



PASIG PERFORMING ARTS

SPECIAL INTEREST GROUP



ORTHOPAEDIC SECTION
AMERICAN PHYSICAL THERAPY ASSOCIATION



PASIG MONTHLY CITATION BLAST: No. 116

June 2016

Dear Performing Arts SIG members:

Upcoming Conferences! We look forward to providing more programming at conferences in 2017. Upcoming events for the Orthopaedic Section is CSM 2017 on Feb 15-17 in San Antonio, TX. The 2017 annual conference will be San Diego Hyatt Regency mission bay April 20-22.

Looking for new committee members! There is room for new committee members, and students are welcome to participate. Please refer to the list below for contact information.

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Looking for great residency and fellowship opportunities? See below:

The Harkness Center for Dance Injuries Residency Program is accepting applications for the 2016-2017 year! A WONDERFUL opportunity:

The NYU Langone Medical Center (NYULMC) Harkness Center for Dance Injuries is a clinical site for NYU Steinhardt School of Education's Orthopedic Physical Therapy Residency (ORP). The ORP is a 12-month program that provides the Resident with an intensive, individualized experience in orthopedic physical therapy and dance medicine. The goal of the residency program, which follows the guidelines and accreditation standards of the American Physical Therapy Association (APTA), is to enable the Resident to develop the advanced clinical skills necessary to provide a superior level of patient care. Upon completion of the residency program, the Resident will have gained the knowledge and experience to be a competent advanced practitioner, and be qualified to sit for board certification in Orthopedics (OCS). Please note that all applicants must apply to New York University's Orthopedic Physical Therapy residency program and also be interviewed and accepted by the Harkness Center for Dance Injuries. Please visit <http://steinhardt.nyu.edu/pt/opt> and <http://hjd.med.nyu.edu/harkness/healthcare-professionals> for more information.

Interested in a Performing Arts Fellowship? The American Board of Physical Therapy Residency and Fellowship Education (ABPTFRE) has approved the PASIG Description of Specialist Practice (DSP) for the Performing arts as an area of study. We are now working with the ABPTFRE to turn the DSP into a Description of Fellowship Practice (DFP). We anticipate the DFP will be available online by June 2016. This means that sites can begin forming fellowships in dance medicine, music medicine, theater medicine, etc. The PASIG will provide the fellowship criteria for accreditation. We may have a meeting on creating a performing arts fellowship at CSM 2017 and/or the 2017 Orthopaedic Section annual meeting. Please contact Rosie Canizares, Mariah Nierman, and Laurel Abbruzzese if interested.

Current PASIG members, please remember to update your membership:
https://www.orthopt.org/login.php?forward_url=/surveys/membership_directory.php

Keep up with us on Facebook by contacting Dawn Doran. It is a closed group, so you need to contact Dawn first. Keep up with us and post on Twitter: We are **PT4Performers**. <https://twitter.com/PT4Performers>

Call for case reports: If you have a brief, clinically-focused case report on a performing arts PT patient, or a clinical commentary, please contact Annette Karim to submit your writing for the next Orthopaedic Physical Therapy Practice Magazine: neoluvsonlyme@aol.com

WE NEED MORE CONTRIBUTORS TO OUR MONTHLY CITATION BLASTS!!!!

Past Monthly citation blasts are available, with citations and EndNote file, listed on the website:

http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

TOPICS THAT HAVE BEEN COVERED RECENTLY INCLUDE:

Inguinal Disruption (current edition)

Femoroacetabular Impingement

Hand and Wrist Conditions in Gymnasts

Factors in Optimal Turnout

Achilles Tendinopathy

Biomechanics and Posture in Musicians

Pilates

ACL Injuries in Dancers

Patellofemoral Pain and Dance

Neural Entrapments Found Among Musicians

Stress Fractures of the Foot and Ankle

Dry Needling

Dynamic Warm Up and Stretching

Platelet Rich Plasma Injections

Back Pain in Dancers

If you are interested in contributing by writing a citation blast or joining the research committee, contact me at lbreising@gmail.com.

