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Overview of Achilles Tendon Injury Treatments

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Abstract. Achilles tendon injuries, common among athletes and individuals engaged in high-impact activities, present significant challenges in both diagnosis and treatment. This article describes the Achilles tendon as a whole, the nature of related injuries, and how they are diagnosed and treated and how they are diagnosed, often magnetic resonance imaging (MRI) and ultrasound play crucial roles in differentiating the severity of these injuries. Treatment approaches range from non-surgical options, like functional bracing and physical therapy, to surgical interventions necessary for complete ruptures. Emerging biological therapies, it includes Platelet-Rich Plasma (PRP) and stem cell tech, show promise in enhancing recovery, though another research is needed to confirm their years effectiveness. Additionally, preventive measures and personalized rehabilitation programs are emphasized as essential strategies for reducing the incidence of Achilles tendon injuries and ensuring effective recovery. The paper concludes by discussing the future direction of treatment modalities, highlighting the potential of advanced technologies and therapies in improving patient outcomes.

Keywords: Achilles Tendon Injuries, Biological Therapies, Rehabilitation Programs.

1. Introduction

The Achilles tendon connects the calf muscles to the calcaneus and is very strong. Due to the considerable mechanical stress it endures during daily activities and sports, it is particularly prone to various injuries. Achilles tendon disorders include acute ruptures, chronic tendinopathy, and paratenonitis, often resulting from repetitive strain, aging, or sudden high-intensity physical activities. Epidemiological studies indicate that Achilles tendon injuries are notably prevalent among athletes engaged in high-impact sports, such as running, basketball, and soccer.

2. Diagnosis of Achilles Tendon Injuries

Achilles tendon injuries require imaging to detect them. Magnetic resonance imaging (MRI) is a common imaging technique that displays images of soft tissue. In addition, ultrasound imaging is widely used because of its convenience. However, the accuracy of ultrasound testing depends on the medical level of the user [1].

3. Treatment Approaches

3.1. Non-Surgical Treatment

Non-surgical interventions are often the first line of treatment for partial tears or early-detected Achilles tendon injuries. Common methods include functional bracing, physical therapy, and the administration

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of non-steroidal anti-inflammatory drugs (NSAIDs) [2]. Studies have shown that the use of braces can reduce the probability of Achilles tendon re-tearing, and it can promote the recovery of Achilles tendon formation [3].

3.2. Surgical Treatment

Surgical repair is typically recommended for complete tendon ruptures or cases where conservative treatment has failed. The goal of surgery, whether performed through open or minimally invasive techniques, is to reattach the torn tendon fibers, thereby restoring their function [4]. Although surgical intervention effectively restores tendon strength, it carries risks such as postoperative infections and adhesion formation, which require careful postoperative management [5].

3.3. Biological Adjunct Therapies

In recent years, biological adjunct therapies such as Platelet-Rich Plasma (PRP) and stem cell therapy have gained traction in the treatment of Achilles tendon injuries [6]. These therapies aim to accelerate the healing process by promoting cellular regeneration and reducing inflammation. Even though the initial studies are promising, more experiments are needed to prove that they work and are safe [7].

3.4. Other Therapeutic Interventions

Additional therapeutic options include electrical stimulation, low-level laser therapy, and extracorporeal shockwave therapy. These treatments primarily focus on improving local blood circulation and alleviating pain to support the recovery process [8].

4. Prevention and Rehabilitation

Preventive measures should include a reasonable exercise program and gradually increasing the intensity of exercise to avoid placing excessive stress on the Achilles tendon [9]. Preventing Achilles tendon injuries hinges on proper conditioning and a gradual increase in physical activity intensity. In the rehabilitation phase, physical therapy is crucial, particularly in enhancing the flexibility and strength of the calf muscles and Achilles tendon [10]. Research has shown that personalized rehabilitation programs can significantly lower the risk of re-injury and expedite functional recovery [11]. Wearing shoes with arch support can reduce stress on the Achilles tendon. And always replace old shoes to ensure the correct support of the foot [12]. It can be combined with low-impact activities, such as swimming, to reduce repeated stress on the Achilles tendon [13]. After exercise, perform static stretches focusing on the calf muscles (gastrocnemius and soleus) to maintain flexibility and reduce the risk of tightness in the Achilles tendon [14]. Physical therapy can use manual therapy, electrical stimulation, and low-intensity laser therapy to promote local blood circulation, reduce pain, and speed recovery [15].

5. Conclusion

In the field of sports medicine, the prevention and rehabilitation of Achilles tendon injury has become a crucial research and practice direction. In this paper, the structure of Achilles tendon, the common causes of injury, diagnosis, treatment, prevention and rehabilitation strategies are discussed. As one of the strongest tendons in the body. There's a lot of force on the Achilles tendon and is therefore susceptible to injury due to repetitive stress, aging, or sudden high-intensity exercise. Through timely and accurate diagnosis, medical personnel can effectively distinguish between complete rupture and partial tear, so as to formulate the most appropriate treatment plan. In terms of treatment, non-surgical and surgical treatment have their own scope of application and efficacy. Physical therapy, and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) are preferred in cases of early detection or partial tear. In cases of complete rupture or failure to respond to conservative treatment, surgical repair is often considered the best way to restore Achilles tendon function. Although surgery can effectively restore the strength of the Achilles tendon, its potential postoperative complications such as infection and adhesions require careful management after surgery. Looking forward, the treatment of Achilles tendon injuries is expected to increasingly incorporate advanced diagnostic technologies and biological adjunct therapies.

While the promise of these technologies is limitless, research is still needed to ensure their safety. Meanwhile, preventive strategies and scientifically-based rehabilitation programs will reduce the chance of Achilles tendon injury.

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