a true inguinal hernia in an athlete. One of the factors involved in the inconsistent surgical treatment of CMI/athletic pubalgia/sports hernia/inguinal disruption is the participation of surgeons from different subspecialties. The authors identified considerable differences in the specific procedures reported when the involved surgeons were trained in orthopedic versus general surgery. They also identified geographic differences in repair technique, with adductor longus (AL) tenotomy and RA repair performed more commonly in American compared to European studies. The authors noted an evolution over time with regard to surgical technique, with recent studies performing fewer primary tissue repairs and more AL tenotomies and RA repairs.

Gerhardt et al. (2020) reported on a retrospective case series of 51 athletes treated surgically for inguinal related groin pain. The purpose of the study was to determine the outcomes and return to sport rates in athletes with inguinal-related groin pain undergoing surgical exploration and neurolysis of the ilioinguinal, iliohypogastric and/or genitofemoral nerves with and without posterior inguinal canal repair. Inclusion criteria were established as any patient that underwent surgery for inguinal-related groin pain. The average follow-up was 4.42 years. Nerve entrapment was demonstrated in 96.2% of cases with involvement of the ilioinguinal in 92.5%, the iliohypogastric in 30.8% and the genitofemoral in 13.2%. Attenuation of the posterior inguinal wall was present and repaired in 79.3% of cases. Scar tissue was present around the adductor origin and required debridement in 56.7% of cases. Forty-nine (96.1%) athletes returned to sport at the same level of play at an average of 5.9 weeks. The authors noted that the most significant study limitation stems from discussing outcomes of surgical treatment for a clinical entity that includes varying combinations of injured abdominal wall, pelvic and proximal thigh structures. The inclusion of patients post-hip arthroscopy is a limitation to this study as the condition can overlap.

A randomized trial was conducted in four European countries to compare open minimal suture repair (OMR) with totally endoscopic extraperitoneal (TEP) repair (Sheen, et al., 2019). A total of 65 athletes (92 % male) with Sportsman's hernia were enrolled (31 open repair, 34 totally extraperitoneal repair). Sportsman's hernia was defined by a history of chronic dull, diffuse groin pain lasting over six weeks. The pain occurred above the inguinal ligament in the deep inguinal ring, and could radiate to the inner thigh, scrotum or pubic bone. Minor pain was allowed that could radiate to the adductor origin or symphysis pubis on finger palpation or muscle stretching tests. Grade I–II edema at the pubic symphysis shown by MRI as a secondary effect of groin disruption was also acceptable for recruitment. Athletes with either unilateral or bilateral pain were included. Patients were excluded if they had an inguinal or femoral hernia, other treatable pathologies revealed by MRI (such as bursitis, hip injury or stress fracture), isolated adductor tendonitis with groin pain below the inguinal ligament, femoroacetabular impingement, isolated severe osteitis pubis (marked X-ray changes; grade III edema on MRI), previous groin surgery to the actual groin, or allergy to polyester or other contraindications to surgery. Results showed that both procedures improved pain and allowed return to sporting activities. TEP repair had a slight advantage over OMR for the primary outcome, complete relief of pain at 1 month, but there were no differences in secondary outcomes such as analgesic consumption, complications, time to resumption of low-level and full training, and pain up to 1 year.

Jørgensen et al. (2019) conducted a systematic review of adults diagnosed with longstanding groin pain with no hernia. Treatment included inguinal hernia repair, tenotomy, and nonsurgical management. Outcomes included return to habitual activity, pain, patient satisfaction, re-operations for the operated patients, and shift to surgery for the non-operated patients. A total of 72 studies with 3629 patients were included; however, only five studies used a comparison group. Overall for these studies, both different treatments were used and with separate outcomes for each treatment. This included four cohort studies and one RCT (Paajanen, et al., 2011). The authors concluded that surgery seems to be more efficient in return the patients to habitual activity, reduce their pain, and satisfy them than conservative treatment. Long term health outcomes were not reported.

Roos et al. (2018) prospectively studied 32 athletes with inguinal disruption and failed conservative treatment who underwent surgery. When inguinal disruption was suspected, patients were referred to the department of surgery where physical examination by an experienced hernia surgeon and additional imaging were performed (ultrasound, X-pelvis/hip, and MRI). All patients underwent endoscopic totally extraperitoneal (TEP) repair with placement of polypropylene mesh. At long-term follow-up, the median pain score was 0 ($p < 0.001$). At 3 months, 60% of patients were able to complete a full training and match. Three months postoperatively, improvement was shown on all physical functioning subscales.