Sincerely,

Laura

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PERFORMING ARTS CONTINUING EDUCATION, CONFERENCES, AND RESOURCES

Musician Health Series, Janice Ying, PT, DPT, OCS
Glendale Adventist Therapy and Wellness Center, Los Angeles area (Eagle Rock), CA
<http://www.musicianshealthcorner.com/>
Healthy Musician Series - Overuse

Orthopaedic Section Independent Study Course. *20.3 Physical Therapy for the Performing Artist.*

Monographs are available for:

- Figure Skating (J. Flug, J. Schneider, E. Greenberg),
- Artistic Gymnastics (A. Hunter-Giordano, Pongetti-Angeletti, S. Voelker, TJ Manal),
- and
- Instrumentalist Musicians (J. Dommerholt, B. Collier).

Contact: Orthopaedic Section at: www.orthopt.org

Orthopaedic Section-American Physical Therapy Association,
Performing Arts SIG

http://www.orthopt.org/content/special_interest_groups/performing_arts

Performing Arts Citations and Endnotes

http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

ADAM Center

<http://www.adamcenter.net/>

Publications:

<http://www.adamcenter.net/#!vstc0=publications>

Conference abstracts:

<http://www.adamcenter.net/#!vstc0=conferences>

Dance USA

<http://www.danceusa.org/>

Research resources:

<http://www.danceusa.org/researchresources>

Professional Dancer Annual Post-Hire Health Screen:

<http://www.danceusa.org/dancerhealth>

Dancer Wellness Project

<http://www.dancerwellnessproject.com/>

Becoming an affiliate:

<http://www.dancerwellnessproject.com/Information/BecomeAffiliate.aspx>

Harkness Center for Dance Injuries, Hospital for Joint Diseases

<http://hjd.med.nyu.edu/harkness/>

Continuing education:

<http://hjd.med.nyu.edu/harkness/education/healthcare-professionals/continuing-education-courses-cme-and-ceu>

Resource papers:

<http://hjd.med.nyu.edu/harkness/dance-medicine-resources/resource-papers-and-forms>

Links:

<http://hjd.med.nyu.edu/harkness/dance-medicine-resources/links>

Informative list of common dance injuries:

<http://hjd.med.nyu.edu/harkness/patients/common-dance-injuries>

Research publications:

<http://hjd.med.nyu.edu/harkness/research/research-publications>

International Association for Dance Medicine and Science (IADMS)

<http://www.iadms.org/>

Resource papers:

<http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=186>

Links:

<http://www.iadms.org/displaycommon.cfm?an=5>

Medicine, arts medicine, and arts education organization links:

<http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=5>

Publications:

<http://www.iadms.org/displaycommon.cfm?an=3>

Performing Arts Medicine Association (PAMA)

<http://www.artsmed.org/>

<http://www.artsmed.org/symposium.html>

Interactive bibliography site:

<http://www.artsmed.org/bibliography.html>

Related links:

<http://www.artsmed.org/relatedlinks.html>

Member publications:

<http://artsmed.org/publications.html>

(Educators, researchers, and clinicians, please continue to email your conference and continuing education information to include in future blasts)

Inguinal Disruption

Although groin pain and injuries is relatively common in the performing arts community, research is sparse in regards to inguinal disruption, which the term of choice for disorders of the inguinal ring. Research articles discuss this disorder via a slew of other names: sports hernia, sportsman's hernia, sports groin, and athletic pubalgia. The purpose of this citation was to review current literature to provide the latest evidence regarding terminology, patient presentation, diagnosing and treating. Due to the complexity of the hip and pelvic region, there are numerous differential diagnoses and possible co-existing pathologies that can include muscle injuries, hip pathologies, referred visceral pain, lumbar spine pathology, nerve entrapments and gynecological issues. Current evidence shows that FAI is a common comorbidity in individuals who present with inguinal disruption. Imaging is commonly necessary and consists of plain radiographs, MRI, multidetector CT and dynamic ultrasound. Research presented does include information regarding examination, evaluation, imaging, conservative vs. surgical interventions, and rehabilitation. Research is needed in our field regarding prevalence in performing artists, performing arts related neuromuscular reeducation, strengthening protocol and education.

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Almeida MO, Silvia BN, Andriolo RB, Atallah AN, Peccin MS. Conservative interventions for treating exercise-related musculotendinous, ligamentous and osseous groin pain. *Cochrane Database Syst Rev.* 2013 Jun 6;(6):CD009565. doi: 10.1002/14651858.CD009565.pub2.

BACKGROUND: Musculoskeletal, ligamentous and osseous groin injuries are common in athletes and may result in a delay of several months to resume sports. Even then, this may not be at the former level of sport activity. The treatment of exercise-related groin pain is mainly conservative (non-surgical), using interventions such as exercises, electrotherapy, manual therapy and steroid injections.

