DOI: 10.7860/JCDR/2024/67353.19129

Case Report

Physical Medicine and Rehabilitation Section

Shoulder and Elbow Synergy for Lateral Epicondylalgia Management: A Case Report

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ABSTRACT

Lateral epicondylalgia, commonly known as tennis elbow, is a chronic overuse injury characterised by acute inflammation at the common wrist extensor origin, resulting in pain. Scapular muscle weakness has been linked to lateral epicondylalgia, as weakness or instability in proximal muscles can trigger distal issues. Non-operative interventions, such as activity adjustments, physiotherapy, and various therapeutic methods, have been effective in managing symptoms. This case report demonstrates the effectiveness of scapular muscle strengthening in improving lateral epicondylalgia, along with extensor strengthening. The patient, a 36-year-old male construction manager, underwent a comprehensive course of physical therapy, including scapular muscle strengthening exercises. Comprehensive follow-up using outcome measures such as the Visual Analog Scale (VAS), Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire, and handheld dynamometer was done. The treatment resulted in improvements in daily function, physical activity, and sports performance, indicating the potential benefits of incorporating scapular muscle strengthening in the management of lateral epicondylalgia. This case emphasises the need for a tailored approach, suggesting scapular muscle strengthening exercises as a more targeted intervention for lateral epicondylalgia.

Keywords: Overuse injury, Physiotherapy, Rehabilitation, Scapular muscle strengthening, Tennis elbow

CASE REPORT

A 36-year-old male patient, presented at the Physiotherapy Department with a chief complaint of persistent right elbow pain. The patient, a construction manager with no prior medical conditions or ongoing medications, has been experiencing pain for the past six months. Initially seeking medical attention from an orthopedic doctor, he received a prescription for pain medication, including Tablet Ultracet twice daily for a couple of weeks, followed by paracetamol 650 mg for another couple of weeks, and was advised to undergo physical therapy. The patient underwent a comprehensive course of physical therapy encompassing six sessions for one month. This treatment plan involved therapeutic ultrasound, joint mobilisation, and soft tissue mobilisation.

However, after one month, the patient's pain persisted. This ongoing discomfort posed limitations on his ability to fully participate in his work. His occupation demanded tasks such as heavy lifting, grilling, and hammering, which became restricted due to the persistent elbow pain. The patient also noted that his pain intensified while riding his motorcycle, lifting a water bucket, and participating in recreational activities like tennis or volleyball. Additionally, the patient experienced morning pain and weakness in the shoulder, wrist, and elbow.

Clinical Findings

Upon observation, the patient consistently wore a tennis elbow band during waking hours but removed it during sleep. No apparent inflammation or scars were evident around the elbow area. The patient's Body Mass Index (BMI) was measured at 24, indicating a healthy range (normal weight, BMI from 20 to 24.9) [1]. Goniometer measurements indicated that both the right and left shoulders demonstrated movement within functional limits in terms of active range of motion. The same applied to the elbows and wrists on both sides. The Manual Muscle Testing (MMT) results revealed that the right shoulder and elbow had a strength of +4/5 for flexion/extension and abduction/adduction [2]. The serratus anterior and medial/lower trapezius on the right-side scored +3/5. Similarly, the right elbow flexion/extension also rated +3/5 on the MMT scale. The MMT scale commonly ranges from 0 to 5, with 0 representing no muscle contraction and five indicating normal strength. A pain-provoking test, Maudsley's test, was performed to diagnose lateral elbow epicondylalgia. This test elicited pain over the lateral elbow and revealed weakness in elbow extension [3].

Therapeutic Intervention

The physiotherapy management for Lateral Elbow Tendinopathy (LET) was divided into three distinct phases.

Phase I: The initial phase focused on neuromuscular education for the serratus anterior, middle, and lower trapezius muscles. The patient was instructed to perform isometric scapular retractions while standing, completing three sets of 10 repetitions once per day over a span of two weeks. Additionally, the patient was guided through active range of motion exercises and unrestricted isometric activations at the end range of wrist extension. This was carried out for three sets of 10 repetitions daily, with gradual increases upto 20 repetitions.

