Arcuate pubic ligament injury : an unknown cause of athletic pubalgia

Arcuate Pubic Ligament Injury – An unknown cause of Athletic Pubalgia

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ABSTRACT

A case report is presented that gives new insight into a very rare cause of athletic pubalgia. Up till now, no case has been published in literature about the relevance of an arcuate pubic ligament (APL) injury in athletic pubalgia. The APL or inferior pubic ligament (IPL) is a thick triangular arch of ligamentous fibers connecting the two pubic bones below. The main function of the APL is to stabilize the symphysis pubis. The rupture of this ligament can lead to groin pain due to lack of stabilization of the symphysis pubis. Despite the importance of the anatomical and clinical function of the APL, very limited research is available about injuries of this ligament. This report describes a case of a traumatic left APL rupture, confirmed by Magnetic Resonance Imaging (MRI), causing longstanding left groin pain in an amateur athlete.

INTRODUCTION

Between 2% and 10% of all athletic injuries involve the groin, and up to 13% of soccer injuries are groin related [1-2]. Despite the large list of differential diagnoses, no cause could be agreed upon for a considerable amount of pubalgia cases. Groin injuries often recur and may lead to the premature termination of athletic careers. In this article the authors report a case of an isolated traumatic rupture of the APL causing pubalgia. To the best of our knowledge, there is no such case described in literature. Thorough research describes a link between APL injury and groin pain. In addition to the case report, this article discusses the anatomy, the anamnesis, clinical features, radiological features and the biomechanism of an acute APL rupture.

CASE REPORT

The patient was a thirty-year-old man, playing competitive soccer three times a week, presenting with left groin pain. Two years ago, the sportsman threw a sliding tackle whereby his right foot got stuck in the grass. Pain in his left groin occurred and aggravated progressively. The clinical features consisted of pain in the left groin which radiated to the region of the pubis.

Plain radiographs and ultrasound of the left groin region, in the first week after the trauma, were negative. Previously, plenty of conservative treatment options for athletic pubalgia failed: including cessation of physical activity, anti-inflammatory drug medication, local anaesthetic/corticosteroid injection into the adductor tendon across the left pubic ramus in addition to graduated strengthening of the core muscles, passive physical therapy modalities, stretching exercises and mesotherapy. Therefore we ordered an MRI which demonstrated an APL tear at the left side (secondary cleft sign). The ligament was ruptured at the level of the origin of the adductor longus, anteriorly up to the posterior margin of the symphysis pubica (figure 1).

A minor thickening of the left adductor longus tendon and origin is documented in comparison with the right side (figure 1). An ultrasound-guided infiltration of the left inferior pubic ligament with Platelet-Rich Plasma (PRP) decreased the pain gradually within ten days. The patient underwent a single injection of PRP. Within four weeks after infiltration, the patient was able to return to play pain-free at competitive level, which is a spectacular result after six months of absence. Up till now, the football player has been able to play all league games.

DISCUSSION

The pubic symphysis is a fibrocartilaginous joint of minimal mobility (amphiartrosis, synchondrosis). The two ends of the pubic bones, which are not flat, but marked by reciprocal crests and papillae, are lined axially by hyaline cartilage and are joined by a fibro-cartilaginous disc, the interosseous ligament with a thin central cleft [3-4]. The joint is closed anteriorly by the very thick anterior ligament. It contains aponeurotic expansions from the abdominal muscles and the adductor longus. The posterior ligament is a fibrous membrane continuous with the periosteum. The superior aspect of the joint is strengthened by the superior ligament, a thick and dense fibrous band, extending to the pubic tubercles [5]. The inferior border of the joint is strengthened by the APL, the subpubic arched ligament, which is continuous with the interosseous ligament and forms a sharp-edged arcade rounding off the apex of the pubic arch. The main function of the APL is to stabilize the symphysis pubis. Movements of the pubic symphysis joint have been little described [4]. Angulation, rotation and displacement are possible but slight and are likely in activities at the sacro-iliac and hip joints (i.e. while walking and or standing on one leg). Symphysis pubis movements are minimal and limited by its ligaments [3-4].

