

Sports Hernia: An Overview for the Healthcare Provider of Active Populations

Introduction:

Musculoskeletal pathology of the groin is a particularly complicated matter given the complexity of the region's anatomy and the lexicon that is often used to describe pathology in this region. Sports hernia represents one such pathology of the groin region, and, given its prevalence among active individuals, an understanding of its clinical management is integral for the healthcare professional seeking to return these patients back to their prior level of activity. Sports hernia has been used interchangeably with terms such as sportsman's hernia, athletic pubalgia, Gilmore's groin, conjoined tendon lesions, posterior abdominal wall deficiency, pubic inguinal pain syndrome, gracilis syndrome, inguinal canal lesions, hockey groin, footballers groin, incipient hernia, and occult hernia.¹⁻⁵ One systematic review evaluating the most effective treatment of groin pain in athletes found that sportsman's hernia was the most prevalent diagnosis out of 33 different diagnoses that were used to describe groin pain.⁶ Diagnosing sports hernia, however, can pose a challenge for the healthcare professional, as patients do not usually present with the palpable bulge that is characteristic of a true hernia.^{1,7} Furthermore, there are many other pathologies that can afflict the groin region, making it difficult to discern sports hernia from other potential diagnoses. Upon reaching a diagnosis of sports hernia, a careful consideration of various intervention options is necessary to achieve an optimal outcome. This overview of sports hernia will summarize the anatomy of the groin and the sports hernia injury, describe the clinical presentation and differential diagnosis of the condition, and conclude with a summary of the evidenced-based interventions that have shown to be effective.

Anatomy:

The anatomy of the groin region consists of a bony pelvis that serves as a basin for the

pelvic viscera as well as an attachment site for many musculoskeletal tissues. The vast number of tissues that are located in and around the groin is one reason why diagnosing pathology in this region is so challenging. The challenge of diagnosing groin pathology has even resulted in the groin being called the “Bermuda triangle of sports medicine.”⁸ Representing the groin as a triangle, though in a more literal sense, may also help clinicians identify various sources of chronic groin pain.⁹ Falvey and colleagues describe a “groin triangle” that serves to orient clinicians to the location of various tissues.⁹ The superior border of the triangle extends from the pubic tubercle to the anterior superior iliac spine (ASIS), which corresponds to the approximate location of the inguinal ligament.⁹ Just superior to this border are the muscles of the abdomen: the rectus abdominis, the internal and external obliques, and the transversus abdominis. These muscles converge to insert onto the pubic bone.⁹ Just lateral to this insertion site lies the superficial inguinal ring and conjoint tendon. The conjoint tendon represents the convergence of fascia from the internal oblique and transversus abdominis muscles and serves as the posterior wall of the inguinal canal.⁹ Continuing to trace the superior border of the groin triangle from medial to lateral reveals the conjoint tendon of the iliospoas passing underneath the lateral third of the inguinal ligament.⁹ In addition to musculoskeletal tissues, the ilioinguinal nerve, iliohypogastric nerve, and genital branch of the genitofemoral nerve are also located in this region.⁹

The lateral border of the groin triangle extends from the ASIS to a point halfway between the ASIS and the superior pole of the patella.⁹ Lastly, the medial border is formed by connecting the medial margin of the superior border to the distal margin of the lateral border. This line separates the adductors of the hip, which are located medially, from the iliospoas, rectus femoris, and femoral canal, which are located inside the triangle.⁹

The specific tissues involved in a sports hernia injury have not been consistently described in the literature. This is largely a reflection of the poor consensus regarding naming conventions and terminology. While some authors have restricted their definition of sports hernia to a deficiency in the posterior wall of the inguinal canal,^{3,10} others have been less specific, using the term interchangeably with athletic pubalgia to describe a variety of pathologies causing pain in the groin or lower abdomen.^{5,11} Utilizing the more strict definition of sports hernia, Orchard and colleagues used ultrasound imaging to view the bilateral inguinal canals of 35 professional Australian football players, fourteen of whom were identified as having experienced recent groin pain.¹⁰ Ultrasound imaging revealed inguinal canal posterior wall deficiency in 21 of the 35 subjects and 36 of the 70 inguinal canals that were examined. Among the nine patients who proceeded to have surgery, surgical findings were largely consistent with the ultrasound diagnosis of inguinal canal posterior wall deficiency.¹⁰ In another study, Garvey and Hazard retrospectively examined 100 patients who presented with chronic groin or lower abdominal pain.³ After reviewing various imaging techniques, including radiographs, ultrasound, computed tomography, magnetic resonance imaging, herniography, and bone scan, they identified sixteen cases of sports hernia. In this study, sports hernia was defined as “a presentation of groin pain with an impalpable inguinal bulge demonstrated by diagnostic imaging.”^{3(p816)} This inguinal bulge is the result of a dysfunctional conjoint tendon, which leads to a deficiency in the posterior wall of the inguinal canal.³