In a retrospective review, Zoland et al. (2017) described the experience of a tertiary group of physicians specializing in groin pain and athletic pubalgia. A retrospective search for all MRIs performed on patients referred for an indication of groin pain, sports hernia, or athletic pubalgia revealed 117 patients in the studied time period. Patients (68%) had an MRI finding of athletic pubalgia, 67 (57%) had an acetabular labral tear in one or both hip joints, and 41 (35%) had a true inguinal hernia. Concomitant findings were common: 47 cases of athletic pubalgia and labral tear(s), 28 cases of athletic pubalgia and inguinal hernia, and 15 cases of all three

(athletic pubalgia, labral tear, inguinal hernia). On 24 of the 119 MRIs, the Valsalva maneuver either revealed the finding or made it significantly more apparent. Of the 79 patients with MRI-positive athletic pubalgia:

- 39 patients subsequently underwent surgery, and 31 (79%) of these were followed up by telephone. Mean duration of rest after surgery was 6.2 weeks. Twelve patients (39%) had physical therapy after surgery, some as early as four weeks, and some have continued their therapy since surgery. Of the 31 patients who were followed up after surgery, 23 (74%) resumed previous activity levels. Return to previous activity level took these patients a mean of 17.9 weeks. When asked if outcomes satisfied their expectations, 28 patients (90%) said yes, and three said no.
- 40 patients with MRI-positive athletic pubalgia were non-operatively treated, and 28 (70%) of these patients were followed up. In this group, mean duration of rest after surgery was 6.9 weeks. Thirteen patients (46%) participated in physical therapy, for a mean duration of 10.8 weeks. Of the patients followed up, 19 (68%) returned to previous activity level. Twenty-one patients (75%) were satisfied with their outcome.

Matikainen et al. (2017) prospectively evaluated 15 female nonprofessional athletes with obscure groin pain (athletic pubalgia) lasting over 6 months. Participants had failed conservative treatment and were treated surgically via placement of total extraperitoneal endoscopic polypropylene mesh behind the injured groin area. Prior to treatment, gynecologist and a general surgeon evaluation were conducted including ultrasound imaging and endoscopic studies (usually sigmoidoscopy) were performed if necessary. Pelvic radiographs and MRI were obtained in all patients to rule out musculoskeletal abnormalities. The presence of preoperative bone marrow edema (BME) at the pubic symphysis seen on MRI was graded from 0 to 3 and correlated with pain scores after surgery. After 1 year, surgical outcomes were excellent or good in 47% of women.

In a systematic review, de Sa et al. (2016) identified 73 articles, with data from 4655 patients with athletic groin pain. Over 80% (3895/4656) of the causes of groin pain requiring surgery in athletes was attributed to one of five gross etiologies: femoroacetabular impingement (FAI) (32%), athletic pubalgia (24%), adductor related pathology (12%), inguinal pathology (10%) and labral pathology (5%), with 35% of this labral pathology specifically attributed to FAI. The two most common imaging modalities used to diagnose groin pain in the athlete were: (1) MRI at 40% (1870/4655), with 8% (145/1870) specifically using an arthrogram; and (2) plain radiograph at 33% (1545/4655), with 51% (795/1545) of studies not reporting the specific views used. Intra-articular causes (ie, FAI and labral) were almost exclusively treated with arthroscopic procedures, whereas extra-articular causes (ie, athletic pubalgia and adductor-related) were almost exclusively treated with open or miniopen/percutaneous surgical procedures. Athletic pubalgia was treated with open surgical procedures 70% of the time (786/1122), with 61% (482/786) of those procedures using mesh reinforcement.

Limitations within the review and literature included incomplete and/or inadequate reporting across the individual studies included, and a lack of consistency in the included literature on nomenclature (often resulting in nonspecific and broad terminology) and diagnostic criteria for such pathology. The authors noted an additional limitation of this review stems from the inclusion of mostly case series, which precludes drawing inferences to the larger population of athletes with groin pain requiring surgery. Return to sport rates as an outcome was not reported, as there were too many potential biases in the reporting of these that would not accurately reflect true return to play seen in practice.