OBJECTIVES: To assess the effects (benefits and harms) of conservative interventions for treating exercise-related musculotendinous, ligamentous and osseous groin pain.

SEARCH METHODS: We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (December 2011); the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2011, Issue

4); MEDLINE (1948 to November week 3 2011); EMBASE (1980 to Week 49 2011); CINAHL (1982 to December 2011); LILACS (1982 to December 2011); PEDro (1929 to December 2011), SPORTDiscus (1985 to December 2011), OTseeker (to December 2011), reference lists of papers and conference proceedings (2000 to 2011).

SELECTION CRITERIA: Randomized controlled trials and quasi-randomized controlled trials evaluating conservative interventions for treating exercise-related musculotendinous, ligamentous and osseous groin pain were included. Studies comparing conservative with surgical treatments were excluded.

DATA COLLECTION AND ANALYSIS: Two review authors independently extracted data and conducted risk of bias assessments. There was no pooling of data.

MAIN RESULTS: Two studies, involving a total of 122 participants who had experienced adductor-related groin pain for at least two months, were included in this review. All but one of the participants were male athletes aged between 18 and 50 years old. Both studies were assessed as 'high risk of bias' for at least one source of bias domain. The 'successful treatment' outcome reported in both studies was based primarily on pain measures. One study, based on an intention-to-treat analysis, found a significant difference favouring exercise therapy (strengthening with an emphasis on the adductor and abdominal muscles and training muscular co-ordination) compared with 'conventional' physiotherapy (stretching exercises, electrotherapy and transverse friction massage) in successful treatment at 16-week follow-up (25/34 (74%) versus 10/34 (29%); risk ratio (RR) 2.50, 95% CI 1.43 to 4.37, $P = 0.001$). Similarly, of those followed-up significantly more athletes treated by exercise therapy returned to sport at the same level (23/29 (79%) versus 4/30 (13%); RR 5.95, 95% CI 2.34 to 15.09, $P = 0.0002$). Although still favouring the exercise group, the differences between the two groups in patients' subjective global assessment at 16 weeks and successful treatment at 8 to 12 years follow-up were not statistically significant. The second study (54 participants) found no significant differences at 16-week follow-up between a multi-modal treatment (heat, manual therapy and stretching) and exercise therapy (the same intervention as in the above study) for the outcomes of successful treatment (14/26 (54%) versus 12/22 (55%); RR 0.99, 95% CI 0.59 to 1.66, $P = 0.96$) and return to full sports participation (13/26 (50%) versus 12/22 (55%); RR 0.92, 95% CI 0.53 to 1.58, $P = 0.75$). Those returning to full sports participation returned on average 4.5 weeks earlier after receiving multi-modal therapy (mean difference -4.50 weeks, 95% CI -8.60 to -0.40, $P = 0.03$) than those in the exercise therapy group. This study reported that there were no complications or side effects found in either intervention group.

AUTHORS' CONCLUSIONS: The available evidence from the randomized trials is insufficient to advise on any specific conservative modality for treating exercise-related groin pain. While still low quality, the best evidence is from one trial which found that exercise therapy (strengthening of hip and

abdominal muscles) in athletes improves short-term outcomes (based primarily on pain measures) and return to sports compared with physiotherapy consisting of passive modalities. Given the low quality of the available evidence from both included trials, further randomized trials are necessary to reinforce their findings.

Becker LC, Kohlrieser DA. Conservative management of sports hernia in a professional golfer: a case report. *Int J Sports Phys Ther.* 2014 Nov;9(6):851-60.

STUDY DESIGN: Case Report.

BACKGROUND: Activity-limiting groin pain is relatively common in athletes who participate in sports which involve rapid or repetitive twisting, cutting, and/or kicking. Despite the reported prevalence of this condition in athletes, there is still much controversy as to the anatomical structures involved and most effective treatment approach. There is limited evidence favoring conservative management of sports hernia as opposed to surgical intervention in professional athletes, and there are no reports of sports hernia management in the professional golf population. The purpose of this case report is to describe the conservative management and decision making used with a professional golfer with symptoms consistent with a sports hernia, which allowed for successful return to prior level of sport participation.

