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Exploring the potential of dry needling as a targeted approach for tennis elbow relief and recovery

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Abstract
Tennis elbow, or lateral epicondylitis, is a common condition causing outer elbow pain due to overuse and strain on forearm tendons. Dry needling, a modern technique, involves inserting sterile needles into trigger points to relax muscles and alleviate pain. For tennis elbow, it targets muscles like the extensor carpi radialis brevis, aiming to release tension and enhance healing. Dry needling offers potential as a treatment for tennis elbow by targeting trigger points and dysfunctional forearm muscles. Proposed mechanisms include neurophysiological effects, local tissue responses, and pain pathway modulation. Inserting needles triggers local twitch responses, activating Golgi tendon organs to induce muscle relaxation. Microtrauma from needling initiates an inflammatory response, aiding tissue healing and regeneration. Dry needling may also engage central pain modulation mechanisms, enhancing pain relief. Improved muscle function and motor control result from restoring optimal muscle length through targeted needling. A literature search, performed in google scholar, EBSCO, Pubmed, Cochrane and web of science (all publications until September 2022), resulted in 3680 hits. The search terms used are lateral epicondylitis, tennis elbow, trigger points, muscle tightness, tennis elbow. In conclusion, dry needling offers a targeted and promising treatment avenue for tennis elbow, alleviating pain, enhancing muscle function, and aiding long-term recovery.

Keywords: Lateral epicondylitis, tennis elbow, trigger points, dry needling, pain relief

Introduction

Tennis elbow, medically known as lateral epicondylitis, is a common musculoskeletal condition that affects the outer aspect of the elbow. Despite its name, tennis elbow is not exclusive to tennis players; it can occur in anyone who repeatedly performs activities involving gripping, wrist extension, or repetitive forearm movements. The condition typically arises from overuse or repetitive strain on the forearm muscles and tendons, leading to microtears, inflammation, and degeneration of the tendons that attach to the lateral epicondyle of the humerus bone [1].

Individuals with tennis elbow commonly experience pain and tenderness on the outer side of the elbow, which may radiate down the forearm. The pain is often aggravated by activities such as lifting objects, gripping, shaking hands, or even simple movements like turning a doorknob. It can significantly impact daily activities and work productivity, making it essential to find effective treatment options. Dry needling is a therapeutic technique gaining popularity in the management of musculoskeletal pain and dysfunction. Unlike acupuncture, which is rooted in traditional Chinese medicine, dry needling is based on modern anatomy and neurophysiology principles. In this intervention, fine, sterile needles are inserted into specific trigger points, tight bands, or dysfunctional muscles to stimulate a local twitch response and promote muscle relaxation. By targeting these trigger points, dry needling aims to reduce pain, restore muscle function, and improve overall tissue health [2].

In the context of tennis elbow, dry needling focuses on releasing the tension and tightness in the affected forearm muscles, including the extensor carpi radialis brevis (ECRB) muscle, which is often implicated in this condition. By deactivating trigger points and improving blood flow to the affected area, dry needling may offer relief and facilitate the healing process [3].

Background on dry needling

Dry needling is a therapeutic technique that involves the insertion of thin, solid needles into specific points in the skin and underlying tissues without injecting any substance (hence the term "dry") [4]. This intervention is used to target trigger points, myofascial knots, and dysfunctional muscles to alleviate pain, improve muscle function, and promote tissue healing [5].

Mechanism of action

Dry needling targets trigger points, which are thought to be areas of increased electrical activity and biochemical changes within muscles. Inserting a needle into a trigger point may stimulate muscle fibers, causing them to contract briefly and then relax. This process, known as a "local twitch response," is believed to release tension in the muscle and deactivate the trigger point, reducing pain and restoring normal muscle function [6]. Dry needling may affect the nervous system by stimulating A-delta and C-fibers, which transmit pain signals to the brain. The input from the needle can lead to a phenomenon called "diffuse noxious inhibitory control," where the brain's pain-modulating centers release endorphins and other neurotransmitters to inhibit pain transmission. This could result in pain relief beyond the immediate site of needling [7]. Inserting a needle into tissues creates a micro-trauma, which triggers an inflammatory and healing response. The increased blood flow to the area can deliver oxygen, nutrients, and immune cells to promote tissue repair and reduce inflammation [8]. Dry needling may influence neuromuscular control by targeting specific motor points or nerve endings within muscles. By doing so, it could potentially improve muscle coordination, proprioception, and overall motor function [9].

