

Sports Hernia/Athletic Pubalgia Among Women

Mark P. Zoland,^{*†} MD, Joseph C. Iraci,[†] MD, Srino Bharam,[‡] MD, Leah E. Waldman,[§] MD, John P. Kouloutouros,^{||} BA, and Devon Klein,[§] MD, MPH

Investigation performed at Lenox Hill Hospital of Northwell Health, New York, New York, USA

Background: “Athletic pubalgia,” a term that has gained acceptance over “sports hernia,” is more common in men than women; however, it represents a significant source of morbidity for patients of both sexes. Inconsistent terminology surrounding this entity poses a diagnostic challenge and makes studying the populations at risk difficult.

Purpose: To review a case series of women with athletic pubalgia by analyzing their presentations, concomitant pathologies, and surgical outcomes.

Study Design: Case series; Level of evidence, 4.

Methods: Between 2013 and 2016, 197 patients were seen and evaluated for the diagnosis of athletic pubalgia. Eighteen patients seen during this time were women. All patients received “pubalgia protocol” magnetic resonance imaging and subsequent surgical intervention for their pathologies. Outcomes among 17 women were assessed with a patient questionnaire >1 year after surgery.

Results: Of the 17 women, 9 had rectus aponeurotic plate injury only, or pure athletic pubalgia; the remaining 8 had athletic pubalgia in combination with ≥ 1 inguinal, obturator, and femoral hernias. Regarding female patients in both groups, 88.2% reported that the surgery was a success at follow-up.

Conclusion: Surgical repair of athletic pubalgia among women is successful in dramatically reducing pain levels in this important subset of patients.

Keywords: athletic pubalgia; groin pain; pelvic pain; aponeurotic plate injury; sports hernia

Athletic pubalgia among women is infrequently addressed in the literature. Variable terminology and the multiplicity of names and definitions for the actual injury have made pathologic identification a challenge. Recent meetings on

the subject attempted to create more consistently definable entities. To this end, soft tissue injuries at the pubis and inguinal canal are categorized according to orthopaedic, gynecologic, and urologic etiologies.¹⁸ By all accounts, female sex accounts for the minority of pubalgia injuries, appearing to make up only 5% to 15% of the injured population.⁶ Despite the lower relative incidence in this population, diagnosis and treatment appear to be on the rise. Additionally, acute injury and time away from sport appear similar between female and male patients with groin injury.⁹ The purpose of this study was to review our case series of women with athletic pubalgia by analyzing their presentations, concomitant pathologies, and surgical outcomes.

METHODS

Institutional review board approval was obtained for the study of these patients. Referrals to our tertiary practice typically originate from the primary care physician or another specialist who evaluated the patient. Most elite athletes are referred by their orthopaedic surgeon, physiatrist, physical therapist, or trainer. Other patients are referred by their gynecologist or pelvic pain specialist.

Based on a prior protocol,¹⁹ the algorithm that we employ begins by providing our patients with a questionnaire that

*Address correspondence to Mark P. Zoland, MD, Department of General Surgery, Lenox Hill Hospital of Northwell Health, 122 E 76th St, Suite 1B, New York, NY 10021, USA (email: markzoland@gmail.com).

†Department of General Surgery, Lenox Hill Hospital of Northwell Health, New York, New York, USA.

‡Department of Orthopedic Surgery, Lenox Hill Hospital of Northwell Health, New York, New York, USA.

§Department of Radiology, Lenox Hill Hospital of Northwell Health, New York, New York, USA.

||Columbia University, New York, New York, USA.

One or more of the authors has declared the following potential conflict of interest or source of funding: S.B. has received educational funding from Pivot Medical and Arthrex and is a consultant for Smith & Nephew. D.K. received compensation from Lilly USA for participating on the Lilly Osteoporosis Advisory Board. AOSM checks author disclosures against the Open Payments Database (OPD). AOSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Ethical approval for this study was obtained from Northwell Health (FWA 00002505).

