

The Treatment for Athletic Pubalgia

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Abstract. Athletic Pubalgia injury is a common sports injury that troubles the sports life of ordinary people and the performance of athletes. This paper aims to help everyone briefly understand the anatomical mechanism of injury, treatment methods, and precautions. Also, the most important part of this paper is that the treatment of Athletic Pubalgia. It divided in two parts, one is on surgical grounds, and other one is on conservation treatment grounds. This paper shows the correlation between the two treatments. At last, this paper shows the prognosis of this injury. Also, it shows the different effects of ordinary people and athletes. Through this paper, it will be more evidence-based when dealing with Athletic Pubalgia injuries in daily life, enabling people to have a clearer understanding of the ways to recover from injuries and illnesses, and to recover their health as soon as possible.

Keywords: Athletic Pubalgia; rectus abdominis; adductor; muscle strain; muscle tears; Copenhagen Side Plank; muscle adhesion.

1. Introduction

Athletic Pubalgia is a routine sports injury, it is also called sports hernia. Exercise induced inguinal pain is a strain or tear of any soft tissue (muscle, ligament, or tendon) attached to the lower abdomen or groin. This includes the muscles attached to the pubic bone at the proximal end of the leg (usually tears of the adductor and rectus abdominis muscles, as there is stress confrontation between the two muscles involved in repeated powerful kicking, twisting, turning, or cutting movements). The most vulnerable muscle is the adductor muscle group attached to the pubic bone. For Athletic Pubalgia, most of the current treatment methods are conservative treatment and anti-inflammatory drug treatment, followed by a course of focused physical therapy. But for populations with severe injuries or special needs, corresponding surgical treatment is required. The surgical principles include reattachment of the rectus abdominis and repair or reinforcement of the abdominal musculature in layers to re-create the inguinal ligament anatomy. Due to the fact that Athletic Pubalgia is a common sports injury, it can affect people's daily lives for the general public and disturb us during exercise; For athletes, Athletic Pubalgia is a disease that often occurs in the later stages of their career, and athletes' concerns about Athletic Pubalgia can also lead to a decline in their competitive state. In order to better continue their career, further research on Athletic Pubalgia treatment is important. The paper will give better research for Athletic Pubalgia treatment, and it can give people a clear understanding. In the future, effective methods can be found as soon as possible when encountering different patients.

2. Basic Information

Athletic Pubalgia is a common injury for athletes, and it will also happen in normal person. The anatomy of Athletic Pubalgia is basically combined with tow muscles, one is rectus abdominis (Transversalis Fascia, Rectus Abdominis, Internal Oblique, External Oblique) other is adductor (Pectineus, Adductor Brevis, Adductor Longus, Adductor Magnus, Gracilis) [1]. When the movement involves hip joint torsion, leg swing, and amputation, in mechanics, the rectus abdominis and adductor muscles will generate upward and downward tension, and the stress concentration point will appear at the attachment point of the two muscles at the pubic bone.

About the Pathoanatomic after Athletic Pubalgia injury occurs, the adductor muscle is subjected to muscle tearing, which usually occurs within the muscle fibers, resulting in the rupture of the fascia

covering the surface of the muscle fibers. Further damage can cause damage to the connective tissue layer within and around the muscles. According to the severity of muscle strain, it can be roughly divided into three levels. Level 1 indicates mild injury, with only a small amount of fiber tearing. When injured, there is local pain or slight tingling, and the impact on movement and strength is relatively small. Level 2 indicates moderate injury, with numerous muscle fiber tears and severe functional impairment, accompanied by significant pain and swelling. Level three indicates severe injury, complete muscle tear, complete loss of function, and severe pain and swelling [2].

The site of muscle injury often occurs at the connection between muscles and tendons, followed by the connection between tendons and periosteum. Because the joints between muscles and tendons are more rigid than other parts of the muscles, while the joints between tendons and periosteum lack blood supply. Of course, injuries can also occur to the muscular abdomen [2].