CASE PRESENTATION: The subject of this case report is a professional golfer who developed lower abdominal and groin pain after changes in conditioning routine. Clinical presentation was consistent with a diagnosis of sports hernia. Rehabilitation of this athlete included a structured core muscle retraining program which utilized a step wise progression through the neurodevelopmental sequence in order to allow for development of neuromuscular control and stability required for return to golf.

OUTCOME: This athlete was able to return to full golf participation after 13 physical therapy visits over 4 weeks.

DISCUSSION: The available evidence supports surgical intervention over conservative management in the treatment of sports hernia in the athletic population. A structured and comprehensive rehabilitation program addressing core muscle weakness and contributing impairments adjacent to injury may be a beneficial treatment option prior to surgical repair potentially allowing return to sport in some athletes.

LEVELS OF EVIDENCE: 4.

Broadley P, Offiah AC. Hip and groin pain in the child athlete. *Semin Musculoskelet Radiol.* 2014 Nov;18(5):478-88. doi: 10.1055/s-0034-1389265. Epub 2014 Oct 28

ABSTRACT: An increasing number of children are taking up sporting activities and at more competitive levels. For this reason (pediatric) radiologists should expect to receive greater numbers of requests from their orthopedic colleagues to image the athletic child who presents with hip or

groin pain: "athletic pubalgia." Lower limb sports-related pathology is particularly common in sports such as ballet, football, hockey, rugby, and running. Injuries to the hip and groin may account for up to a quarter of injuries seen in athletic children and may be acute or chronic, osseous, cartilaginous, ligamentous, or muscular. The radiologist should also bear in mind the possibility of non-sports-related pathology such as inflammation or tumor and of complications related to previous trauma such as avascular necrosis or femoroacetabular impingement complicating previous slipped capital femoral epiphysis. Radiologists should avoid use of the term sports hernia and provide a more specific description of the true abnormality. The major imaging modalities are radiographs and MRI. In this article we provide an overview of the common sports-related pathologies of the hip and groin that may be encountered in the athletic child.

Chow AH, Morrison WB. Imaging of hip injuries in dancers. *J Dance Med Sci*. 2011;15(4):160-72.

ABSTRACT: Dancers are quite prone to injuries in the hip region. Imaging plays a key role in evaluation of the pain resulting from such injuries, as proximity of structures and cross-innervation can result in a clinical dilemma regarding the specific injury, and thus origin of the pain generator. Advanced imaging techniques, including MRI, ultrasound, and multidetector CT, are becoming increasingly important in the workup of injuries in athletes, yet radiographs remain an essential component. This article presents a variety of injuries in the hip and groin region that may be seen in dancers and discusses the utility of basic and advanced imaging modalities.

De Sa D, Holmich P, Phillips M, Heaven S, Simunovic N, Philippon MJ, Ayeni OR. Athletic groin pain: a systematic review of surgical diagnoses, investigations and treatment. *Br J Sports Med*. 2016 May 6. pii: bjsports-2015-095137. doi: 10.1136/bjsports-2015-095137. [Epub ahead of print]

INTRODUCTION: Athletic groin pain requiring surgery remains a diagnostic and therapeutic challenge. This systematic review aims to identify the most common causes of groin pain in athletes requiring surgery. Additionally, it aims to further characterise their susceptible athlete profiles, common physical examination and imaging techniques, and surgical procedures performed. This will enable the orthopaedic sports medicine clinician/surgeon to best treat these patients.

MATERIALS AND METHODS: The electronic databases MEDLINE, PubMed and EMBASE were searched from database inception to 13 August 2014 for studies in the English language that addressed athletic groin pain necessitating surgery. The search was updated on 4 August 2015 to find any articles published after the original search. The studies were systematically screened and data were abstracted in duplicate, with descriptive data presented.

RESULTS: A total of 73 articles were included within our study, with data from 4655 patients abstracted. Overall, intra-articular and extra-articular

causes of groin pain in athletes requiring surgery were equal. The top five causes for pain were: 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.

CONCLUSIONS: Given the complex anatomy, equal intra-articular and extra-articular contribution, and potential for overlap of clinical entities causing groin pain leading to surgery in athletes, further studies are required to ascertain the finer details regarding specific exam manoeuvres, imaging views and surgical outcomes to best treat this patient population.

Dimitrakopoulou A, Schilders E. Sportsman's hernia? An ambiguous term. *J Hip Preserv Surg.* 2016 Feb 24;3(1):16-22. doi: 10.1093/jhps/hnv083. eCollection 2016.

