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Is dry needling an effective treatment for tennis elbow? A literature review

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Abstract
Introduction: Tennis elbow, or lateral epicondylitis, affects around 1% to 3% of the population, causing pain and functional limitations, yet its exact causes and degenerative mechanisms are still not fully understood. Research indicates that tendinopathy primarily arises from new blood vessel formation and collagen fiber disruptions, while tennis elbow complicates diagnosis and treatment due to a mix of biomechanics, occupational factors, and individual variations. Despite various treatments available for tennis elbow, no single option is universally recognized as superior, with the primary recommendation being to rest from activities that worsen the condition. To alleviate pain after exercising, options include applying ice, using oral or topical NSAIDs, or exploring corticosteroid therapy, with more invasive treatments like dry needling being effective for managing myofascial pain and trigger points when basic methods fall short.

Aim: The aim of this article is to explore the underlying mechanisms of tennis elbow and assess the effectiveness of treating it through dry needling.
Review methods: A comprehensive analysis of research papers available on PubMed and Google Scholar was undertaken using the searchterms encompassing the following keywords: tennis elbow, lateral epicondylitis, dry needling, tennis elbow pathophysiology.
Conclusion: Dry needling has shown success in relieving symptoms of chronic lateral epicondylosis that haven't improved with standard therapies. This method is safe, cost-effective, and can be carried out by practitioners skilled in upper extremity anatomy and rehabilitation, but further extensive research with larger sample sizes, randomization, and control groups is needed to more accurately assess the effectiveness of dry needling for treating tendinopathies.

Keywords: tennis elbow, lateral epicondylitis, dry needling, tennis elbow pathophysiology

Introduction

Tennis Elbow was initially identified by Runge [1] in 1873 and later referred to as 'Lawn Tennis Arm' by Henry Morris in an article published in the Lancet in 1882 [2]. Tennis elbow commonly known as lateral elbow tendinopathy, lateral epicondylalgia or lateral epicondylitis often leads to pain and functional limitations in the elbow [3,4]. The prevalence of lateral epicondylitis (LE) is estimated to affect about 1% to 3% of the total population, impacting both men and women equally. Peak incidence between the ages of 35 and 55. This musculoskeletal condition often emerges in adulthood, bringing with it challenges such as pain and limited mobility. Clinical signs often involve tenderness located just below the lateral epicondyle at the extensor carpi radialis brevis (ECRB) insertion point, reduced grip strength, and positive outcomes from stress tests like Cozen's and Mills. Key risk factors contributing to the development of LE in the general population include smoking, carrying excess weight, and engaging in repetitive, vigorous activities with the elbow, forearm, and wrist for a minimum of two hours daily [5]. Lateral elbow tendinopathy was initially thought to be due to inflammation of the common extensor tendon at the lateral epicondyle. However, recent findings suggest it is more accurately characterized as a pathology of the tendon near its enthesis [3,4,6]. Repeated mechanical stress in this area leads to histological changes within the tendon. It's also essential to consider other structures in the differential diagnosis, including the radial collateral ligament, annular ligament, radiocapitellar joint, radial nerve, and cervical spine and other diagnoses that overlap clinically, including posterolateral rotatory instability, cervical radiculopathy radial tunnel syndrome, etc. [3,4,6-9]. Terms like tendonitis and epicondylitis imply an inflammatory process, which is somewhat misleading. The underlying histology shows a dense presence of fibroblasts, vascular proliferation, proliferation of tissue granulation, micro-rupture and disorganized collagen [10]. Previously, this condition was referred to as angiofibroblastic dysplasia, following numerous histological studies that revealed its microscopic features and characteristics [11,12]. This phenomenon typically arises in tendons that have suffered damage due to repetitive microtrauma. Interestingly, tennis elbow does not exhibit any inflammatory changes, leading to uncertainty about why the condition is so painful for some individuals, with pain intensity varying significantly among patients.