The Orthopaedic Journal of Sports Medicine, 6(9), 2325967118796494

DOI: 10.1177/2325967118796494

© The Author(s) 2018

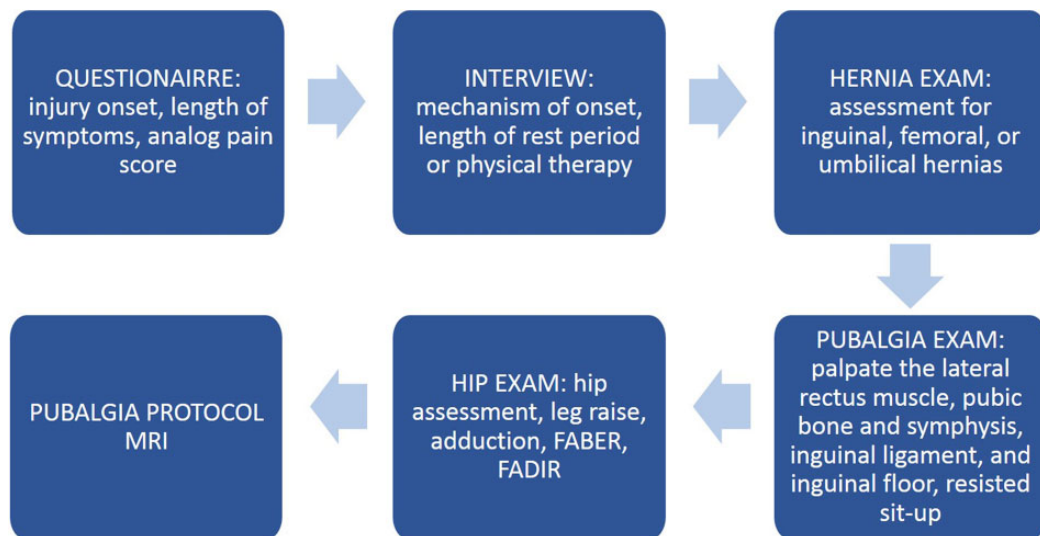


Figure 1. Algorithm for the evaluation of patients presenting with groin pain. FABER, flexion, abduction, and external rotation; FADIR, flexion, adduction, and internal rotation; MRI, magnetic resonance imaging.

queries the length of symptoms and the current mean pain level on a scale of 0 to 10 (worst pain). The patients are then interviewed and examined. The initial interview directs attention to injury onset, mechanism of onset, and length of rest period or physical therapy. Initial examination consists of hernia assessment. This portion of the examination may be more difficult for the female patient,¹¹ as the scrotum in the male can be invaginated and used to palpate the structures more directly. Pubalgia examination is then performed, followed by a hip examination. Figure 1 outlines the algorithm. Depending on the acuity of the injury, pain may not be elicited during the examination. Alternatively, the patient may complain of pain during sport or activity and at times may describe pain as occurring only immediately after the activity or the next day.

All patients receive “pubalgia protocol” magnetic resonance imaging (MRI) designed to detect pathology of the pubic symphysis, hips, and inguinal canals. This includes axial single-shot fast-spin echo imaging without and with Valsalva maneuver, which increases the sensitivity for detecting abdominal wall deficiencies, such as an attenuated transversalis fascia with bulging of the preperitoneal fat—a finding that is consistent with the diagnosis of “Gilmore’s groin” as described in 1991.⁸ Specific low-echo time sequencing with proton density and T1 axial, sagittal, and coronal images are used to identify femoral and obturator hernias. Additional T2 fat-suppressed sequences with thin sections through the pubic symphysis are obtained to increase the visual conspicuity of injury at the prepubic aponeurotic complex or rectus aponeurotic plate.^{2,5,7} Trauma at the pubic aponeurotic plate has been distinguished as a separate injury within the past decade and has been a contributing element in the diagnosis of “athletic pubalgia,” which was first described in Europe and subsequently referenced by Brunet et al in 1984.³ Figure 2 illustrates the typical findings of a “secondary cleft sign” and bone marrow edema, which are hallmarks of this injury and

are distinguished from other findings seen more laterally within the inguinal canal.^{1,14} Finally, the pubalgia protocol MRI enables an initial assessment of the hips and the iliopsoas tendons, as these can be concomitant pathologies that may contribute to groin pain.^{12,15}

Between 2013 and 2016, our practice evaluated 197 patients with groin pain. Patients were excluded from the study if they did not have 1 of the following MRI findings: rectus aponeurotic plate injury (athletic pubalgia), attenuated transversalis fascia (Gilmore’s groin), or adductor longus tendinopathy. Eighteen women met these criteria. One of the 18 was lost to follow-up after surgery, as she was an undercover agent in the field during the data collection phase of the study. The remaining 17 women were surveyed at a minimum follow-up of 1 year after treatment.