Santilli et al (2015) retrospectively reported on the outcomes of pain control and return to sports following laparoscopic surgery. Of a total of 1450 athletes referred to the sports center, 590 of them were diagnosed through physical examination and ultrasound with sports hernias. The author reported finding 84 sport hernias in 769 patients with previous diagnosis of adductor muscle strain (10.92 %); on the other hand, in 127 (21.52 %) of patients with sport hernias US detected concomitant injuries of the adductor longus tendon, seven of which merited additional surgical maneuvers (partial tenotomy). All had experienced long term chronic pain of the inguino-crural region or pubalgia. Conservative treatments were tried out (in 529 cases physical therapy and in 40 physical therapy plus infiltration with local anesthetics and corticosteroids), without obtaining response or with transient improvement followed by recurrence of pain upon restarting sports activity. Laparoscopic transabdominal preperitoneal (TAPP) approach was performed. Postoperative contact (personal and telephone interviews) was maintained up to 36 months in 299 patients (50.67 %). Compared with the findings of laparoscopy, ultrasound had a sensitivity of 95.42 % and a specificity of 100 %; the positive and negative predictive values were 100 and 99.4 % respectively. No postoperative complications were reported. Only seven

patients suffered recurrence of pain (successful rate: 98.81 %). A total of 583 patients resumed sport activity within 30 days of the procedure. The authors concluded that a multidisciplinary approach in which patients are initially evaluated by orthopedic surgeons in order to discard the most common causes of 'pubalgia' is recommended. They note that sports hernias are often associated with adductor muscle strains and other injuries.

Paajanen et al. (2011) conducted a randomized controlled trial on 60 athletes with groin symptoms that had persisted for 3-6 months in order to compare the efficacy of surgery with insertion of polypropylene mesh to non-operative treatment. The diagnosis of groin pain was based on patient history, physical examination, and radiologic imaging studies. Paajanen et al. stated the patients had chronic groin pain and suspected sportsman's hernia, noting common causes for chronic groin pain include adductor tendinitis and musculus rectus abdominis tendopathy, osteitis pubis, or disruption of the posterior wall of inguinal canal, which are all different forms of athletic pubalgia. Paajanen et al. also stated sportsman's hernia (also called 'athletic pubalgia') is a deficiency of the posterior wall of the inguinal canal, which is often repaired by laparoscopic mesh placement. In this study, no participants were lost during the 12 months of follow-up. The athletes were randomized either to undergo operation or start an active physical therapy for two months. Patients in the latter (non-operative) group were then encouraged to gradually begin their sports activity. If groin symptoms persisted and the patient was motivated to operative treatment, operative therapy was offered after three months of conservative therapy. Operative treatment was performed by endoscopic, total extraperitoneal (TEP) mesh placement behind the pubic bone and/or posterior wall of the inguinal canal. Of the 30 athletes who underwent operation, 27 (90%) returned to sports activities after three months of convalescence compared to 8 (27%) of the 30 athletes in the non-operative group ($p < .0001$). Of the 30 athletes in the conservatively treated group, seven (23 %) underwent operation later because of persistent groin pain. Although this small trial indicated that the endoscopic placement of retropubic mesh was more efficient than conservative therapy for the treatment of sportsman's hernia (athletic pubalgia), additional larger, well-designed trials are needed.

In a non-comparison trial, van Veen et al. (2007) prospectively studied 55 athletes with undiagnosed chronic groin pain to report return to sport outcomes after undergoing surgery. van Veen et al. stated Gilmore's groin, incipient hernia, occult hernia, athletic pubalgia, sports hernia, sportsman's hernia, groin disruption, and conjoint tendon injury can best be described as incompetent abdominal wall musculature in the absence of a clinically detectable hernia (bulge). van Venn et al. also stated sportman's hernia is characterized by insidious-onset, gradually worsening, diffuse groin pain. It may radiate along the inguinal ligament, perineum, and rectus muscles. Radiation of pain across the midline, down the inside of the thigh into the adductor area, and into the scrotum and testicles is present in about 30% of symptomatic patients. In this prospective study, the pain existed for at least three months and did not respond to conservative therapy such as prolonged rest, physiotherapy, and adequate pain medication. All the patients underwent an endoscopic TEP mesh placement. During the procedure, the incipient hernia or sportsman's hernia was diagnosed 15 times (27%) on the right side, 12 times (22%) on the left side, and nine times (16%) bilaterally. Inguinal hernia was found in 20 patients (36%). Within 6-8 weeks, 48 of the patients (88%) returned to normal sports activities without groin pain. The authors propose that if no clear pathology is identified, reinforcement of the wall using a mesh offers good clinical results for athletes with idiopathic groin pain. This prospective study was not comparative, and reported diagnosing sports hernia during the repair surgery.