Dry needling for tennis elbow

Dry needling can help release the tension and knots within the ECRB muscle, reducing muscle tightness and promoting relaxation. The local twitch response and pain-modulating effects of dry needling may lead to decreased pain signals being transmitted to the brain, providing pain relief in the affected elbow region [10]. The needling-induced micro-trauma can stimulate blood flow to the injured area, which may facilitate the delivery of healing factors and accelerate tissue repair [11]. By targeting specific neural structures within the forearm muscles, dry needling may positively affect neuromuscular control and motor function, potentially improving grip strength and overall arm functionality [12].

Pathophysiology of tennis elbow

.One of the primary causes of tennis elbow is repetitive strain on the extensor tendons of the forearm. Activities such as repetitive gripping, lifting, twisting, or using tools that require forceful wrist extension can lead to microtrauma and overload on the tendons. Imbalances in the strength and flexibility of the forearm muscles can contribute to the development of tennis elbow. Weakness in the forearm extensor muscles and tightness in the forearm flexor muscles can place additional stress on the extensor tendons during movement. Over time, repetitive strain can lead to degeneration and microtears in the extensor tendons, particularly the extensor carpi radialis brevis (ECRB) tendon, which is commonly affected in tennis elbow cases. The microtrauma to the tendons can cause vascular changes, leading to a reduced blood supply to the affected area [13]. This hampers the tendon's ability to heal and recover from injury. The body's natural response to tissue injury involves inflammation. In tennis elbow, the inflammatory process contributes to pain and swelling around the lateral epicondyle of the humerus bone [15]. Age-related changes in tendon structure and function may make the tendons less resilient to repetitive use, increasing the risk of tennis elbow in older individuals. Poor ergonomics and improper sports or work techniques can contribute to the development of tennis elbow. Incorrect form during activities can place excessive strain on the forearm tendons [14].

Role of trigger points and muscle tightness in tennis elbow

Trigger points are hyperirritable spots within a muscle or its fascia that are associated with local tenderness, referred pain patterns, and restricted muscle function. Muscle tightness and the presence of trigger points play significant roles in the development and persistence of tennis elbow symptoms [16]. Tennis elbow is considered a form of myofascial pain syndrome, in which trigger points are present in the forearm extensor muscles, especially the ECRB muscle. These trigger points may refer pain to the outer aspect of the elbow, contributing to the characteristic pain pattern of tennis elbow [17]. Trigger points in the forearm muscles can refer pain to other areas, including the elbow. The presence of trigger points can exacerbate the pain experienced by individuals with tennis elbow, making it more challenging to pinpoint the exact source of pain [18]. Muscle tightness in the forearm flexor muscles can increase the strain on the extensor tendons during gripping and wrist extension movements. This tightness can create imbalances and overload the extensor tendons, leading to microtears and inflammation [19]. Trigger points and muscle tightness can limit the range of motion in the affected forearm, making it difficult for individuals to perform activities without pain and discomfort [20]. Muscle tightness and trigger points can impede the natural healing process of the tendons, prolonging the recovery time for tennis elbow [21]. The presence of trigger points and muscle tightness can contribute to the chronicity of tennis elbow symptoms, making it more challenging to manage and resolve the condition [22].