RESULTS

Of the 17 patients evaluated, the most common symptoms were lower abdominal pain, pelvic or pubic burning sensation, and adductor pulling or pain. The mean \pm SD length of symptoms prior to evaluation was 2.7 ± 2.7 years (range, 1-12 years). The age range spanned from 17 to 64 years, with a mean of 41.4 ± 15.5 years. Nine patients (52.9%) had rectus aponeurotic plate injury only, or pure athletic pubalgia. The remaining 8 (47.1%) had a combination of aponeurotic plate injury and ≥ 1 inguinal, obturator, and femoral hernias. All surgical procedures were performed in accordance with MRI findings. Pubalgia was addressed with open repair while hernias were addressed with open repair if possible, or laparoscopic approach when needed. The mean pain level prior to surgery for all patients was 7.82 ± 1.7 (range, 3-10). Patients with pure athletic pubalgia had a mean pain level of 7.94 ± 1.3 . After surgery, the mean was 1.76 ± 2.3 (range, 0-7) for all patients and 0.56 ± 0.8 for those with pure

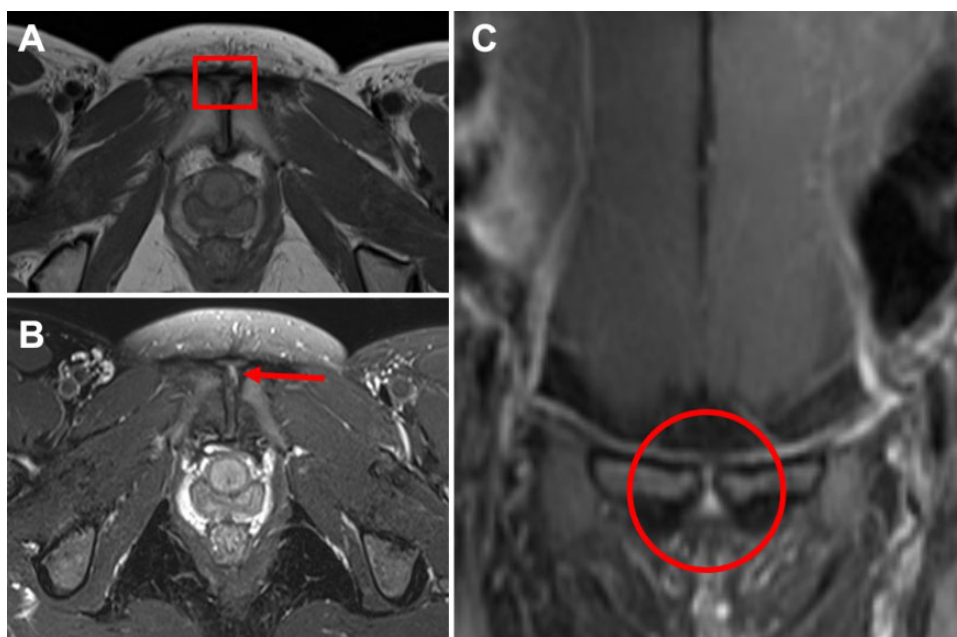


Figure 2. (A) An axial proton density image showing increased signal at the central aponeurotic plate consistent with injury (rectangle). (B) An axial T2-weighted fat-saturated image showing abnormal fluid-like signal lateral to the pubic symphysis, an example of the secondary cleft sign (arrow). (C) A coronal short tau inversion recovery image showing fluid-like signal in the central anterior symphysis (circle).

TABLE 1
Pubalgia Among Female Patients^a

Patient	Age, y	Duration of Symptoms, y	Pain Level ^b		Surgical Repair	Time to Follow-up, y
			Before	After		
1	43	1	10	1.5	Pure pubalgia	1.1
2	21	2	10	0	Pure pubalgia	3
3	48	0.58	7	2	Pure pubalgia	3
4	41	2	7	0	Pure pubalgia	2
5	45	3	8	0	Pure pubalgia	3
6	64	12	8	1	Pure pubalgia	4
7	17	1	6.5	0	Pure pubalgia	1.5
8	21	2.4	7	0	Pure pubalgia	2
9	25	5	8	0.5	Pure pubalgia	2
10	61	1	8.5	4	Pubalgia repair + R inguinal, obturator, femoral hernias	3
11	44	1	8	2.5	Pubalgia repair + BL inguinofemoral, L obturator, umbilical hernias	2
12	30	4	10	1	Pubalgia repair + L inguinal hernia	1.5
13	43	2	7	7	Pubalgia repair + R inguinal and femoral hernias	2
14	60	2	7	0	Pubalgia repair + BL inguinal hernias	1.25
15	59	3	3	0.5	Pubalgia repair + BL inguinal and BL femoral hernias	3
16	55	2	10	7	Pubalgia repair + BL inguinal, L femoral hernias	1.25
17	27	1.25	8	3	Pubalgia repair + BL inguinal, R femoral hernias	2

^aBL, bilateral; L, left; R, right.