Despite the presence of an inguinal bulge with diagnostic imaging, Zoga and colleagues insist that the term *hernia* is used too liberally, given the spectrum of injuries that they identified in a population of patients diagnosed with either athletic pubalgia or sports hernia.¹² Among 102 patients with groin pain who underwent surgical intervention, 91 (89%) had rectus abdominis

injuries at or near the muscle's insertion site, and 74 (73%) patients were identified as having an adductor tendon injury.¹²

Regardless of the definition of sports hernia that is applied, it should be recognized that many pathologies of the groin occur concurrently. Sports hernia has been shown to co-exist with other pathologies such as groin disruption injury, rectus abdominis wasting/asymmetry, traumatic osteitis pubis, and avulsion fracture of the pubic bone, to name a few.³ Additionally, surgical findings of adductor tendon injuries less commonly occurred in isolation and more commonly occurred with rectus abdominis insertion injuries.¹²

Clinical Presentation and Differential Diagnosis:

Sports-related groin injuries account for 2 to 5% of all sports injuries; however, this percentage varies from sport to sport.¹³ Groin injuries most commonly occur in sports and activities that involve a lot of cutting or change of direction, pivoting, rapid lateral movements, and changes in speed.^{5,13} Examples of sports that fit this description include soccer, football, rugby, and ice hockey.^{2,5} Exceptions do exist, however, as long-distance runners have also been identified as athletes that may be disposed to developing sports hernia.² The specific etiology of a sports hernia injury is not completely understood. However, it has been suggested that these injuries may arise from an imbalance of pelvic musculature and/or shearing stress imposed at the pubic symphysis.^{1,7} A comprehensive physical examination may help elucidate any potential causative factors as well as any factors that continue to contribute to the patient's complaint. Furthermore, the physical examination may provide more valuable information than imaging techniques, as many of these techniques often return negative results despite patients' subjective complaints of pain and positive physical examination findings.¹

The five clinical signs and symptoms identified as being most indicative of sports hernia

include: (1) deep groin pain or lower abdominal pain, (2) pain that is aggravated by activity and alleviated with rest, (3) the subjective complaint of tenderness upon palpation of the insertion sites of the rectus abdominis and/or conjoint tendon, (4) pain that is aggravated by resisted hip adduction, and (5) pain that is aggravated by resisted abdominal curl-ups.⁷

The patient presenting to the healthcare provider will typically complain of groin pain that is aggravated by exercise.^{2,5,7} The onset is usually insidious, but there have also been cases in which an acute “tearing” sensation occurred.^{1,2,7} In one case series of three soccer and hockey players, patients reported pain with sprinting, skating, and kicking the soccer ball.¹ Two of the patients also reported pain with coughing and sneezing.¹ Patients described the pain as sharp and also reported “pulling” and “burning” sensations.¹ Prolonged rest typically alleviates the pain, but relief may not occur until several hours after the cessation of activity.¹

Tenderness at the insertion sites of the rectus abdominis and/or conjoint tendon is often indicative of sports hernia.⁷ In one case, tenderness was localized to a small fascial defect or divot within the internal oblique.¹ Nevertheless, other tissues inserting in or around the pubic ramus may also be tender to palpation, such as the adductor longus, adductor brevis, and pectineus muscles.¹

Pain with hip adduction and abdominal curl-ups was found in all three of the patients described by Yuill and colleagues¹ and is consistent with the high prevalence of rectus abdominis and adductor tendon injuries among individuals diagnosed with athletic pubalgia or sports hernia.¹² A comprehensive physical examination should also look for muscle imbalances, hip and lumbar spine range of motion (ROM) limitations, structural malalignments, and leg length discrepancies.^{1,7}