ABSTRACT: Groin pain is common in athletes. Yet, there is disagreement on aetiology, pathomechanics and terminology. A plethora of terms have been employed to explain inguinal-related groin pain in athletes. Recently, at the British Hernia Society in Manchester 2012, a consensus was reached to use the term inguinal disruption based on the pathophysiology while lately the Doha agreement in 2014 defined it as inguinal-related groin pain, a clinically based taxonomy. This review article emphasizes the anatomy, pathogenesis, standard clinical assessment and imaging, and highlights the treatment options for inguinal disruption.

Ellsworth AA, Zoland MP, Tyler TF. Athletic pubalgia and associated rehabilitation. *Int J Sports Phys Ther.* 2014 Nov;9(6):774-84.

BACKGROUND: Evaluation and treatment of groin pain in athletes is challenging. The anatomy is complex, and multiple pathologies often coexist. Different pathologies may cause similar symptoms, and many systems can refer pain to the groin. Many athletes with groin pain have tried prolonged rest and various treatment regimens, and received differing opinions as to the cause of their pain. The rehabilitation specialist is often given a non-specific referral of "groin pain" or "sports hernia." The cause of pain could be as simple as the effects of an adductor strain, or as complex as athletic pubalgia or inguinal disruption. The term "sports hernia" is starting to be replaced with more specific terms that better describe the injury. Inguinal disruption is used to describe the syndromes related to the injury of the inguinal canal soft tissue environs ultimately causing the pain syndrome. The term athletic pubalgia is used to describe the disruption and/or separation of the more medial common aponeurosis from the pubis, usually with some degree of adductor tendon pathology.

TREATMENT: Both non-operative and post-operative treatment options share the goal of returning the athlete back to pain free activity. There is little research available to reference for rehabilitation guidelines and creation of a plan of care. Although each surgeon has their own specific set of post-operative guidelines, some common concepts are consistent among most

surgeons. Effective rehabilitation of the high level athlete to pain free return to play requires addressing the differences in the biomechanics of the dysfunction when comparing athletic pubalgia and inguinal disruption. CONCLUSION: Proper evaluation and diagnostic skills for identifying and specifying the difference between athletic pubalgia and inguinal disruption allows for an excellent and efficient rehabilitative plan of care. Progression through the rehabilitative stages whether non-operative or post-operative allows for a focused rehabilitative program. As more information is obtained through MRI imaging and the diagnosis and treatment of inguinal disruption and athletic pubalgia becomes increasingly frequent, more research is warranted in this field to better improve the evidence based practice and rehabilitation of patients. LEVELS OF EVIDENCE: 5.

Hegedus EJ, Stern B, Reinman MP, Tarara D, Wright AA. A suggested model for physical examination and conservative treatment of athletic pubalgia. *Phys Ther Sport*. 2013 Feb;14(1):3-16. doi: 10.1016/j.ptsp.2012.04.002. Epub 2012 May 8.

BACKGROUND: Athletic pubalgia (AP) is a chronic debilitating syndrome that affects many athletes. As a syndrome, AP is difficult to diagnose both with clinical examination and imaging. AP is also a challenge for conservative intervention with randomized controlled trials showing mixed success rates. In other syndromes where clinical diagnosis and conservative treatment have been less than clear, a paradigm has been suggested as a framework for clinical decision making.

OBJECTIVES: To propose a new clinical diagnostic and treatment paradigm for the conservative management of AP.

DESIGN: Relevant studies were viewed with regard to diagnosis and intervention and where a gap in evidence existed, clinical expertise was used to fill that gap and duly noted.

RESULTS: A new paradigm is proposed to assist with clinical diagnosis and non-surgical intervention in patients suffering with AP. The level of evidence supporting this paradigm, according to the SORT taxonomy, is primarily level 2B.