^b0 = least pain, 10 = worst pain.

athletic pubalgia. When asked whether surgery was successful, 88.2% of patients responded positively. Of the group with pure athletic pubalgia, 89% responded positively. Table 1 summarizes our results.

DISCUSSION

To our knowledge, a study devoted to female groin pain in the realm of the sports hernia/athletic pubalgia diagnosis has not been published. Despite the lower incidence of the

injury in the female population, it is not insignificant. Additionally, sex-specific study is important in this area, as the anatomy of the anterior pelvis is distinctly different in the female patient.⁴ In fact, studies to date have cited locomotion and strain forces in women that appear to differ from their male counterparts.¹⁷ How the female pelvis and its structural soft tissue attachments react, whether different from or the same as the male pelvis, is worth understanding. Consequently, injury patterns among women bear a closer look.

Of note, female patients referred to our practice are mostly from 2 sources. The first is similar to the high-performance male athlete referrals, who are usually sent from a trainer, physical therapist, or orthopaedic surgeon. As female athletics has grown dramatically, the scope of the female injury profile has expanded as well.¹⁰ The requisite increase of chronic groin pain seen in the female high school, collegiate, and professional athlete is expected.

The second pathway of female patient referral is through a gynecologist or pelvic pain specialist. This is not surprising, as pelvic pain issues often overlap with chronic groin pain and can be traced in full or in part to lower abdominal wall and pelvic floor hernias, such as inguinal, femoral, or obturator types.¹⁶ Therefore, the patient who was sent for chronic groin pain without concern for athletic pubalgia may ultimately receive this diagnosis per the MRI. Moreover, as seen in this study, the 2 diagnoses are not mutually exclusive. Of note, the correlate male diagnosis would be pelvic floor dysfunction and/or a urologic diagnosis, such as chronic prostatitis.¹³

Several findings in the study are worth noting. First, female patients represented only 8.6% of the total population, which is consistent with prior studies.⁶ Despite this, the present data suggest that findings such as mean age, pain levels, symptoms, and surgical results in the female population are similar to those of the overall population.¹⁹ This is especially important with regard to surgical recommendation. Women with the clinical syndrome and radiologic diagnosis of athletic pubalgia who have not responded to rest and physical therapy have a surgical success rate (89%) similar to that of their male counterparts.¹⁹

Second, one of the more commonly seen symptoms in the female population is a burning sensation at the pubis. In our experience and prior study,¹⁹ this symptom is not as frequent among male patients. The anatomic difference of a spermatic cord in males versus a round ligament in females may play a role, as the genital and ilioinguinal nerves that run along these structures may be affected differently. Alternatively, the anatomically dissimilar bony pelvis and consequent difference in force vectors may play a role. At this time, the reasons are still unclear.

Third, the finding of concomitant hernias seen in almost half (47%) of the female patients is higher than that in the combined population (35%).¹⁹ The reasons why women have a higher incidence of hernias is unknown, but they may again be due to differential anatomy as noted earlier. While a larger internal ring is not likely, a larger femoral and/or obturator canal may very well be the cause.

Finally, the case that sports hernia/athletic pubalgia is an injury of the high-performance athlete is not supported by this study. Of the 17 women with rectus aponeurotic

plate injury, 12 (70%) were high-performance recreational, college, or professional athletes. One-third of the patients were lower-level recreational athletes or even nonathletes. Yet pain levels, results, and perceived success rates were similar in both groups.

There are several limitations to this study. First, the number of studied patients was small. This was a direct result of the available population and the lower number of female patients who present with this injury. Second, the studied population consisted of mixed diagnoses, with only 9 patients having pure athletic pubalgia, which similarly is a consequence of the characteristics of patients presenting to our practice. As knowledge of this entity continues to grow, a larger, prospective study examining surgical outcomes is the logical next step. Finally, this study did not evaluate the female patients diagnosed with athletic pubalgia who were not referred for surgery. In our previously published examination of male patients, we found that 40% with acute injury (within a 6-month time frame) had successful outcomes when treated conservatively.¹⁹ Further research to include nonsurgically treated patients may be of value.