Sources of groin pain are varied and can include extra-articular, intra-articular, and non-

musculoskeletal causes.¹³ Therefore, it is important for the examining clinician to rule in or out any other pathologies that may or may not be blameworthy. Femoroacetabular impingement (FAI) represents one such intra-articular source of groin pain. In fact, it has been postulated that FAI may even be a cause of sports hernia or athletic pubalgia.¹⁴ Birmingham and colleagues tested this hypothesis in a study involving twelve hips from six human cadavers.¹⁴ In this study, the authors simulated a cam-type FAI lesion by placing a dome-shaped wooden button at the junction of the femoral head and neck.¹⁴ A cam-type lesion is defined as an increase in the bony diameter of the femoral head-neck junction.¹⁴ This increased diameter creates a situation that is akin to anatomic femoral retroversion in that the femoral neck impinges upon the acetabular rim earlier on in the internal rotation ROM.¹⁴ Therefore, Birmingham and colleagues were specifically interested in the effect of cam-type lesions on motion at the pubic symphysis during hip internal rotation.¹⁴ By analyzing the hips both with and without the simulated cam lesion, they found that the cam lesion resulted in increased motion at the pubic symphysis compared to the no lesion condition. This difference in motion was statistically significant at higher levels of torque after the point of bony contact.¹⁴ These findings suggest that limited hip internal rotation ROM as caused by a cam-type FAI lesion may result in repetitive loading at the pubic symphysis, which may in turn contribute to the development of athletic pubalgia or sports hernia.¹⁴ With that being said, patients suspected of having a sports hernia should also be suspected of having FAI. Failure to manage both conditions is more likely to result in poorer outcomes.¹⁵

Regardless of the presence of FAI, limited hip ROM is a common clinical finding in individuals with sports hernia.¹⁶ Even after excluding individuals with FAI, Rambani and Hackney found that individuals with sports hernia demonstrated significantly less internal and

external rotation at the hip.¹⁶ The average internal rotation ROM was 17.40 degrees and 40.90 degrees for the sports hernia and control groups, respectively. Similarly, the average external rotation ROM was 26.20 degrees and 45.10 degrees for the sports hernia and control groups, respectively.¹⁶ One year after undergoing reparative surgery, the average internal and external rotation ROM in the sports hernia group improved to 38.20 degrees and 39.40 degrees, respectively.¹⁶

In addition to FAI, other pathologies of the groin region that should be included in the clinician's differential diagnosis include: osteitis pubis, adductor tenoperiostitis, fracture of the femoral neck, pubic symphysis, or pubic ramus, pubic osteomyelitis, acetabular labral derangement, sartorius tendinopathy, Leg-Calve-Perthes disease, slipped capital femoral epiphysis, nerve entrapment, urologic dysfunction, endometriosis, an adnexal mass, and uterine fibroids.^{12,17}

Interventions:

Serner et al performed a systematic review of the literature in an effort to synthesize the best available evidence concerning the treatment of groin pain in athletes.⁶ They found that moderate evidence suggests that surgery results in more optimal outcomes than conservative interventions in athletes with sportsman's hernia.⁶ Of the 72 studies that were included in the review, only four were identified as high quality. However, only one of these high quality studies addressed the management of sportsman's hernia.⁶ This study, a randomized, prospective study by Paajanen and colleagues, included 60 subjects with a history of groin pain persisting for 3 to 6 months.⁴ MRI findings were normal in 23 of the subjects but were abnormal among 35 subjects with pubic bone marrow edema and 15 subjects with increased signal in the adductor region.⁴ Subjects were then randomized into either an operative group or a physiotherapy group (30

subjects per group). The operative group underwent a total extraperitoneal (TEP) mesh placement procedure, in which a light mesh was placed bilaterally to cover both pubic tubercles and both internal rings of the inguinal canal. The mesh was anchored via staples into the conjoint tendon and transversalis fascia.⁴ Patients identified as having adductor tendonitis additionally underwent an open tenotomy procedure under the same anesthesia as the TEP procedure.⁴ Conversely, the physiotherapy group participated in therapy three times per week for 90 minutes per session for a total of eight weeks. Physiotherapy primarily included activities to strengthen and improve the coordination of muscles around the hips, pelvis, and abdomen.⁴ One month after randomization, 20 subjects (67%) in the operative group had returned to full participation in their sport compared to only 6 subjects (20%) in the physiotherapy group. After three months, the number of subjects who had fully returned to sport increased to 27 subjects (90%) in the operative group and 8 subjects (27%) in the physiotherapy group. Finally, after twelve months, 29 subjects (97%) in the operative group and 15 subjects (50%) in the physiotherapy group had fully returned to sport.⁴ Similar trends were observed for pain and patient satisfaction. The operative group reported significantly less pain than the physiotherapy group at every follow-up period from 1 to 12 months. The operative group also reported being more satisfied than the physiotherapy group at 1, 3, and 12 months post-randomization.⁴ By six months, seven of the subjects in the physiotherapy group elected to have the TEP procedure.⁴