An acute rupture of the APL is possible when an unexpected and too high passive force (load) is exerted on the pelvis in craniocaudal direction. The direction of the acting force on the right side of the pelvis must be opposite to that on the left side. The authors hypothesize that the inferior pubic ligament will tear at the side where the caudal force affects the os pubis. In our case, the athlete sportsman threw a sliding tackle whereby his right foot got stuck in the grass. At that moment the right pelvis was subject to a cranial force, while the left pelvis underwent a caudal force (figure 2). Because the right foot stuck in the grass, the contrary forces on the symphysis pubis were unexpected. The patient did not have enough time to contract his adductor or abdominal muscles to absorb the conflicting force. As result, the APL tore. Similar to what happens in anterior cruciate ligament rupture without lesions of the muscular tendons of the knee joint. Patients with an acute APL injury will present with pubic-related groin pain with a sudden onset after an unexpected trauma (according to the biomechanism described

above). Clinical exam shows pinpoint pain at the affected side of the symphysis pubis. There is no clinical sign of inguinal herniation, hip problem, adductor- or abdominal muscle strain or other causes of groin pain. However, instability of the pubic symphysis joint, due to the loss of function of the APL, could induce overuse injuries secondary to the APL rupture. The diagnosis is made by MRI. The MRI examination demonstrates an APL tear (secondary cleft sign). Brennan et al. [6] described the secondary cleft sign as a marker of microtearing at the adductor attachment at contrast symphysography and at MRI [6]. In our case the patient underwent an ultrasound-guided infiltration of the left inferior pubic ligament with Platelet-Rich Plasma (PRP). The authors used a self-created injection technique specific for the APL: The transducer is placed longitudinally over the pubic prominence while the patient is in a supine position. The left and the right pubic bodies are clearly visible. The transducer slides down to the inferior margin of the pubic bodies, where the APL attaches. The needle is inserted using an out of plane technique superior to the transducer. This approach allows the physician to perform a direct ultrasound-guided infiltration with visibility of the needle and the APL. In our case, an anesthetic was injected around the left side of the APL before administering the PRP. The first four hours after the infiltration the patient experienced no pain. After the anesthesia wears off, the groin pain resumed. Three days after the PRP infiltration, the pain started to decrease gradually and disappeared within ten days.

CONCLUSION

To the best of our knowledge, this is the first description of a traumatic arcuate pubic ligament rupture causing athletic pubalgia. Thorough research of the literature shows a link between injury of the APL and hip and groin pain. Diagnosis was confirmed by MRI. Treatment of the APL with an ultrasound-guided PRP injection was successful. Further research is needed to determine the right place of APL injury on the list of differential diagnoses in chronic groin pain.

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Figure 1

A Axial T2 weighted MRimage at the inferior part of the pubis (level of the dotted horizontal line on B).

B Sagittal intermediate TE weighted MRimage with fat suppression at the origin of the left adductor-gracilis complex (level of the dotted vertical line on A).

C Coronal intermediate TE weighted MRimage with fat suppression at the anterior part of the pubis (level of the superior horizontal dotted line on A and left vertical dotted line on B).

D Coronal intermediate TE weighted MRimage with fat suppression at the posterior part of the pubis (level of the inferior dotted line on A and right vertical dotted line on B).

Arrows: thickened adductor longus-gracilis complex at the left side with minor increased signal.

Arrowheads: increased signal at the rupture of the ligamentum arcuatum pubicum (secondary cleft sign) present at the whole anterior to posterior width of the joint.

Figure 2

Forces acting on the symphysis pubis while traumatic event

Red arrows indicate direction of ground reaction force (Foot stuck in the grass)

Green arrows indicate direction of weight/sliding force (Tackling/sliding leg reaching out for the ball)