Professional Societies/Organizations

The American Academy of Orthopaedic Surgeons has no published guidelines or position statements that address surgical treatment for athletic pubalgia.

Use Outside of the US

European Association of Endoscopic Surgery (EAES): The EAES Consensus Development Conference (Poelman et al., 2013) listed these Endoscopic Repair of Sportsman's Hernia Statements:

- A multidisciplinary team should evaluate possible sportsman's hernia in order to exclude other causes of groin pain such as lumbar spine problem (compression syndrome, herniated lumbar disc), leg length differences, tendinitis of the adductor muscle, osteitis pubis, or prostatitis. MRI is the preferred imaging modality. (LoE: 5, expert opinion)

- Endoscopic placement of a mesh in the groin is effective in athletes with a sportsman's hernia. (LoE: 1b, Individual RCT)

Medicare Coverage Determinations

	Contractor	Policy Name/Number	Revision Effective Date
NCD		No National Coverage Determination found	
LCD		No Local Coverage Determination found	

Note: Please review the current Medicare Policy for the most up-to-date information.

Coding/Billing Information

- Note:** 1) This list of codes may not be all-inclusive.
 2) Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Considered Experimental/Investigational/Unproven when used to report athletic pubalgia (sports hernia) surgery:

CPT®* Codes	Description
27299	Unlisted procedure, pelvis or hip joint
49659	Unlisted laparoscopy procedure, hernioplasty, herniorrhaphy, herniotomy
49999	Unlisted procedure, abdomen, peritoneum and omentum

*Current Procedural Terminology (CPT®) ©2020 American Medical Association: Chicago, IL.

References

1. American Academy of Orthopaedic Surgeons (AAOS). Sports hernia (athletic pubalgia). Last reviewed June 2017. Accessed April 2021. Available at URL address: <https://orthoinfo.aaos.org/en/diseases--conditions/sports-hernia-athletic-pubalgia>
2. Brooks DC. Sports-related groin pain or 'sports hernia'. In: UpToDate, Fields KB, Rosen M (Ed), UpToDate, Waltham, MA. Literature review current through: Mar 2021. Topic last updated: Sep 08, 2020.
3. de Sa D, Hölmich P, Phillips M, Heaven S, Simunovic N, et al. Athletic groin pain: a systematic review of surgical diagnoses, investigations and treatment. *Br J Sports Med.* 2016 Oct;50(19):1181-6.
4. Gamborg S, Öberg S, Rosenberg J. Characteristics of groin hernia repair in patients without a groin hernia: a nationwide cohort study. *Hernia.* 2020 Feb;24(1):115-120.
5. Garvey JF, Hazard H. Sports hernia or groin disruption injury? Chronic athletic groin pain: a retrospective study of 100 patients with long-term follow-up. *Hernia.* 2014;18(6):815-823.
6. Gerhardt M, Christiansen J, Sherman B, Miranda A, Hutchinson W, Chahla J. Outcomes following surgical management of inguinal-related groin pain in athletes: a case series. *J Hip Preserv Surg.* 2020 Jan 22;7(1):103-108.
7. Hammoud S, Bedi A, Magennis E, Meyers WC, Kelly BT. High incidence of athletic pubalgia symptoms in professional athletes with symptomatic femoroacetabular impingement. *Arthroscopy.* 2012 Oct;28(10):1388-95.

