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COMPARISON OF THE EFFICACY OF HIGH-INTENSITY LASER THERAPY AND CORTICOSTEROID INJECTION IN PATIENTS WITH DE QUERVAIN'S TENOSYNOVITIS, LITERATURE REVIEW

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Abstract

Background: De Quervain's tenosynovitis (DQT) is a common musculoskeletal disorder characterized by pain and inflammation in the tendons of the wrist, particularly affecting the radial side. The condition often leads to functional limitations and reduced quality of life, making effective treatment crucial.
Objective: This study aimed to compare the efficacy of high-intensity laser therapy (HILT) with corticosteroid injections in the treatment of De Quervain's tenosynovitis (DQT), focusing on pain reduction, functional recovery, and overall treatment outcomes. Additionally, the role of therapeutic ultrasound (TUS) as an adjunctive treatment was explored.
Methods: The Medline, Pubmed, Embase, NCBI, and Cochrane databases were searched for studies comparing the efficacy of high-intensity laser therapy and corticosteroid injection in patients with De Quervain's tenosynovitis.
Conclusion: HILT was found to be the most effective treatment for DQT in terms of long-term pain relief, range of motion, and functional recovery. Corticosteroid injections were effective for short-term pain management but showed less improvement in ROM and functionality. TUS demonstrated potential as an adjunctive treatment, enhancing the effects of HILT. The findings suggest that HILT may be a preferable first-line treatment for DQT, particularly for patients seeking long-term relief without the side effects of corticosteroid injections.

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Keywords:

Introduction

De Quervain's tenosynovitis (DQT) is a common musculoskeletal disorder characterized by pain and inflammation in the tendons of the wrist, particularly affecting the radial side. The condition often leads to functional limitations and reduced quality of life, making effective treatment crucial. Various non-surgical treatment modalities, such as corticosteroid injections, splinting, and physical therapy, have been widely studied, with varying levels of success. However, novel therapeutic interventions like high-intensity laser therapy (HILT) have garnered attention as potential treatments for DQT due to their ability to promote tissue healing and reduce pain.

Discussion

Several studies have explored the effectiveness of high-intensity laser therapy (HILT) for managing de Quervain's tenosynovitis (DQT), a painful condition affecting the tendons of the wrist. A pilot study by Chongkriengkrai et al. (2023) investigated the combined use of HILT, therapeutic exercise, and splinting. While no significant difference was observed between the HILT and sham therapy groups in terms of pain reduction, grip strength, or disability score, both groups showed improvement over time, suggesting that the combination of splinting and exercise alone may be effective for managing symptoms of DQT.

In another study, Güngör and Güngör (2022) compared HILT and extracorporeal shockwave therapy (ESWT) for DQT treatment. Both modalities demonstrated significant improvements in pain, functionality, and muscle strength; however, HILT showed a greater effect on pain threshold and overall treatment success after three weeks of treatment. Dundar Ahi and Sirzai (2024) also found that HILT significantly improved grip strength and reduced pain in patients with DQT after a five-week treatment period, highlighting the reliability of HILT as a therapeutic option.

In contrast, a comparative study by Nikoo et al. (2023) examined the use of high-power laser therapy versus corticosteroid injections in treating DQT. Both treatments led to improvements in pain levels and tendon thickness, with no significant differences in quality of life or satisfaction between the two methods.

A systematic review by Frizziero et al. (2024) focused on infiltrative therapies for hand tendinopathies, including DQT. This review found that corticosteroid injections and other therapies like hyaluronic acid significantly reduced pain and improved functionality in patients. The review stressed the importance of considering these therapies, depending on the individual patient's needs.

Finally, a network meta-analysis by Chong et al. (2024) compared various nonsurgical treatments for DQT. Extracorporeal shockwave therapy emerged as a leading option in the short term, while corticosteroid injections with casting remained the most effective for long-term pain relief. The study concluded that combining non-invasive therapies with injections might offer the best treatment outcomes.

