Achilles Tendinopathy Treatment Guidelines

Achilles tendinopathy (AT) is a chronic condition characterized by pain, swelling, and functional limitations in the Achilles tendon, often associated with overuse or degenerative changes. Common in athletes and middle-aged individuals, AT requires a comprehensive, personalized treatment approach to alleviate symptoms and restore function. These guidelines provide a structured framework for the treatment and management of AT.

Conservative treatment of Achilles tendinopathy

Conservative treatment remains the first-line approach for managing Achilles tendinopathy (AT), especially in the early stages or when symptoms are not severe enough to warrant surgical intervention.

These treatments aim to reduce pain, improve function, and address biomechanical factors contributing to tendon overload. Although many non-operative treatments have been proposed, a consistent lack of robust evidence-based support limits their predictability and long-term effectiveness (Tarantino et al., 2023).

Activity modification

For patients with nonacute Achilles tendinopathy, complete rest is not recommended (Martin et al., 2018). Clinicians should encourage patients to maintain physical activity within their pain tolerance while participating in a structured rehabilitation program. High-impact activities, such as running and jumping, which can exacerbate symptoms, should be temporarily reduced. Instead, patients are advised to engage in low-impact alternatives, such as swimming or cycling, to preserve overall fitness and tendon function.

Maintaining activity within tolerable pain levels is critical, as prolonged rest can lead to tendon deconditioning, potentially delaying recovery.

Research by Silbernagel et al. (2011) emphasizes the benefits of continuing activity under guided pain thresholds. Their findings demonstrate that engaging in structured exercise programs while maintaining modified activity levels optimizes recovery, reduces recurrence rates, and allows the majority of patients to achieve full recovery. This approach balances the need for tendon loading to promote remodeling with the necessity of avoiding aggravation of symptoms.

Pharmacological interventions

Pharmacological approaches are often used as adjuncts to other treatments for Achilles tendinopathy, primarily to manage symptoms and enable patients to engage in effective rehabilitation strategies. However, the evidence supporting these interventions varies, and their use should be tailored to individual patient needs and risks (Tarantino et al., 2023).

Non-steroidal anti-inflammatory drugs (NSAIDs)

NSAIDs are commonly prescribed for managing acute symptoms of Achilles tendinopathy, offering short-term pain relief (Glaser et al., 2008). While tendinopathies are not considered classical inflammatory conditions, NSAIDs can be useful for controlling pain to enable proper eccentric strengthening exercises and stretching of the gastrocnemius and soleus muscles. Despite their benefits, the effect of NSAIDs on acute symptoms has been described as modest, with limited evidence supporting their long-term effectiveness in tendinopathy management. (Tarantino et al., 2023).

Cryotherapy

Cryotherapy, widely used for its analgesic properties, works by reducing the metabolic rate of the tendon, decreasing blood flow and protein extravasation from new capillaries formed during tendon injury (Kannus & Józsa, 1991). Although cryotherapy can provide temporary pain relief, current evidence does not support its efficacy as a definitive treatment for Achilles tendinopathy (Tarantino et al., 2023). It is best considered as a complementary approach for symptom management rather than a primary intervention.

Nitric oxide administration

Topical administration of nitric oxide, typically via glyceryl trinitrate adhesive patches, has been evaluated as a treatment for mid-portion Achilles tendinopathy. Early studies reported promising results, with benefits lasting up to three years in cases of chronic non-insertional AT (Paoloni et al., 2004). However, more recent systematic reviews and meta-analyses have challenged these findings, concluding that nitric oxide therapy offers no significant advantage in reducing pain or improving outcomes compared to other treatments. These mixed results underscore the need for further research to clarify its role in AT management (Tarantino et al., 2023).

Therapeutic exercise

Therapeutic exercise programs form the cornerstone of conservative management for Achilles tendinopathy (AT). These programs, particularly those involving eccentric loading exercises, are widely recognized as the first-line treatment for non-insertional AT (Longo et al., 2009). Their ability to promote tendon remodeling and improve function has made them a fundamental part of AT management protocols.

Eccentric loading exercises

Eccentric exercises are the most effective conservative treatment for mid-portion AT. They promote collagen fiber cross-link formation within the tendon, which facilitates tendon remodeling and improves tensile strength (Jarin et al., 2020;Tarantino et al., 2023).

The Alfredson protocol is the most commonly used eccentric exercise program, involving three sets of 15 repetitions performed twice daily, seven days a week, for 12 weeks (Alferdson et al., 1998). This regimen has consistently shown superior outcomes compared to a "wait-and-see" approach, with positive results reported in both athletic and sedentary populations (Silbernagel et al., 2001).

While the benefits of eccentric training are well-documented, some studies have reported varying success rates, with outcomes influenced by factors such as patient motivation and compliance (Sayana & Maffulli, 2007). Not all patients respond to eccentric exercises, and the exact mechanisms of their effectiveness remain incompletely understood. However, the lack of adverse effects and the overall trend of improvement make this approach widely accepted (Tarantino et al., 2023).