CONCLUSIONS: Further testing is warranted but following the suggested paradigm should lead to a clearer diagnosis of AP and allow more meaningful research into homogeneous patient populations within the AP diagnostic cluster. Strength-of-Recommendation Taxonomy (SORT): 2B

Hopp SJ, Ojodu I, Pohlemann T, Kelm J. Posterior symphyseal spurs--an unusual differential diagnosis in athletes with groin pain. *Phys Sportsmed*. 2015 May;43(2):150-4. doi: 10.1080/00913847.2015.1012038. Epub 2015 Feb 11

ABSTRACT: We set out to highlight the significance of posterior symphyseal spurs as an unusual diagnostic possibility in athletes with chronic groin pain and to demonstrate that operative resection was successful in quickly and

safely returning the patients to sporting activities. Five competitive nonprofessional male athletes, three soccer players, and two marathon runners (median age: 30 [26/33] years), who presented to us with significant groin and central pubic pain with duration of at least 12 months, and who had failed conservative or surgical interventions (symphyseal plating), were evaluated. Physical examination as well as pelvic radiographs confirmed the diagnosis of posterior symphyseal spurs. Four out of five athletes underwent complete resection of the spur. Size of spurs was 2.2 (1.3/2.9) cm (median) with four of them posterosuperiorly and one posterocentrally located. All of them had uneventful postoperative recovery period and were still pain-free at the latest follow up after 26.6 months (24/30). Median time-to-return to competitive sports level was 10 weeks (8/13). None of the patients developed pubic instability due to symphyseal spur resection. The results of considerable postoperative improvement in our patients highlight the significance of posterior symphyseal spurs as a diagnostic possibility in athletes with chronic groin pain.

Larson CM. Sports hernia/athletic pubalgia: evaluation and management.

***Sports Health.* 2014 March;6(2):139-44. doi: 10.1177/1941738114523557**

CONTEXT: Sports hernia/athletic pubalgia has received increasing attention as a source of disability and time lost from athletics. Studies are limited, however, lacking consistent objective criteria for making the diagnosis and assessing outcomes.

EVIDENCE ACQUISITION: PubMed database through January 2013 and hand searches of the reference lists of pertinent articles.

STUDY DESIGN: Review article.

LEVEL OF EVIDENCE: Level 5.

RESULTS: Nonsurgical outcomes have not been well reported. Various surgical approaches have return-to-athletic activity rates of >80% regardless of the approach. The variety of procedures and lack of outcomes measures in these studies make it difficult to compare one surgical approach to another. There is increasing evidence that there is an association between range of motion-limiting hip disorders (femoroacetabular impingement) and sports hernia/athletic pubalgia in a subset of athletes. This has added increased complexity to the decision-making process regarding treatment.

CONCLUSION: An association between femoroacetabular impingement and athletic pubalgia has been recognized, with better outcomes reported when both are managed concurrently or in a staged manner.

Munegato D, Bigoni M, Gridavilla G, Olmi S, Cesana G, Zatti G. Sports hernia and femoroacetabular impingement in athletes: a systematic review. *World J Clin Cases.* 2015 Sep; 3(9):823-30. doi: 10.12998/wjcc.v3.i9.823.

AIM: To investigate the association between sports hernias and femoroacetabular impingement (FAI) in athletes.

METHODS: PubMed, MEDLINE, CINAHL, Embase, Cochrane Controlled Trials Register, and Google Scholar databases were electronically searched for

articles relating to sports hernia, athletic pubalgia, groin pain, long-standing adductor-related groin pain, Gilmore groin, adductor pain syndrome, and FAI. The initial search identified 196 studies, of which only articles reporting on the association of sports hernia and FAI or laparoscopic treatment of sports hernia were selected for systematic review. Finally, 24 studies were reviewed to evaluate the prevalence of FAI in cases of sports hernia and examine treatment outcomes and evidence for a common underlying pathogenic mechanism.

RESULTS: FAI has been reported in as few as 12% to as high as 94% of patients with sports hernias, athletic pubalgia or adductor-related groin pain. Cam-type impingement is proposed to lead to increased symphyseal motion with overload on the surrounding extra-articular structures and muscle, which can result in the development of sports hernia and athletic pubalgia. Laparoscopic repair of sports hernias, via either the transabdominal preperitoneal or extraperitoneal approach, has a high success rate and earlier recovery of full sports activity compared to open surgery or conservative treatment. For patients with FAI and sports hernia, the surgical management of both pathologies is more effective than sports pubalgia treatment or hip arthroscopy alone (89% vs 33% of cases). As sports hernias and FAI are typically treated by general and orthopedic surgeons, respectively, a multidisciplinary approach for diagnosis and treatment is recommended for optimal treatment of patients with these injuries.

CONCLUSION: The restriction in range of motion due to FAI likely contributes to sports hernias; therefore, surgical treatment of both pathologies represents an optimal therapy.