Phase II: The subsequent phase involved moderate progressive strengthening exercises. For the middle and lower trapezius muscles, the patient was instructed to stand and perform arm rows with a 5 lb weight, flexing the elbow to 90 degrees. This exercise comprised 20 repetitions for three sets. Meanwhile, for the serratus anterior, the patient was asked to lay supine and execute upward punches using a 5 lb weight, completing 10 repetitions for three sets each day. Wrist exercises involved concentric and eccentric extensions; the patient was seated with their arm at the edge of a table, extending the wrist against 5 lb resistance for 20 repetitions and three sets during a 2-week period.

Phase III: The final phase incorporated heavy-load, long lever exercises. For the middle and lower trapezius muscles, the patient assumed a prone position with shoulders abducted to 90 degrees (elongated lever) and performed arm rows with a 10 lb weight, achieving 10 repetitions for three sets. Serratus anterior strengthening involved supine patients executing upward punches with a 10 lb weight, completing 10 repetitions for three sets. Wrist extensor exercises were performed while seated with the arm extended on the

table, executing concentric and eccentric wrist extensions, along with plyometric exercises against 10 lb resistance. This routine consisted of 10 repetitions for three sets.

Throughout these phases, the physiotherapy regimen was delivered by a certified therapist in individual one-to-one sessions. These sessions occurred four times per week over the course of six weeks, resulting in a total of 24 visits. Each session lasted for 30 minutes and included the prescribed exercises. A summary of the treatment is given in [Table/Fig-1].

Phase	Focus	Exercises	Repetitions	Sets	Resistance	Duration	Frequency
1	Neuromuscular education	Isometric scapular retractions, Active range of motion exercises, Isometric activations at end range of wrist extension	10 (scapular retractions), 10-20 (wrist exercises)	3 (each exercise)	None (initially), Gradual increase	2 weeks	4 times
2	Moderate progressive strengthening	Arm rows (5 lb) for middle and lower trapezius, Upward punches (5 lb) for serratus anterior, Wrist exercises (concentric and eccentric extensions, 5 lb resistance)	20 (arm rows), 10 (upward punches), 20 (wrist exercises)	3 (each exercise)	5 lb	2 weeks	4 times
3	Heavy-load, long lever exercises	Arm rows (10 lb) with elongated lever for middle and lower trapezius, Upward punches (10 lb) for serratus anterior, Wrist exercises (concentric and eccentric extensions, plyometric exercises, 10 lb resistance)	10 (arm rows), 10 (upward punches), 10 (wrist exercises)	2 (each exercise)	10 lb	2 weeks	4 times

[Table/Fig-1]: Treatment plan.

Follow-up and outcomes:

In this case study, various outcome measures were systematically employed to assess the efficacy of the physiotherapy intervention. The Visual Analog Scale (VAS), a subjective measure, was utilised to gauge the intensity of the patient's pain. Through this scale, the participant marked a point on a continuum reflecting their perceived pain intensity, with higher scores indicative of greater discomfort on a scale of 1 to 10. The DASH questionnaire, a self-report tool, provided insights into the impact of the upper limb disorder on the patient's daily life. Ratings of difficulty in performing various activities contributed to an assessment of overall disability, with higher scores indicating more significant impairment [4]. Additionally, the use of a hand-held dynamometer added an objective dimension to the evaluation, measuring muscle strength by quantifying the force exerted during specific movements. (The Handheld Dynamometer mentioned is the K-Push, manufactured by Kinvent, providing a lightweight and versatile tool for convenient on-the-go strength assessments of nearly 40 muscle groups.) These outcome measures collectively furnished a comprehensive understanding of the patient's progress, offering valuable insights into the effectiveness of the therapeutic interventions implemented over the course of the study.

During his initial clinic visit, the patient reported experiencing pain at rest rated at 7/10 on the VAS scale. The DASH questionnaire, utilised to assess upper extremity physical function, yielded a score of 68, indicative of moderate difficulty in physical functions. A muscle strength test was conducted using a handheld dynamometer, and the results indicated weakness in the scapular muscles. Data collection took place at baseline, the 3rd week, and the 6th week. Over the course of the treatment, the patient demonstrated advancements in physical functionality and communicated a decrease in pain levels. By the end of the 3rd week, notable enhancements were observed in the patient's scapular stabilisers, and a substantial reduction in pain was documented as a result of the intervention. Detailed scoring of each outcome is given in [Table/Fig-2,3] for VAS, DASH, and handheld dynamometer, respectively [Table/Fig-4].