Heavy slow resistance training

Heavy slow resistance (HSR) training is another effective therapeutic exercise modality. HSR programs involve controlled, slow-loading movements under high resistance, typically performed over a 12-week period (Beyer et al., 2015). This approach has been shown to be as clinically effective as eccentric exercises, with a trend toward higher patient satisfaction. HSR training may also be better tolerated by certain patients, offering an alternative for those who struggle with traditional eccentric protocols (Tarantino et al., 2023).

Isotonic, isokinetic, and concentric loading exercises

Isotonic, isokinetic, and concentric loading exercises have been explored as part of rehabilitation strategies for AT. These types of exercises focus on controlled, repetitive movements designed to strengthen the tendon and surrounding musculature. However, compared to eccentric exercises, these approaches generally yield inferior outcomes in terms of pain relief, functional improvement, and long-term recovery (Tarantino et al., 2023).

Physical therapy

Physical therapy interventions are widely employed in the management of AT, often as an adjunct to exercise-based treatments. Among these, extracorporeal shockwave therapy (ESWT) and ultrasound (US) therapy are the most studied modalities, though their effectiveness varies depending on application protocols and patient-specific factors (Tarantino et al., 2023).

Extracorporeal shockwave therapy (ESWT)

ESWT is a second-line management option for AT, particularly when conservative exercise treatments alone are insufficient. The therapy acts on two fronts: promoting tissue healing and providing pain relief. By generating high strains in the tendon, ESWT stimulates a healing response and induces analgesic effects. However, consensus is lacking regarding the optimal application method, energy levels, number of sessions, and treatment frequency, which may influence outcomes (Tarantino et al., 2023).

Studies have shown that low-energy ESWT is more effective than eccentric exercises (EE) alone for insertional AT but shows similar short-term outcomes for mid-portion AT (Rompe & Maffulli, 2008). Combining ESWT with EE may yield superior results compared to EE alone for mid-portion AT.

However, if low-energy ESWT is not applied according to scientifically recommended modalities, its efficacy diminishes, leading to suboptimal outcomes. Recent systematic reviews and meta-analyses highlight that while ESWT has specific benefits, it does not universally outperform EE for chronic AT (Arora et al., 2022; Tarantino et al., 2023).

Ultrasound therapy

Ultrasound (US) therapy is another commonly used modality in physical therapy for AT. While widely available, its efficacy remains controversial. Many studies indicate insufficient evidence to support US therapy's benefits at current clinical dosages (Tarantino et al., 2023). A randomized controlled trial by Chester et al. (2008) compared heavy eccentric loading to US therapy in patients with a sedentary lifestyle, finding no significant difference in outcomes, though both treatments were well-tolerated.

Some recent evidence suggests that combining US therapy with other modalities, such as cryotherapy, may provide synergistic benefits. A retrospective observational study by Agostini et al. (2023) found that simultaneous cryotherapy and US therapy alleviated symptoms in AT patients, offering a potential avenue for multimodal therapy. However, more robust research is needed to confirm these findings (Tarantino et al., 2023).

Orthotics

Orthotics are commonly employed in the management of AT, particularly for patients with chronic symptoms or a sedentary lifestyle. These devices are designed to offload the tendon, provide support, and reduce strain during physical activity, thereby enhancing comfort and enabling participation in rehabilitation programs. Despite their widespread use, there is significant contradictory evidence regarding their efficacy and recommendations for their application remain inconsistent (Tarantino et al., 2023).

Injection therapy

Injection therapy is a commonly explored second-line treatment option for Achilles tendinopathy, especially in cases resistant to conservative management. Various substances and techniques, including platelet-rich plasma (PRP), high-volume image-guided injections (HVIGI), sclerosing injections, and hyaluronic acid (HA), have been investigated. However, the evidence supporting these therapies is mixed, and no single approach has been established as superior.

Platelet-rich plasma (PRP)

The use of PRP in AT management has grown exponentially in recent years. PRP is thought to enhance tissue healing by delivering concentrated growth factors directly to the affected area. However, a randomized controlled trial (RCT) evaluating PRP combined with eccentric exercises found no significant difference in pain or activity levels compared to saline injections at 6, 12, or 24 weeks (des Vos et al., 2010).

Systematic reviews and meta-analyses further confirm that while PRP may provide some baseline pain reduction and functional improvement, it is not more effective than placebo interventions, such as sham injections or physiotherapy alone. Additionally, there are no standardized protocols for PRP dosage, injection technique, timing, or number of injections, limiting its reliability and clinical applicability (Tarantino et al., 2023).

High-volume image-guided injections (HVIGI)

HVIGI involves injecting large volumes of saline, often combined with anesthetics or corticosteroids, under ultrasound guidance. The technique aims to disrupt neovascularization and accompanying nerve ingrowth, which is believed to contribute to pain in chronic AT (Tarantino et al., 2023).