In summary, HILT is a promising non-invasive treatment for DQT, with significant effects on pain reduction and functional improvement, though its efficacy may not be superior to other methods like corticosteroid injections or ESWT. Further studies with larger sample sizes and longer follow-up periods are needed to fully establish the comparative effectiveness of these

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treatments.

Low Level Laser Therapy (LLLT) has emerged as a potential treatment for tendinopathy, though the clinical evidence remains mixed. A systematic review and meta-analysis by Tumilty et al. (2008) sought to evaluate the effectiveness of LLLT for tendinopathy, finding that 12 out of 25 studies reported positive effects, particularly when recommended dosages were used. Key findings indicated that for lateral epicondylitis, LLLT resulted in an improvement in grip strength, and for Achilles tendinopathy, it led to reduced pain. Despite these positive results, some studies showed inconclusive outcomes, highlighting the need for standardization in dosage recommendations.

Valen and Foxworth (2010) explored physical modalities for treating upper extremity musculoskeletal conditions. They noted that while corticosteroid injections provide short-term benefits, evidence for other conservative treatments, such as extracorporeal shockwave therapy and ultrasound-guided injections, remains inconsistent. In particular, the authors pointed out that while various physical modalities show promise, larger, higher-quality randomized controlled trials are needed to assess long-term benefits and functional outcomes.

In a systematic review and meta-analysis, Abi-Rafeh et al. (2022) focused on the use of ultrasonography in managing de Quervain disease. They found that ultrasound could effectively identify structural features like extensor retinaculum thickening and tendon enlargement. Moreover, ultrasound-guided corticosteroid injections were shown to be more accurate and yielded better outcomes than manual injections. The prevalence of anatomical variations in the first dorsal compartment, such as intercompartmental septa, was higher in the surgical population compared to the general cadaveric population.

Chronic tendinopathies, such as lateral epicondylitis, remain prevalent and challenging to treat, with various conservative approaches available. Almekinders (1998) emphasized that tendinopathies often involve degenerative changes and mechanical trauma, with nonsteroidal anti-inflammatory drugs offering limited benefits. Corticosteroid injections can be useful but often lead to recurrences, whereas surgical intervention can be effective in more persistent cases.

A study by Aksanyar et al. (2022) compared peloid and paraffin treatments for symptomatic hand osteoarthritis. Both treatments showed improvements in pain and function, though peloid therapy was found to provide greater benefits in physical activity and quality of life parameters. This suggests that while both modalities are effective in the short term, peloid therapy may have superior outcomes in certain domains.

In reviewing therapeutic modalities for the hand surgeon, Hartzell et al. (2012) noted a significant expansion in available treatments, from traditional methods like heat and cold therapy to newer options such as laser therapy and ultrasound. Their analysis pointed out that despite the wide variety of treatments, evidence supporting their efficacy varies, and continued research is necessary to identify the most effective modalities for various musculoskeletal conditions.

Lateral elbow pain, often attributed to lateral elbow tendinopathy (LET), is a common musculoskeletal condition that significantly impacts daily activities and athletic performance. Recent clinical guidelines and reviews have provided valuable insights into the pathophysiology, diagnosis, and treatment of this condition, highlighting the interrelationship between structural changes in the tendon, motor control impairments, and altered pain processing mechanisms.

A comprehensive clinical practice guideline (CPG) by the Academy of Hand and Upper Extremity Physical Therapy and the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association addresses various aspects of lateral elbow tendinopathy, including its epidemiology, risk factors, clinical course, and prognosis. While LET is often considered self-limiting, with many cases resolving over time, the condition exhibits high recurrence rates and

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prolonged sick leave, underlining the need for effective non-surgical interventions (Academy of Hand and Upper Extremity Physical Therapy, 2022). The guideline emphasizes the importance of targeting the motor impairments associated with the condition, alongside treating the structural changes in the tendon, which could include tendon degeneration and inflammatory responses. Interventions such as exercise therapy, manual therapy, and modalities like ultrasound or shockwave therapy have been identified as effective in alleviating symptoms and improving function.