VAS	Baseline	3rd week	6th week
At rest	7	5	1
With activity	9	7	4

[Table/Fig-2]: Visual Analog Scale (VAS) scoring.

DASH	Baseline	3rd week	6th week
Score	68	45	35

[Table/Fig-3]: DASH Scale scoring.

Right	Baseline	3rd week	6th week
Serratus anterior	11.4 kg	12.3 kg	13 kg
Upper trapezius	5.3 kg	6.1 kg	8 kg
Lower trapezius	8.1 kg	9 kg	11.2 kg

[Table/Fig-4]: Handheld dynamometer scoring.

DISCUSSION

Lateral epicondylalgia is a chronic overuse injury characterised by multifactorial origins [5]. It results from acute inflammation at the common wrist extensor origin, causing pain [6]. Awkward postures and repetitive motions at the elbow and wrist elevate the risk [7]. Various studies support the connection of scapular muscles to lateral epicondylalgia. According to the kinetic chain theory, weakness or instability in proximal muscles can trigger distal issues, such as lateral epicondylalgia [8,9]. A case report demonstrated scapular muscle dysfunction in patients with lateral epicondylalgia, consistent with the findings of Day JM et al., [10]. Their research highlighted a direct association between scapular muscle weakness and elbow instability, a contributing factor to tennis elbow [10]. Previously, Mandalidis D and O'Brien M observed that reduced grip strength showed a partial correlation with diminished shoulder isokinetic strength, as reported in their earlier study [11]. Numerous studies have emphasised the importance of evaluating shoulder muscle strength in individuals experiencing elbow pain [7,12]. Bhatt JB et al., introduced a case of lateral epicondylalgia in which the patient displayed scapular muscle weakness and exhibited positive outcomes through an intervention specifically focused on the shoulder girdle muscles [7]. In the research conducted by Lucado AM et al., a decrease in lower trapezius muscle strength was documented among a cohort of female tennis players affected by lateral epicondylalgia. This reduction was in contrast to a control group of asymptomatic female tennis players that were matched for comparison [12].

It should be acknowledged that the patient did not undergo any specialised training for functional activities. The patient likely experienced motor learning, as the improvement in scapular muscle strength not only enhanced the elbow condition but also grip strength. This enhancement might have arisen from a combination of enhanced motor control and increased scapular muscle strength. The present case report's limitations encompass the absence of exploration into electrotherapy modalities for pain reduction. Additionally, there was inconsistency observed in the patient's adherence to the treatment regimen.

In summary, despite initial medication and physical therapy, the patient's persistent right elbow pain remained, hindering daily activities and work tasks. Clinical examination revealed consistent use of a tennis elbow band, a healthy BMI, and specific muscle weaknesses. This case emphasises the need for a tailored approach, suggesting scapular muscle strengthening exercises as a more targeted intervention for lateral elbow epicondylalgia.

CONCLUSION(S)

The present case report findings highlight the efficacy of scapular muscle strengthening exercises in significantly improving daily

activities and reducing pain for lateral epicondylalgia patients. Moving forward, it's important to recognise that incorporating scapular muscle strengthening in conjunction with eccentric wrist exercises not only enhances strength but also plays a pivotal role in alleviating lateral elbow epicondylalgia by mitigating pain and enhancing daily function. The findings of this case report strongly advocate for the inclusion of scapular musculature assessment and treatment, combined with elbow extensor eccentric exercises, as a crucial management approach.

Acknowledgement

The authors would like to acknowledge the contributors of the articles from which the supportive data was derived.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Sep 05, 2023
- Manual Googling: Dec 13, 2023
- iThenticate Software: Jan 01, 2024 (6%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Sep 03, 2023**
Date of Peer Review: **Nov 16, 2023**
Date of Acceptance: **Jan 03, 2024**
Date of Publishing: **Mar 01, 2024**