CONCLUSION

To our knowledge, this is the first study devoted to the study of athletic pubalgia in the female population. Despite some notable differences, female patients have similar characteristics, presentations, and surgical outcomes to their male counterparts.¹⁹ We conclude that surgical repair of athletic pubalgia in women is successful in significantly reducing pain levels in this important subset of patients.

REFERENCES

1. Albers SL, Spritzer CE, Garrett WE Jr, Meyers WC. MR findings in athletes with pubalgia. *Skeletal Radiol*. 2001;30(5):270-277.
2. Brennan D, O'Connell MJ, Ryan M, et al. Secondary cleft sign as a marker of injury in athletes with groin pain: MR image appearance and interpretation. *Radiology*. 2005;235(1):162-167.
3. Brunet B, Brunet-Geudj E, Genety J. La pubalgie: syndrome "fourretout" pour une plus grande rigueur diagnostique et therapeutique. *Intantanes Medicaux*. 1984;55:25-30.
4. Dwyer MK, Boudreau SN, Mattacola CG, Uhl TL, Lattermann C. Comparison of lower extremity kinematics and hip muscle activation during rehabilitation tasks between sexes. *J Athl Train*. 2010;45(2):181-190.
5. Gamble JG, Simmons SC, Freedman M. The symphysis pubis: anatomic and pathologic considerations. *Clin Orthop Relat Res*. 1986; 203:261-272.
6. Garvey JFW, Read JW, Turner A. Sportsman hernia: what can we do? *Hernia*. 2010;14(1):17-25.
7. Gibbon WW, Hession PR. Diseases of the pubis and pubic symphysis: MR imaging appearances. *AJR Am J Roentgenol*. 1997;169(3): 849-853.
8. Gilmore OJ. Gilmore's groin: ten years experience of groin disruption—a previously unsolved problem in sportsmen. *Sports Med Soft Tissue Trauma*. 1991;1(3):12-14.
9. Harøy J, Clarsen B, Thorborg K, Hölmich P, Bahr R, Andersen TE. Groin problems in male soccer players are more common than previously reported. *Am J Sports Med*. 2017;45(6):1304-1308.
10. Hillbrand MJ, Hammoud S, Bishop M, Woods D, Fredrick RW, Dodson CC. Common injuries and ailments of the female athlete: pathophysiology, treatment and prevention. *Phys Sportsmed*. 2015;43(4): 403-411.

11. Koch A, Edwards A, Haapaniemi S, Nordin P, Kald A. Prospective evaluation of 6895 groin hernia repairs in women. *Br J Surg*. 2005; 92(12):1553-1558.
12. Meyers WC, McKechnie A, Philippon MJ, Horner MA, Zoga AC, Devon ON. Experience with "athletic pubalgia" spanning two decades. *Ann Surg*. 2008;248(4):656-665.
13. Nickel JC. Is chronic prostatitis/chronic pelvic pain syndrome an infectious disease of the prostate? *Investig Clin Urol*. 2017;58(3):149-151.
14. Omar IM, Zoga AC, Kavanagh EC, et al. Athletic pubalgia and "athletic pubalgia": optimal MR imaging technique and findings. *Radio-graphics*. 2008;28(5):1415-1438.
15. Ross JR, Stone RM, Larson CM. Core muscle injury/athletic pubalgia/athletic pubalgia, and femoroacetabular impingement. *Sports Med Arthrosc*. 2015;23(4):213-220.
16. Salnikova LE, Khadzhieva MB, Kolobkov DS. Biological findings from the PheWAS catalog: focus on connective tissue-related disorders (pelvic floor dysfunction, abdominal hernia, varicose veins and hemorrhoids). *Hum Genet*. 2016;135(7):779-795.
17. Wall-Scheffler CM, Myers MJ. The biomechanical and energetic advantages of a mediolaterally wide pelvis in women. *Anat Rec (Hoboken)*. 2017;300(4):764-775.
18. Weir A, Brukner P, Delahunt E, et al. Doha agreement meeting on terminology and definitions in groin pain in athletes. *Br J Sports Med*. 2015;49(12):768-774.
19. Zoland MP, Maeder ME, Iraci JC, Klein DA. Referral patterns for chronic groin pain and athletic pubalgia/athletic pubalgia: magnetic resonance imaging findings, treatment, and outcomes. *Am J Orthop*. 2017;46(4):e251-e256.