Mechanisms of dry needling in tennis elbow

Dry needling acts as a potential treatment for tennis elbow (lateral epicondylitis) due to its ability to target trigger points and dysfunctional muscles in the forearm. Based on the reviewed studies, several mechanisms have been proposed through which dry needling may provide relief in tennis elbow cases. These mechanisms encompass neurophysiological effects, local tissue responses, and potential modulatory effects on pain pathways [23]. Dry needling is thought to exert various neurophysiological effects that contribute to pain relief in tennis elbow. When a fine needle is inserted into a trigger point or dysfunctional muscle, it can lead to a "local twitch response." This response is characterized by a brief contraction of the muscle fibers around the needle insertion site, followed by relaxation. The local twitch response is believed to activate the Golgi tendon organs, which in turn inhibit alpha motor neurons, leading to muscle relaxation [24]. Additionally, the needling process stimulates sensory nerve fibers, including A-delta and C-fibers, which are involved in pain transmission. This stimulation can trigger the release of endorphins, enkephalins, and other neurotransmitters, leading to pain modulation and pain relief in the affected area. Moreover, the increased sensory input from the needle may also disrupt pain signaling to the brain, leading to a reduction in pain perception [25]. The insertion of a needle into the affected tissues during dry needling induces a localized microtrauma. This microtrauma initiates an inflammatory response that promotes healing and tissue repair. The inflammatory process brings in immune cells, growth factors, and cytokines that contribute to tissue remodeling and regeneration [26]. In tennis elbow, the extensor tendons are often affected by degeneration and microtears. Dry needling may help stimulate the body's natural healing processes and improve the overall health of the tendons. Enhanced blood flow to the area can also aid in delivering nutrients and oxygen to the injured tissues, facilitating the healing process [27]. Dry needling may exert modulatory effects on pain pathways both locally and at the central nervous system level. The stimulation of sensory nerves by the needle can induce the release of pain-inhibiting neurotransmitters, such as gamma-aminobutyric acid (GABA) and serotonin, at the spinal cord level. These neurotransmitters can dampen the transmission of pain signals and reduce pain sensitivity. At the central level, the increased sensory input from dry needling may activate descending pain inhibitory pathways, involving the brain's pain-modulating centers. This can lead to diffuse noxious inhibitory control (DNIC), where the perception of pain is diminished in response to a competing noxious stimulus. As a result, patients may experience pain relief beyond the immediate site of needling. Dry needling can also influence muscle function and motor control, which may be relevant in tennis elbow cases. By targeting trigger points and tight bands within the forearm muscles, dry needling aims to restore optimal muscle length and function. This may lead to improved muscle coordination and proprioception, which are essential for precise movements and grip strength [28].

Research gaps and future recommendations

Firstly, large-scale, well-designed randomized controlled trials (RCTs) with longer follow-up periods are needed to strengthen the level of evidence. Existing studies often vary in methodology, making it challenging to draw definitive conclusions [29]. Secondly, the optimal frequency, duration, and intensity of dry needling sessions remain unclear. Standardized protocols would enhance treatment consistency and aid in determining the most effective parameters for tennis elbow management [30]. Additionally, research should explore the comparative effectiveness of dry needling versus other interventions, such as physical therapy, corticosteroid injections, or acupuncture. Comparative studies would provide valuable insights into the relative benefits of dry needling in the context of a comprehensive treatment plan [2]. Furthermore, investigations into the mechanism of action at a molecular and cellular level could deepen our understanding of how dry needling influences tissue healing and pain modulation in tennis elbow cases [11]. In conclusion, future research should focus on large-scale RCTs with standardized protocols, explore optimal treatment parameters, compare dry needling with existing interventions, and delve into the underlying mechanisms. Addressing these gaps will contribute to a more robust evidence base and guide the refinement of clinical practices [31].

Conclusion

In conclusion, the current evidence supports the potential of dry needling as a viable treatment option for tennis elbow. Dry needling holds promise as a valuable treatment option for tennis elbow. Its ability to directly target trigger points and dysfunctional muscles makes it a specific and localized intervention [23]. It offers specific benefits such as pain relief, improved muscle function, and reduced muscle tightness [24, 25]. It's potential to improve muscle function and reduce muscle tightness may facilitate active rehabilitation and promote long-term recovery [28].

Conflict of Interest

Not available

Financial Support

Not available

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