HVIGI has shown promising results, particularly in reducing pain and improving function in resistant cases. Studies suggest that HVIGI may offer superior short-term outcomes compared to PRP, though high-quality research is needed to confirm these findings (Boesen et al., 2017; Tarantino et al., 2023).

Sclerosing injections

Sclerosing injections are used to target and occlude pathological neovascularization in the tendon. While some studies report positive outcomes, including pain reduction and improved function, results have been inconsistent (Tarantino et al., 2023). The variability in outcomes may stem from differences in injection techniques, patient selection, and study designs.

Hyaluronic acid (HA) injections

Recently, peritendinous injections of HA have been proposed as a treatment for AT. HA is thought to enhance tendon hydration and reduce friction within the tendon structure (Agostini. Preliminary studies show promising results, with HA injections providing superior pain relief compared to extracorporeal shockwave therapy (ESWT) in the short term.

For example, HA demonstrated a 68.1% reduction in pain at 4 weeks, compared to a 47.9% reduction with ESWT (Lynen et al., 2017). Additionally, HA was associated with functional improvements at 3- and 6-month follow-ups. While these findings are encouraging, further high-quality research is necessary to validate HA’s long-term efficacy (Tarantino et al., 2023).

Surgical intervention

Surgical intervention is typically reserved for patients with Achilles tendinopathy who do not respond to at least six months of conservative treatment. The primary goals of surgery are to remove degenerative tissue, restore tendon structure, and improve function. However, long-standing cases are often associated with poorer outcomes and higher reoperation rates, emphasizing the importance of careful patient selection and counseling (Tarantino et al., 2023).

Open surgery

Open surgery remains the most widely utilized approach for treating AT, particularly in severe cases. This procedure involves making longitudinal incisions along the medial side of the tendon to avoid injuring the sural nerve and short saphenous vein. The surgeon debrides the tendinopathic tissue, often characterized by its disorganized "crabmeat" appearance. Typically, over 50% of the degenerative tissue is removed (Tarantino et al., 2023). For significant tissue loss, tendon augmentation or grafting may be necessary, with common options including the peroneus brevis and flexor hallucis longus tendons.

Post-operative rehabilitation focuses on early controlled motion while avoiding tendon overloading during the initial healing phase. Success rates for open surgery range from 50% to 100%, but complications such as wound infections, hematomas, keloid scars, sural nerve apraxia, tendon rupture, and thromboembolic events occur in up to 11% of cases (Tarantino et al., 2023). These risks highlight the need for thorough preoperative discussions regarding expectations and recovery.

Minimally invasive techniques

Minimally invasive techniques are increasingly favored for managing chronic AT, especially in cases resistant to conservative treatments. These approaches aim to reduce pain, restore function, and minimize recovery time while lowering the risk of complications compared to traditional open surgery.

Percutaneous stripping of the paratenon

Percutaneous stripping involves removing the paratenon tissue either directly or indirectly through high-volume fluid injections (Maffulli et al., 2017). The procedure is performed using small incisions, minimizing tissue disruption while accessing the targeted area. Patients often report significant pain relief and improved function, particularly in cases of non-insertional AT where conservative treatments have failed (Tarantino et al., 2023).

Percutaneous longitudinal tenotomies

This technique is performed under ultrasound guidance and is suitable for isolated tendinopathy and nodular lesions smaller than 2.5 cm (Maffulli et al., 1997) . The procedure is conducted under local anesthesia in an outpatient setting, making it both practical and effective. Outcomes are comparable to open surgical techniques, with benefits including early post-operative movement, such as dorsiflexion and plantar flexion, which help prevent stiffness and support recovery (Tarantino et al., 2023).

Stripping neovessels in Kager’s fat triangle

Targeting neovessels in Kager’s fat triangle is another minimally invasive technique aimed at addressing chronic AT pain (Longo et al., 2009).. The procedure disrupts neovessels and their accompanying nerve supply, which are often linked to pain in chronic cases. This approach has shown significant efficacy in pain reduction and is particularly beneficial for patients whose symptoms are associated with neovascularization (Tarantino et al., 2023).

Minimally invasive open debridement

Minimally invasive open debridement is a hybrid technique ideal for elite athletes and individuals with non-insertional AT (Tarantino et al., 2023). It involves removing degenerative tissue and, when necessary, resecting the plantaris tendon. Compared to traditional open surgery, this method reduces complication rates, minimizes recovery time, and helps patients return to activities sooner.

Endoscopic techniques

Endoscopic procedures provide additional benefits by minimizing tissue damage and reducing the risk of infection. These techniques allow for the precise removal of pathological tissue while maintaining low morbidity rates. Outcomes for endoscopic methods are comparable to open surgery, making them a valuable option in the minimally invasive management of AT (Tarantino et al., 2023).

Additional notes

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