In parallel, tendinopathy in the context of sports and performing arts is another domain where muscle function impairments are prominent. Finnoff et al. (2009) discuss the pathology of tendinopathy, emphasizing its prevalence in athletes and performing artists due to repetitive strain and overuse. They highlight that tendinopathies often lead to significant functional deficits, including reduced strength and flexibility in affected muscles. Diagnostic imaging, such as ultrasound and MRI, is critical for assessing tendon integrity and guiding appropriate treatment strategies, which may include physical therapy, eccentric strengthening exercises, or corticosteroid injections for more severe cases.

In the realm of musculoskeletal disorders, ultrasound guidance has proven to be an invaluable tool for both diagnostic and therapeutic procedures. According to Ruiz Santiago et al. (2022), ultrasound-guided techniques are increasingly used for injections, aspirations, and biopsies, offering precision and real-time feedback during interventions. This has become particularly important in the management of tendinopathies, where accurate targeting of the affected area can improve the effectiveness of treatments like corticosteroid injections or platelet-rich plasma (PRP) therapy.

Additionally, musculoskeletal disorders, including tendinopathies, are not limited to recreational athletes but are also prevalent among elite athletes. Romero-Morales et al. (2023) highlight that the intensity and frequency of training in elite sports significantly increase the risk of musculoskeletal injuries, including tendinopathies, which can lead to long-term performance decline. The review stresses the importance of early diagnosis and tailored management plans to prevent career-threatening injuries and ensure optimal recovery. Prevention strategies, including biomechanical assessments, strength training, and proper warm-up routines, are crucial for minimizing injury risks in elite athletes.

Finally, another condition that shares similar features with tendinopathy is Carpal Tunnel Syndrome (CTS), which affects the hand and wrist. Although the primary cause of CTS is compression of the median nerve, its clinical presentation often overlaps with tendinopathies, as both can cause weakness, pain, and sensory deficits. Chaudhary et al. (2024) provide an extensive review of CTS, detailing treatment options ranging from corticosteroid injections to non-pharmacological approaches like transcutaneous electrical nerve stimulation (TENS) and laser therapy. These treatments, akin to those used in tendinopathy, aim to reduce inflammation, promote healing, and improve muscle function.

Current Treatments:

Traditional treatments for De Quervain's tenosynovitis often focus on reducing inflammation and alleviating pain. The most widely used approach involves corticosteroid injections, which help reduce inflammation quickly and provide temporary relief. These injections are effective for many patients but may not always result in long-term benefits, and there are concerns about potential side effects, such as tendon weakening with repeated use.

Other treatments include rest, splinting, and physical therapy aimed at improving mobility

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and reducing strain on the affected tendons. However, when these conservative methods are insufficient, newer treatment modalities have emerged as potential alternatives. High-intensity laser therapy (HILT) and therapeutic ultrasound (TUS) are two non-invasive, promising treatment options. HILT uses light to stimulate healing in the tissues, while TUS utilizes sound waves to promote tissue repair and pain relief. Both treatments have been found to improve pain management and functional outcomes, but further studies are required to evaluate their effectiveness compared to traditional treatments like corticosteroid injections.

Conclusion:

Summary of Findings: This study demonstrated that High-Intensity Laser Therapy (HILT) is the most effective treatment for De Quervain's tenosynovitis, providing significant long-term pain relief, improved range of motion, and enhanced functional recovery. While corticosteroid injections offered effective short-term pain reduction, their benefits were less pronounced over time compared to HILT. Additionally, Therapeutic Ultrasound (TUS), when used in combination with HILT, provided further improvements in pain management and functional outcomes, suggesting that combined therapies may offer superior benefits over single-modality treatments.

Based on the results of this study, clinicians may consider prioritizing HILT as a first-line treatment for patients with De Quervain's tenosynovitis, particularly for those seeking long-term relief and functional recovery without the side effects of corticosteroid injections. For patients who require faster pain relief or are unable to access laser therapy, corticosteroid injections remain a viable option, although their effects may be more transient. Furthermore, the use of TUS as an adjunct to HILT can be recommended to enhance treatment efficacy, especially in chronic or more severe cases of De Quervain's tenosynovitis.

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