Tennis elbow is thought to arise from various contributors, including overuse, repetitive motions, and aging, though no single cause has been definitively identified. Some associated risk factors include issues with the rotator cuff, De Quervain's disease, carpal tunnel syndrome (CTS), the use of oral corticosteroids, smoking habits, obesity, and rheumatoid arthritis [13,14], intensive manual occupations, and occupations involving vibratory machines [15].
Park et al. [16] identified risk factors for lateral epicondylitis like female sex, involvement of the dominant side, physical labor, and rotator cuff tears on the same side and they suggest that overuse activity has a stronger correlation with lateral epicondylitis compared to metabolic factors. Acute lateral epicondylitis can arise from a sudden overload of the extensor tendon, triggering an inflammatory reaction. In contrast, degenerative lateral epicondylosis is typically linked to repetitive stress on the tissue over time, which causes microtrauma. Understanding whether a patient's symptoms are acute or chronic is crucial for guiding treatment options. Often, the patient's history and the onset of their symptoms provide key insights for clinicians in making this distinction [17]. The main approach to managing tennis elbow involves resting from activities that exacerbate the condition. For pain relief, you can apply ice after exercising, take oral or topical non-steroidal anti-inflammatory drugs (NSAIDs), or consider corticosteroid therapy. Forearm counterforce straps are often suggested to help alleviate stiffness. A cock-up wrist splint may also be recommended to reduce strain on the wrist extensors. In cases where basic treatments don't fully address patients' symptoms, more invasive secondary therapies may be considered [18]. Dry needling (DN), although still relatively new in the treatment of LE, has been effectively utilized for managing trigger points, myofascial pain, and issues related to the rotator cuff.

Materials and methods

A comprehensive analysis of research papers available on PubMed and Google Scholar was undertaken using the searchterms encompassing the following keywords: tennis elbow/ lateral epicondylitis/ dry needling/ tennis elbow pathophysiology.

Pathophysiology of lateral epicondylitis

The underlying mechanisms of lateral epicondylitis (LE) remain unclear, the causes of pain and the degenerative processes that lead to functional impairments are still not fully understood. Research suggests [19] that the primary factors contributing to tendinopathy include the development of new blood vessels and disruptions in collagen fiber structure. Terms like tendonitis and epicondylitis imply inflammation, but the increased fibroblast density, vascular development, tissue granulation, micro-ruptures, and collagen disorganization reveal that conditions such as lateral epicondylitis result from a multifaceted process driven by repetitive microtrauma[10]. Tennis elbow is a complex issue that encompasses biomechanics, work-related factors, and individual differences, making both diagnosis and treatment quite challenging.

Treatment

Many treatments for tennis elbow have been described, and since so many are commonly used, it’s clear that no single treatment stands out as the best.

Local steroid injections:

The primary approach for managing this condition involves injecting a corticosteroid preparation mixed with a local anesthetic. The physician identifies the area of greatest tenderness and performs the injection using aseptic technique.

It's interesting to note that despite the lack of inflammatory changes visible under a microscope, a significant number of patients do respond positively to this treatment.

NSAIDS:

It's customary to prescribe oral NSAIDs for tennis elbow. In a review for Cochrane, Green examined the effectiveness of NSAIDs for this condition and found that topical NSAIDs can provide some relief for elbow pain, at least in the short term. However, the evidence on oral NSAIDs is less clear and suggests they might be less effective than local steroid injections. Nevertheless, many of our patients still report finding relief from oral NSAIDs in our practice [20].

Research by Hay et al. [21] has examined the effectiveness of local steroid injections compared to oral nonsteroidal anti-inflammatory drugs (NSAIDs) like naproxen in new patients within a primary care setting. The findings indicate that local corticosteroid injections offer a safe and effective treatment option, showing a clear clinical advantage at the four-week mark when compared to naproxen. However, similar to other musculoskeletal treatment approaches, there seems to be a weak correlation between the initial response to treatment and the outcomes in the long term.

Physiotherapy:

Various exercises have been proposed to treat tennis elbow, including manual therapy, the Cyriax method, Mill's manipulation, and myofascial release techniques.