8. Jørgensen SG, Öberg S, Rosenberg J. Treatment of longstanding groin pain: a systematic review. *Hernia*. 2019 Dec;23(6):1035-1044.
9. Kajetanek C, Benoît O, Granger B, Menegaux F, Chereau N, et al. Athletic pubalgia: Return to play after targeted surgery. *Orthop Traumatol Surg Res*. 2018 Jun;104(4):469-472.
10. Kraeutler MJ, Mei-Dan O, Belk JW, Larson CM, Talishinskiy T, Scillia AJ. A Systematic Review Demonstrates High Variation of Terminology, Surgical Techniques, Preoperative Diagnostic Measures, and Geographic Differences in the Treatment of Athletic Pubalgia/Sports Hernia/Core Muscle Injury/Inguinal Disruption. *Arthroscopy*. 2021 Apr 9:S0749-8063(21)00288-7.
11. Matikainen M, Hermunen H, Paajanen H. Athletic Pubalgia in Females: Predictive Value of MRI in Outcomes of Endoscopic Surgery. *Orthop J Sports Med*. 2017 Aug 3;5(8):2325967117720171.
12. Paajanen H, Brinck T, Hermunen H, Airo I. Laparoscopic surgery for chronic groin pain in athletes is more effective than nonoperative treatment: a randomized clinical trial with magnetic resonance imaging of 60 patients with sportsman's hernia (athletic pubalgia). *Surgery*. 2011 Jul;150(1):99-107.
13. Paajanen H, Montgomery A, Simon T, Sheen AJ. Systematic review: laparoscopic treatment of long-standing groin pain in athletes. *Br J Sports Med*. 2015;49(12):814-818.
14. Poelman MM, van den Heuvel B, Deelder JD, et al. EAES Consensus Development Conference on endoscopic repair of groin hernias. *Surg Endosc*. 2013;27(10):3505-3519.
15. Pokorny H, Resinger C, Fischer I, Lorenz V, Noske H, Podar S, et al. Fast Early Recovery After Transabdominal Preperitoneal Repair in Athletes with Sportsman's Groin: A Prospective Clinical Cohort Study. *J Laparoendosc Adv Surg Tech A*. 2017 Mar;27(3):272-276.
16. Roos MM, Bakker WJ, Goedhart EA, Verleisdonk EJ, Clevers GJ, Voorbrood CE, et al. Athletes with inguinal disruption benefit from endoscopic totally extraperitoneal (TEP) repair. *Hernia*. 2018 Jun;22(3):517-524.
17. Ross JR, Stone RM, Larson CM. Core muscle injury/sports hernia/athletic pubalgia, and femoroacetabular impingement. *Sports Med Arthrosc*. 2015;23(4):213-220.
18. Rossidis G, Perry A, Abbas H. Laparoscopic hernia repair with adductor tenotomy for athletic pubalgia: an established procedure for an obscure entity. *Surg Endosc*. 2015 Feb;29(2):381-6.
19. Santilli OL, Nardelli N, Santilli HA, Tripoloni DE. Sports hernias: experience in a sports medicine center. *Hernia*. 2016 Feb;20(1):77-84.
20. Serner A, van Eijck CH, Beumer BR, Hölmich P, Weir A. et al. Study quality on groin injury management remains low: a systematic review on treatment of groin pain in athletes. *Br J Sports Med* 2015;49:813.
21. Sheen AJ, Montgomery A, Simon T, Ilves I, Paajanen H. Randomized clinical trial of open suture repair versus totally extraperitoneal repair for treatment of sportsman's hernia. *Br J Surg*. 2019 Jun;106(7):837-844.
22. Srinivasan A, Schuricht A. Long-term follow-up of laparoscopic preperitoneal hernia repair in professional athletes. *J Laparoendosc Adv Surg Tech A*. 2002;12(2):101-106.
23. Strosberg DS, Ellis TJ, Renton DB. The Role of Femoroacetabular Impingement in Core Muscle Injury/Athletic Pubalgia: Diagnosis and Management. *Front Surg*. 2016 Feb 12;3:6.

24. van Veen RN, de Baat P, Heijboer MP, Kazemier G, Punt BJ, et al. Successful endoscopic treatment of chronic groin pain in athletes. *Surg Endosc.* 2007 Feb;21(2):189-93.
25. Zoland MP, Maeder ME, Iraci JC, Klein DA. Referral Patterns for Chronic Groin Pain and Athletic Pubalgia/ Sports Hernia: Magnetic Resonance Imaging Findings, Treatment, and Outcomes. *Am J Orthop (Belle Mead NJ).* 2017 Jul/Aug;46(4):E251-E256.
26. Zoland MP, Iraci JC, Bharam S, Waldman LE, Koulotouros JP, et al. Sports Hernia/Athletic Pubalgia Among Women. *Orthop J Sports Med.* 2018 Sep 14;6(9):2325967118796494. eCollection 2018 Sep.
27. Zuckerbraun BS, Cyr AR, Mauro CS. Groin Pain Syndrome Known as Sports Hernia: A Review. *JAMA Surg.* 2020 Apr 1;155(4):340-348

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