Microscopically, muscle fibers and fascia have been damaged to varying degrees, resulting in corresponding detachment. Severe injuries require surgery to help recover, while milder injuries can also cause muscle adhesion after scar formation. In the later stage of muscle tearing, the injury muscle will form muscle adhesion. Muscle adhesion is an inflammatory reaction produced by muscles. When the muscle is damaged, the body will initiate an inflammatory response and a typical healing process. Within a few days of injury, satellite cells will be activated to repair damaged muscle fibers or produce new ones, while fibroblasts will accelerate the production of collagen fibers and matrix to serve as the framework for muscles. After injury, the collagen fibers will be torn, and the initial arrangement will also be disrupted. The new collagen fibers generated during the repair phase are not arranged in the original direction, so the final result is abnormal connections and adhesions between the fibers. Fibrous tissue around the muscles proliferates, and in the later stages, the fibrous tissue gradually forms scars, which are called adhesions, further affecting the muscle's contractile function. Regardless of the cause of muscle adhesion, it is related to the deterioration of blood circulation at the site of adhesion. Without sufficient nutrition, muscles become stiff, tight, and stick together, eventually forming muscle adhesion as they atrophy. The metabolic waste of muscles may not be smoothly discharged from the body due to poor circulation, further exacerbating symptoms [3].

3. Surgery

For Athletic Pubalgia, muscle tear is the most common injury, and the severity of most muscle tears does not require surgery to recover. However, in the face of severe muscle tears and disconnections, in this condition always need to use surgical methods for treatment. Due to Athletic Pubalgia being a muscle injury, the surgical method is relatively simple, mainly by suturing the severed ends together. But as mentioned earlier, muscle damage can occur in three parts of the muscle (the muscular abdomen, the connection between muscles and tendons, the connection between tendons and periosteum), and there are slight differences between the three. Therefore, we still need to distinguish the surgical methods for different injured parts.

For muscle abdomen and the connection between muscles and tendons, similarly we still need to determine the treatment method based on the situation. For ordinary muscle rupture tears, it only needs to suture the two free end muscles using surgical sutures. However, in most cases, muscle tearing and tearing occur during muscle movement, as the muscles have elasticity. If tearing occurs during contraction and relaxation, the distance between the two free ends will be large and they will contract towards their respective attachment points. At this point, another surgical method is needed. In this condition need tendon transplantation surgery to address this serious injury. In terms of terminology, it is called-- Reconstruction Using Allogeneic Tendon. Tendon transplantation is a common surgical method that can help restore damaged or broken tendon function. Transplantation surgery typically involves removing a segment of a tendon from a healthy tendon area and implanting it into the damaged area to restore normal tendon function. The simple surgical procedure is: (1) Expose the damaged area of the tendon and free the broken ends of the tendons on both sides. (2) According to the prescribed procedure, restore the allogeneic tendon to its normal state. (3) According

to the length of the tendon defect, allogeneic donor tendons of corresponding length were cut. (4) Use appropriate methods to suture tendons [4].

For the connection between tendons and periosteum it's another surgical method. Due to the high strength of ligaments, when an injury occurs during intense exercise, the ligaments may tear off the cartilage attached to the bone. This type of injury is also common, called avulsion fracture [5]. In Athletic Pubalgia injury, both the rectus abdominis and adductor muscles are attached to the pubic bone, which serves as a stress concentration point and is also useful for similar injuries. There are two surgical methods for avulsion fractures. One is to cross fix the free bone fragments in their original positions with Kirschner wires and wait for the bones to heal themselves [6]. Another method is to reconstruct the connection between ligaments and bones, suitable for more severe injuries. A drill bit is used to drill a small hole near the original attachment point between the tendon and the bone, and sutures are used to pull the broken and free tendon to the vicinity of the small hole, which is fixed with rivets.

4. Conservative Treatment

For Athletic Pubalgia conservative treatment is a big part, most people who suffered from Athletic Pubalgia will choose the conservative treatment to treat their injury. Conservative treatment mainly revolves around this immobilization and subsequent rehabilitation exercises. Emergency immobilization in the early stages of injury is necessary and necessary, and for normal Athletic Pubalgia conditions, it usually requires four to six weeks of rest. During the acute phase, appropriate cold compress is also necessary. Athletic Pubalgia is a sports injury, and for the rehabilitation of Athletic Pubalgia, a large amount of rehabilitation exercise is necessary, and of course, physical therapy is needed to assist. There are many ways to exercise rehabilitation, mainly focusing on the training of adductors and core muscle groups of the body. There are many methods available, and here I will introduce a method that has a significant training effect.

Copenhagen Side Plank, also known as Copenhagen adduction, is a variant of lateral plate support that can exercise the muscles in the inner thighs and groin area - the adductor muscle group. The adductor muscles of the hip include the adductor longus, adductor brevis, adductor magnus, pubis, and gracilis, which are mainly responsible for adducting the hip joint or moving the leg towards the midline.