Ross JR, Stone RM, Larson CM. Core Muscle Injury/Sports Hernia/Athletic Pubalgia, and Femoroacetabular Impingement. *Sports Med Arthrosc.* 2015 Dec;23(4):213-20. doi: 10.1097/JSA.000000000000083.

ABSTRACT: Core muscle injury/sports hernia/athletic pubalgia is an increasingly recognized source of pain, disability, and time lost from athletics. Groin pain among athletes, however, may be secondary to various etiologies. A thorough history and comprehensive physical examination, coupled with appropriate diagnostic imaging, may improve the diagnostic accuracy for patients who present with core muscular injuries. Outcomes of nonoperative management have not been well delineated, and multiple operative procedures have been discussed with varying return-to-athletic activity rates. In this review, we outline the clinical entity and treatment of core muscle injury and athletic pubalgia. In addition, we describe the relationship between athletic pubalgia and femoroacetabular impingement along with recent studies that have investigated the treatment of these related disorders.

Sailly M, Whiteley R, Read JW, Giuffre B, Johnson A, Holmich P. Pubic apophysitis: a previously undescribed clinical entity of groin pain in athletes. *Br J Sports Med.* 2015 Jun;49(12):828-34. doi: 10.1136/bjsports-2014-094436.

BACKGROUND: Sport-related pubalgia is often a diagnostic challenge in elite

athletes. While scientific attention has focused on adults, there is little data on adolescents. Cadaveric and imaging studies identify a secondary ossification centre located along the anteromedial corner of pubis beneath the insertions of symphyseal joint capsule and adductor longus tendon. Little is known about this apophysis and its response to chronic stress.

AIM: We report pubic apophysitis as a clinically relevant entity in adolescent athletes.

METHODS: The clinical and imaging findings in 26 highly trained adolescent football players (15.6 years \pm 1.3) who complained of adductor-related groin pain were reviewed. The imaging features (X-ray 26/26, US 9/26, MRI 11/26, CT 7/26) of the pubic apophyses in this symptomatic group were compared against those of a comparison group of 31 male patients (age range 9-30 years) with no known history of groin pain or pelvic trauma, who underwent pelvic CT scans for unrelated medical reasons.

RESULTS: All symptomatic subjects presented with similar history and physical findings. The CT scans of these patients demonstrated open pubic apophyses with stress-related physal changes (widening, asymmetry and small rounded cyst-like expansions) that were not observed in the comparison group. No comparison subject demonstrated apophyseal maturity before 21 years of age, and immaturity was seen up to the age of 26 years.

CONCLUSIONS: This retrospective case series identifies pubic apophyseal stress (or 'apophysitis') as an important differential consideration in the adolescent athlete who presents with groin pain.

Santilli OL, Nardelli N, Santilli HA, Tripoloni DE. Sports hernias: experience in a sports medicine center. *Hernia*. 2016 Feb;20(1):77-84. doi: 10.1007/s10029-015-1367-4. Epub 2015 Mar 18.

PURPOSE: Chronic pain of the inguino-crural region or "pubalgia" explains the 0.5-6.2% of the consultations by athletes. Recently, areas of weakness in the posterior wall called "sports hernias," have been identified in some of these patients, capable of producing long-standing pain. Several authors use different image methods (CT, MRI, ultrasound) to identify the lesion and various techniques of repair, by open or laparoscopic approaches, have been proposed but there is no evidence about the superiority of one over others due to the difficulty for randomizing these patients. In our experience, diagnosis was based on clinical and ultrasound findings followed by laparoscopic exploration to confirm and repair the injury. The present study aims to assess the performance of our diagnostic and therapeutic management in a series of athletes affected by "pubalgia".