Muschaweck and Berger described another surgical technique that has yielded favorable outcomes in individuals with sports hernia.¹⁸ Their Minimal Repair technique differs from the TEP procedure described above in that it does not utilize a prosthetic mesh and it only requires local anesthesia.¹⁸ Instead of reinforcing the posterior wall of the inguinal canal with a prosthetic mesh, the Minimal Repair technique uses sutures to repair the fascial defect in the posterior

wall.^{18,19} The initial results of an ongoing prospective cohort study revealed that as soon as four weeks after surgery 78.9% of patients were completely pain free.¹⁸ In terms of return to sport, professional athletes demonstrated an advantage over non-athletes. Four weeks after surgery, 83.7% of professional athletes had fully returned to sport compared to 59.5% of non-athletes.¹⁸ The Minimal Repair technique has also shown to be superior to another suture repair technique, the modified Bassini technique, in terms of return to sport.¹⁹ The advantage may lie in the fact that the Minimal Repair technique only repairs injured tissue while the modified Bassini technique involves the dissection of healthy tissue as well.¹⁹

In their systematic review of the evidence, Serner et al noted a dearth in the literature regarding conservative treatment protocols for the management of sports hernia.⁶ Nevertheless, conservative intervention is most often recommended as the first line of treatment for this condition.^{1,3,5,7} In the initial stage of treatment, steps should be taken to manage the patient's pain.^{5,20} The patient should receive education regarding activity modification and/or redirection, and various manual therapy techniques may be beneficial at this time.^{1,5,20} As the patient's pain is mitigated, therapeutic interventions should address the other problems and deficits that were identified during the physical examination. Joint mobilizations or manipulations may be indicated in patients that demonstrate joint hypomobility or positional faults of the ilia.⁷ Given the prevalence of hip joint ROM deficits that have been observed in individuals with sports hernia,¹⁶ passive stretching has been suggested to restore hip joint ROM.^{7,20} However, Ross and colleagues caution against attempting to improve ROM, as these attempts may aggravate a hip with FAI or produce movement within pelvic segments that ultimately contributes to the patient's complaint.⁵ Therefore, it is advisable to employ passive stretching with caution and with sound clinical judgment. Strengthening interventions should initially target the muscle

groups around the hips and pelvis, including the rectus abdominis, the internal and external obliques, the transversus abdominis, and the adductors.²⁰ As the patient progresses, more regional and global interventions can be employed that are increasingly more advanced and more sport specific.²⁰ Plyometric training has also been incorporated into the rehabilitation regimen of patients with sports hernia and has demonstrated promising results.¹

To aid clinicians as they choose between conservative versus surgical intervention for their patient with sports hernia, Kachingwe and Grech proposed a decision-making algorithm.⁷ The algorithm is applied to patients who present with the cluster of 5 signs and symptoms of sports hernia that were reported in the *Clinical Presentation and Differential Diagnosis* section of this document. For athletes who report hearing or feeling a “rip” or “tear” at the time of injury but are not scheduled to return to play for at least four months, it is recommended that they undergo an exploratory surgery and repair. For the same athlete who is expected to return to play within the next four months, it is recommended that they first undergo a bout of rehabilitation. For athletes who do not report hearing or feeling a “rip” or “tear” at the time of the injury, it is also recommended that they first try rehabilitation before undergoing surgery. Lastly, for patients who are not high-performance athletes, rehabilitation is the only recommended intervention.⁷

Conclusion:

Sports hernia, a groin injury that goes by many different names, represents one of the many musculoskeletal injuries that plagues active populations. In addition to inconsistent terminology, the literature has been inconsistent in describing the specific tissues implicated in a sports hernia injury. Physical examination is vital to the detection of sports hernia injuries, as imaging results often come back negative.¹ Five clinical signs and symptoms that are indicative of sports hernia include: (1) deep groin pain or lower abdominal pain, (2) pain that is aggravated

by activity and alleviated with rest, (3) the subjective complaint of tenderness upon palpation of the insertion sites of the rectus abdominis and/or conjoint tendon, (4) pain that is aggravated by resisted hip adduction, and (5) pain that is aggravated by resisted abdominal curl-ups.⁷ Although the evidence primarily favors surgical intervention,⁶ conservative treatment has proven successful and is almost always the first line of treatment.^{1,7} FAI and limited hip ROM have been suggested as potential risk factors for developing sports hernia.^{14,16} However, prospective cohort studies are needed to fully elucidate any causal relationships between these proposed risk factors and the development of sports hernia.

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