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mini review

Insights in clinical examination and diagnosis of Athletic Pubalgia

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SUMMARY: **Insights in clinical examination and diagnosis of Athletic Pubalgia.**

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Athletic pubalgia presents with groin and/or pubic pain mainly in athletes. The purpose of this review is to analyze, by evaluating current literature, the clinical examination and differential diagnosis of athletic pubalgia, in an effort to better understand this clinical entity. Diagnosis is challenging due to the anatomical complexity of the groin area, the biomechanics of the pubic symphysis region and the large number of potential sources of groin pain. Clinical examination and medical history are of utmost importance. Differential diagnosis includes intra-and-extra-articular hip and intra-abdominal pathology, as well as non-myoskeletal disorders, such as femoroacetabular impingement (FAI), acetabular labral tears, osteitis pubis, adductor muscles injuries and true inguinal hernia. A thorough clinical examination should be performed in such cases, including the "Resisted sit-up" and the "Single or Bilateral Resisted Leg Adduction" test. Regarding imaging, Magnetic resonance imaging (MRI) should be performed when athletic pubalgia is suspected, especially in athletes. Other imaging techniques, such as plain radiographs and ultrasonography may add to the diagnostic process.

KEY WORDS: Athletic pubalgia - Sportsman hernia - Clinical evaluation athlete's groin - Imaging.

Introduction

Athletic pubalgia represents an obscure sport injury, often mis-or underdiagnosed (1, 2). It presents with groin and/or pubic pain mainly in athletes. It commonly affects athletes, especially those participating in activities, involving rapid acceleration and deceleration or sudden directional changes, kicking, turning, twisting, cutting, pivoting and sprinting (1-3). Hip and groin pain in athletes have been regarded challenging to diagnose clinical signs. The complex anatomy, as well as the multiple pathology of the region may be the main reasons for this confusion (4).

Athletic pubalgia appears in the available literature with many terms, such as sports hernia, sportsman's hernia, "Gilmore's" groin, groin disruption injury and core muscle injury. Mixed terminology and taxonomy also prohibit clear comprehension of this sport injury (1, 3).

Pathophysiology and etiology of athletic pubalgia remains unclear and debatable. Muscle imbalance between the abdominal and hip adductor muscles seems to be the most important pathogenetic factor. Abdominal muscles act synergistically with the posterior paravertebral muscles for the stabilization of the pelvis, allowing a single-leg stance while simultaneously maintaining balance and contributing to the power and precision of the kicking leg. Furthermore, gluteus and adductor muscles represent im-

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portant factors in stabilization during the single-leg stance (1, 4).

The adductors and abdominal muscles are antagonists. Therefore, imbalances between those two muscle groups disrupt the equilibrium of forces and loads around the symphysis pubis. Increased shearing stress at the pelvis may also originate from reduced hip internal rotation and instability of the sacroiliac joint (1).

The purpose of this brief review is to analyze, by evaluating selective literature, the clinical examination and differential diagnosis of athletic pubalgia, in an effort to better understand this obscure clinical entity.

Methods

The present study is a narrative, non-systematic review of the current literature on clinical examination, diagnostic imaging and differential diagnosis of athletic pubalgia. A meticulous electronic search the PubMed database and the Cochrane Library was performed through April 2019 for peer-reviewed English articles on athletic pubalgia. Since the present is a narrative review, an effort was made to include the most recent publications.

Differential diagnosis

Diagnosis is challenging due to the anatomical complexity of the groin area, the biomechanics of the pubic symphysis region and the large number of potential sources of groin pain. Clinical examination and medical history are of utmost importance (5).

Differential diagnosis includes intra-and-extra-articular hip and intra-abdominal pathology, as well as non-myoskeletal disorders. Intra-articular hip pathology includes femoroacetabular impingement (FAI), acetabular labral tears, chondral lesions, femoral head osteonecrosis, septic arthritis, osteoarthritis, osteochondritis dissecans and synovitis. Extra-articular hip pathology includes osteitis pubis, adductor muscles injuries, lumbar radiculopathy, insertional adductors and rectus abdominis tendinopathy, pubic stress fracture, apophyseal avulsion fractures, adductor muscles injuries, greater trochanter pain syndrome and sacroiliac joint disorders (1, 5-8).

Intra-abdominal pathology includes true inguinal hernia, diverticulitis, lymphadenitis, inflammatory bowel disease and appendicitis, while non-myoskeletal disorders include nephrolithiasis, ovarian cysts, pelvic inflammatory disease, prostatitis, endometriosis, adnexa torsion and testicular torsion (1, 6).

It is of note that in athletes, an association between athletic pubalgia and FAI has been observed. FAI is characterized by excessive bone on the acetabular rim, the femoral neck or both, while it is defined as contact between the femoral neck and the acetabular rim (1, 8, 9). Restricted motion range due to FAI may result in compensatory patterns of movement around the pelvis and trunk which may lead to increased stress and loads on the pubic symphysis. Hence, addressing each clinical entity independently may not resolve the patient's symptoms (10, 11).

Clinical examination

Clinical examination has not yet been standardized. Athletes suffering from athletic pubalgia most commonly present with unilateral or bilateral anteromedial groin pain. Pubic symphysis, adductor musculature, lower abdominal muscles, perineal region, inguinal region and/or scrotum may be affected. Symptomatology is typically exacerbated by running, kicking, hip adduction or flexion and eccentric loads to the rectus abdominis (1, 6).

The physician should start palpation laterally at the inguinal ligament and work centrally to the pubic tubercle. Tenderness of the pubic symphyseal region is very common, including mainly pain at/or above the pubic tubercle near the rectus insertion or hip adductor origin. Pubic symphysis should be included in the palpation, since osteitis pubis may be often present in athletic pubalgia (1, 12-14).