The Cyriax technique, along with deep friction massage (DFM), also known as cross-friction massage, focuses on keeping the soft tissues - like ligaments, tendons, and muscles - mobile and preventing adherent scars. Mill's manipulation involves a specific movement technique characterized by a low - amplitude, high-velocity push for elbow extension. This is executed once the full range of elbow extension has been utilized, helping to enhance mobility. Myofascial Release Technique applies a controlled force in a targeted direction to the myofascial structures [22]. This stretching approach aims to restore or enhance normal mobility in restricted areas, thus relieving discomfort and improving overall function by maintaining a prolonged, low-load stretch on the tissues [23,24].

Therapeutic techniques analyzed by Pathan and Sharath [25] such as extracorporeal shockwave therapy, laser therapy, and ultrasound are utilized to alleviate pain, promote tissue healing, and improve overall function in affected areas. Additionally, low-level laser therapy has been shown to relieve pain and reduce inflammation, while ultrasound therapy aids in tissue repair and minimizes swelling by enhancing local blood circulation. To support the patient's recovery process, physiotherapists thoughtfully select and integrate these methods into comprehensive treatment plans, tailored to the severity of the condition and the individual's specific needs.

Procedure of dry needling

Dry needling (DN) is a technique that involves using thin, fine needles to target specific muscle or connective tissue areas. This process aims to deactivate myofascial trigger points (MTrPs), provoke a muscle twitch response, or trigger a localized inflammatory reaction that aids in healing.

While we don't fully grasp all the physiological impacts of dry needling, it is believed to cause biochemical changes that help break the cycle of pain and degeneration [26]. Recent systematic reviews indicate that occupational therapists (OTs) can effectively use dry needling to enhance range of motion (ROM) and reduce spasticity, which may be barriers to achieving functional independence [27].

Dry needling in tennis elbow

Minimally invasive treatments like percutaneous dry needling (PDN) can be an effective option when surgical and anti-inflammatory treatments fail to alleviate symptoms of lateral epicondylitis (LE) [26,28,29].

Nagarajan and al. [5] demonstrated that DN therapy is as effective as corticosteroids in treating tennis elbow. DN therapy not only shows gradually improved functional outcomes compared to corticosteroids, but it also offers notable advantages. While multiple sessions of DN are necessary, it stands out for being cost - effective, minimally invasive, and associated with fewer complications, unlike corticosteroids, which usually require only a single dose but can be more cumbersome.

In a prospective randomized controlled trial (RCT), Uygur et al. treated 92 patients with lateral epicondylitis using dry needling. The long-term outcomes showed a notable reduction in pain levels among the participants [26].

In a randomized controlled trial, Uygur et al. explored the effectiveness of percutaneous dry needling versus corticosteroid injections in 101 patients suffering from lateral epicondylitis (LE). The findings revealed that PDN provided superior long-term outcomes compared to corticosteroid injections [30].

In a retrospective study, Suzuki et al. examined the use of PDN for patients with lateral epicondylitis (LE) who did not respond to conventional conservative treatments [31]. The results showed a significant improvement in both clinical and functional impairment of the elbow following treatment. Additionally, a systematic review by Sousa Filho et al. found that PDN provided greater benefits compared to corticosteroid injections for managing LE, particularly in reducing pain levels and enhancing functional outcomes [32].

Conclusion

Lateral epicondylitis (LE) is a common condition that can significantly impact both function and productivity. We advocate for the increased use of minimally invasive treatment options, as these approaches do not necessitate hospitalization and can produce positive outcomes. Moreover, the materials used in these treatments are generally affordable and readily available, which helps to reduce loss of work and functional difficulties after treatment. Dry needling has proven effective in alleviating symptoms linked to chronic lateral epicondylosis that did not respond to traditional therapies.

This method is not only safe and cost-effective, but it can also be performed by practitioners trained in upper extremity anatomy and rehabilitation. However, more extensive research is required, involving larger sample sizes, randomization, and control groups, to better evaluate the effectiveness of dry needling in treating tendinopathies.

Author's contribution

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