Research has shown a correlation between the strength of the hip adductor muscle group and inguinal injury. Through a systematic review of multiple studies, this literature found that the strength of the hip adductor muscle group significantly decreased before and during inguinal injury. In addition, the strength of the hip adductor muscle group of injured athletes significantly decreased during relevant tests [7].

There is another similar study, which mainly studies the relationship between inguinal pain and the strength and range of motion of the hip adductor muscle group in male football players [8]. The author found that players with inguinal pain showed a significant decrease in the strength of the eccentric adductor muscle group when tested on the dominant leg, and the range of motion of the athlete's hip adductor muscle group was also affected. So in summary, hip joint adduction strength is crucial for reducing the risk of groin related injuries and maximizing hip joint function, especially for athletes who need to frequently kick or run. There are many training movements for adductors, such as hanging adduction, sitting adduction, single leg adduction, etc. Why is Copenhagen Plate Support more recommended? This study, published in the British Journal of Sports Medicine in 2013, aims to compare the effects of different hip adductor training movements on the activation of adductor muscle groups, in order to evaluate the application value of these training movements in the prevention and treatment of inguinal injury. The study used electromyography (EMG) technology to test 8 common hip adductor training movements, while recording data on the physical characteristics and adductor muscle group strength of participating football players [9]. The research results show that leg adduction and Copenhagen plate support are the most effective training methods for adductor

muscle groups, which can significantly activate the hip adductor muscle group. In contrast, other training methods for adductor muscle groups, such as single leg adduction, suspension adduction, and sitting adduction, have lower activation levels, and may not be as effective in preventing and treating inguinal injuries as the first two. In addition, in addition to preventing inguinal injury, a study published in the 2014 American Journal of Sports Medicine showed that Copenhagen treadmill support training can significantly improve the activation level of waist and hip muscles, especially the adductor muscle group and hip muscles. The enhancement of these muscles helps to improve the stability of the trunk core, thereby reducing the risk of injury and improving athletic performance.

Physical factor therapy mainly includes sound, light, electricity, magnetism, and heat, and is accompanied by drug treatments such as etoperidone hydrochloride tablets, celecoxib capsules, and acetaminophen tablets, aiming to reduce inflammation and relieve pain.

5. Prognosis

Regarding prognosis, the main focus is on reducing muscle adhesion and preventing secondary injuries. Whether it's conservative treatment or surgical treatment, we all face the next exercise, so every exercise is a risk. After Athletic Pubalgia recovers, many people still need to return to their normal lives, and many athletes also need to return to their sports fields to continue competitive sports. So, what we need at this point is a lot of warm-ups before exercise, especially paying attention to dynamic stretching before exercise to maintain muscle elasticity. After exercise, this static stretching can ensure muscle ductility and prevent injured tissues from developing muscle adhesion again. If muscle adhesion is not resolved after more than three months, then it involves using surgical methods to solve the problem of muscle adhesion. Among the common surgical methods, the most effective one is the small needle knife treatment. Small needle knife therapy is a new medical discipline created by absorbing modern Western medicine and natural science achievements under the guidance of traditional Chinese medicine theory [10]. This treatment method is achieved by using a needle, a long handle type treatment device composed of small blades, to penetrate deep into the soft tissue of adhesions. Through reasonable and effective techniques, the adhesions are cut open, instantly releasing the adhesions, and quickly relieving the pain and limited limb movement caused by adhesions. It is a closed release surgery that falls between surgical and non-surgical methods. Due to its small wound size, easy operation, safety and efficiency, it is often used in clinical practice. Local block therapy can also be performed by injecting local anesthetic drugs and anti-inflammatory drugs such as hormones into the area to relieve pain. After appropriate activities, the symptoms can be eliminated by pulling the adhesive position apart.

6. Conclusion

AP belongs to muscle injury and is also an injury to the core muscle group, which is prone to secondary injury after injury. Therefore, in the rehabilitation stage, it is important to focus on the patient's personal feelings (muscle pain, muscle fatigue). Surgical treatment does not conflict with conservative treatment. After surgical treatment, in order to reduce sequelae, resume exercise as soon as possible, and prevent further injuries, appropriate rehabilitation training is also necessary, and the training method is basically the same as conservative treatment. In fact, the treatment technology is relatively mature, mainly during the prognosis period. For similar muscle injuries, we should pay more attention to the later rehabilitation. Especially for professional athletes, good recovery and later physical maintenance are the key to returning to the field. The above is the overall summary.

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