Two main clinical tests should be performed for athletic pubalgia. The "Resisted sit-up" and the "Single or Bilateral Resisted Leg Adduction" test. During the "Resisted sit-up" test the patient lies supine, while the physician stabilizes the patient's feet. The patient holds his/her arms straight and

performs the sit-up and hold this position for 5 seconds. If pain at the rectus insertion is caused, the test is positive. During the "Single or Bilateral Resisted Leg Adduction" test, the patient lies supine with flexed lower limbs to 30 degrees. The physician puts his/her hands on the medial aspect of the patient's heel, while the patient resists abduction. The test is positive if patient's symptomatology is reproduced (1, 6, 12-16).

Furthermore, adductor tenderness may be present in 36% of athletes suffering from athletic pubalgia. The external inguinal ring should also be examined for identification of palpable true hernia that may be the cause of pain or co-exist with athletic pubalgia (6). Valsava maneuvers may reproduce the patient's symptoms, while a thorough sensory examination should be performed, since as sensory disturbances, as well as dysesthesias in the lower abdomen, inguinal region, anteromedial thigh and genitals could be present in cases of entrapment of the iliohypogastric, ilioinguinal and genitofemoral nerves (6, 15).

Both hips should also be included in the clinical examination to rule out intra-or-extra articular pathology. Range of hip motion, "Flexion, Abduction, external rotation" (FABER) test, sacroiliac joint dysfunction, "Dynamic External Rotatory Impingement" (DEXRIT) test and weakness of abductor or adductor muscles should be evaluated (1, 8).

In addition, some Authors have suggested that local corticoid and/or anesthetic injections in the pubic symphysis may be helpful diagnostic tools (17, 18).

Diagnostic imaging

Plain radiographic examination comprises of anteroposterior pelvis, as well as lateral hips X-ray views (6). Disorders such as FAI, osteoarthritis, acetabular dysplasia and loose bodies should be excluded. Osteitis pubis, pelvic stress fractures may also be visible (19-22).

Magnetic resonance imaging (MRI) should be performed when athletic pubalgia is suspected, especially in athletes (1, 6, 23). On the other hand, if intraarticular hip pathology, such as labral tear or FAI, is more likely, a hip MR arthrogram seems to be the gold standard imaging technique (19-21). MRI is able to evaluate groin pain, as well as to identify pathology arising from the hip or lumbar spine, since patients often poorly localize pain (1, 6, 23).

MRI findings of athletic pubalgia in acute and semi-acute (less than 6 months) cases include hyperintense signal on T2-weighted images within the symphysis and adjacent parasymphyseal area. In chronic cases, subchondral sclerosis, subchondral resorption with bony irregularity and osteophytosis or pubic beaking (1, 6, 23).

Evaluation of the pelvic area through MRI is of utmost importance in athletic pubalgia suspected cases. Osteitis pubis may be present, but rarely observed in isolation. Hip and adductor pathology may be also present, such as microtears of the adductor longus tendon. Adductor longus tendinosis represents a result of chronic overuse and occurs immediately distal to the rectus abdominis–adductor longus aponeurosis. Injury to the aponeurotic plate may also be present. Tear of the aponeurotic plate presents as a fluid-signal cleft lifting up the anterior periosteum at the pubis with additional fluid signal abnormality disrupting the tendinous insertion of either one or both tendons (1, 6, 23).

Dynamic ultrasonography has also been proposed as diagnostic tool. However, due to its operator dependency, it is characterized by poor reproducibility (6).

Discussion

Although a precise etiology is not defined, athletic pubalgia seems to be related to muscular imbalance and pelvic instability. Weakening and/or tearing of the lower abdominal or adductor muscles and their opposing forces on the pubic have been identified as the most likely pathogenetic mechanism (1). In general, in cases of chronic lower abdominal, as well as unilateral exercise related groin pain in athletes without true hernia, athletic pubalgia should always be considered. Detailed medical history, including the training habits of the athlete are of utmost importance (12). Furthermore, clinical examination should exclude many different hip intra-and extra-articular pathologies, as well as clinical entities from the abdominal and genitourinary system (5-8).

During the last few years, FAI has been strongly associated with athletic pubalgia (8). Their relationship represents a "hot" research topic. They are considered two distinct clinical studies. However, they frequently affect athletes with groin pain, while they may co-exist (24, 25). It seems that is of paramount importance to address both pathologies for favorable outcomes (1, 25).

MRI is the imaging technique of choice in athletic pubalgia suspected cases (23). MRI may evaluate groin pain, as well as to identify pathology arising from the hip or lumbar spine, since patients often poorly localize pain. Plain radiographs, ultrasonography and diagnostic injections may also provide useful information (1, 6, 23).

Although in this review the treatment options were not discussed, it should be noted that non-operative treatment, consisting of core stability exercises and muscle stretching and strengthening exercises of the abdominal, adductor, flexor and extensor hip muscles, is usually tried prior to any surgical intervention. In patients not responding to conservative treatment, surgery is advised, which may include open, laparoscopic or robotic-assisted approach (26, 27).

In conclusion, athletic pubalgia, represents an obscure sports injury, whose pathophysiology has not yet fully been defined. This critical review offers an overview of differential diagnosis, clinical examination and diagnostic imaging of this clinical entity in an effort to better understand its presentation as well as its diagnosis and management.

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Conflict of interest

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GK, AI, MKK, FA, MCM, AM for the literature search and analysis, and manuscript writing. KV, PJP, KMK for the final manuscript revision. All Authors have read and approved the final manuscript.

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