METHODS: 1450 athletes coming from the orthopedic office of a sport medicine center were evaluated. In 590 of them (414 amateur and 176 professionals) sports hernias were diagnosed through physical examination and ultrasound. We performed laparoscopic "TAPP" repair and, thirty days after, an assessment was performed to determine the evolution of pain and the degree of physical activity as a sign of the functional outcome. We used

the U Mann-Whitney test for continuous scale variables and the chi-square test for dichotomous variables with $p < 0.05$ as a level of significance. RESULTS: In 573 patients ultrasound examination detected some protrusion of the posterior wall with normal or minimally dilated inguinal rings, which in 498 of them coincided with areas affected by pain. These findings were confirmed by laparoscopic exploration that also diagnosed associated contralateral (30.1%) and ipsilateral defects, resulting in a total of 1006 hernias. We found 84 "sport hernias" in 769 patients with previous diagnosis of adductor muscle strain (10.92%); on the other hand, in 127 (21.52%) of our patients with "sport hernias" US detected concomitant injuries of the adductor longus tendon, 7 of which merited additional surgical maneuvers (partial tenotomy). 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%); the ultrasound ruled out hernia recurrence, but in three cases it diagnosed tendinitis of the rectus abdominis muscle.

CONCLUSIONS: Our series reflects the multidisciplinary approach performed in a sports medicine center in which patients are initially evaluated by orthopedic surgeons in order to discard the most common causes of "pubalgia". "Sports hernias" are often associated with adductor muscle strains and other injuries of the groin allowing speculate that these respond to a common mechanism of production. We believe that, considering the difficulty to design randomized trials, only a high coincidence among the diagnostic and therapeutic instances can ensure a rational health care.

Sheen AJ, Igbal Z. Contemporary management of 'Inguinal disruption' in the sportsman's groin. *BMC Sports Sci Med Rehabil.* 2014 Nov;6:39. doi: 10.1186/2052-1847-6-39.

BACKGROUND: This article helps define the basic principles to diagnosis and manage one of the surgically correctable causes of the 'painful groin', which is commonly described as the sportsman's groin.

DISCUSSION: Often many surgeons will describe a single pathology for the sportsman's groin such as a 'hernia' but often other coexisting etiologies may be present. Management relies on a multidisciplinary approach with a diagnosis initially made by a history of pain in the groin on exercise.

Physiotherapy is the recommended first line treatment and is designed to concentrate on strengthening of the abdominal wall muscle and tendon groups around the groin area. Surgery does have a role in the sportsman's groin but only once all conservative measures have been exhausted or if there is a clear identified pathology causing the groin symptoms such as posterior wall defect. Surgical principles for an inguinal disruption include either open or laparoscopic techniques reinforcing the inguinal canal with a mesh or suture repair followed by an active rehabilitation programme.

SUMMARY: Once an accurate diagnosis has been achieved, contemporary

guidance for inguinal disruption requires a multidisciplinary approach including a specially designed physiotherapy regime and possibly surgery.

St-Onge E, MacIntyre IG, Galea AM. Multidisciplinary approach to non-surgical management of inguinal disruption in a professional hockey player treated with platelet-rich plasma, manual therapy and exercise: a case report. *J Can Chiropr Assoc.* 2015 Dec;59(4):390-7.

ABSTRACT: To present the clinical management of inguinal disruption in a professional hockey player and highlight the importance of a multidisciplinary approach to diagnosis and management.

CLINICAL FEATURES: A professional hockey player with recurrent groin pain presented to the clinic after an acute exacerbation of pain while playing hockey.

INTERVENTION: The patient received a clinical diagnosis of inguinal disruption. Imaging revealed a tear in the rectus abdominis. Management included two platelet-rich plasma (PRP) injections to the injured tissue, and subsequent manual therapy and exercise. The patient returned to his prior level of performance in 3.5 weeks.

DISCUSSION: This case demonstrated the importance of a multidisciplinary team and the need for advanced imaging in athletes with groin pain.

SUMMARY: Research quality concerning the non-surgical management of inguinal disruption remains low. This case adds evidence that PRP, with the addition of manual therapy and exercise may serve as a relatively quick and effective non-surgical management strategy.

Strosberg DS, Ellis TJ, Tenton DB. The Role of Femoroacetabular Impingement in Core Muscle Injury/Athletic Pubalgia: Diagnosis and Management. *Front Surg.* 2016 Feb;3:6. doi: 10.3389/fsurg.2016.00006.

ABSTRACT: Chronic groin pain in athletes represents a major diagnostic and therapeutic challenge in sports medicine. Two recognized causes of inguinal pain in the young adult athlete are core muscle injury/athletic pubalgia (CMI/AP) and femoroacetabular impingement (FAI). CMI/AP and FAI were previously considered to be two distinct entities; however, recent studies have suggested both entities to frequently coincide in the athlete with groin pain. This article briefly discusses the role of FAI in CMI/AP and the diagnosis and management of this complex disease.

