

The Immediate Effect of Combination Therapy with TENS and Active Movement on Mobility and Pain Relief in a Patient with Frozen Shoulder: A Case Report

Khatri SM

Principal, Maharashtra Institute of Physiotherapy,
Latur, India 413 531.

E-mail: physiokhatri@gmail.com

Received: 10th April 24

Revised: 5th June 24

Accepted: 1st July 24

ABSTRACT

Background and Purpose: Although the use of transcutaneous electrical nerve stimulation (TENS) for pain relief in various neuro-musculoskeletal conditions is well documented but there is hardly any study about TENS and active movement combination therapy in frozen shoulder. The purpose of this case report is to describe the use of TENS along with active movements in a patient with a frozen shoulder who had pain and mobility issues in the left shoulder for more than 6 months.

Case Description: The patient, a 52-year-old male, was referred to orthopedic physiotherapy OPD with a left frozen shoulder for the last six months with associated co-morbidity in form of type 2 diabetes for 18 years. His complaint was pain and stiffness in his left shoulder that affected his activities of daily living including sleep and his constant shoulder score was 47.

Outcomes: After intervention which included the application of LF TENS (Low-frequency Trans cutaneous Electrical nerve Stimulation) for 20 minutes with a portable TENS machine and then active movements along with TENS. Participant's pain on active movement got reduced to 1/10 on the NPRS scale and he felt comfortable in doing movements and the range of active flexion elevation increased by 15 degrees. After one week the constant shoulder score was 45.

Discussion: This case report outlines the novel use of TENS along with active movements in the treatment of the frozen shoulder.

Conclusion: Pain-free active flexion elevation demonstrates an immediate improvement in range. The results warrant further research and exploration in clinical applicability.

KEYWORDS: Frozen shoulder, TENS, Combination therapy, case report, rehabilitation

INTRODUCTION

Chronic shoulder pain has considerable health care costs and a major impact on the health of affected individuals, including absence from work and disability. Shoulder complaints may have an unfavorable outcome, with only about 50% of all new episodes of shoulder complaints presenting in health care practice showing a complete recovery within six months.^[1,2] After one year, this fraction increases to sixty percent. A study that involved a self-administered questionnaire as a part of general health screening reported an estimated prevalence rate of 15.4 % in men and 24.9% in women who reported weekly episodes of pain.^[3]

Non-traumatic shoulder pain is one of the disabling and episodic conditions. Large proportions of patients report symptoms that may get alleviated, only to be experienced again

sometime in the near or distant future. Shoulder pain can occur due to either local or systemic causes. It has been reported that about 95% of all shoulder disorders are due to four conditions: adhesive capsulitis, simple tendinitis, tendinous perforation and rupture, and hyperalgesia calcareous tendinitis. Note that three of these four conditions are tendinous in origin, but tendon inflammation is not as common in the shoulder as it is in the elbow and wrist.^[4-6] However, since all tendons are avascular, every one of them is subject to chronic trauma, microtears, slow repair, and aging degeneration.

Patients with chronic episodic shoulder pain are often seen and treated by physiotherapists. Shoulder vasculopathy and tendinopathy with or without additional inflammation mimic the

clinical presentation with shoulder pain located at acromion, deltoid and joint capsule that may radiate up to if not below the below, mimic the clinical presentation [7-9] and key to its treatment is pain-free active movements and mostly this is tried after the application of pain-relieving modalities like TENS. In the present study, the investigator tried a simultaneous application of TENS for pain relief along with active movements to get the additional effect of negating fear of pain.

Description of case: This case report followed a science teacher with a left frozen shoulder for six months. The outcome measures included NPRS for pain, constant shoulder score, and active range of shoulder flexion elevation and abduction elevation.

History: Mr. S, a 52-year-old science teacher had considerable left shoulder pain, stiffness, and difficulty in activities of daily living especially sleeping on the affected side for six months. He visited the orthopedic department with the recent aggravation of pain, he was diagnosed by orthopedic surgeon as having frozen shoulder based on clinical presentation with normal radiography investigation^[10] Further, he was advised to take NSAIDs and for physiotherapy treatment.

Examination: Patient-reported pain in Deltoid region acromion, shoulder joint line, and arm up to the elbow and lateral epicondyle. Local tenderness at the insertion of supraspinatus tendon & joint line and spasm of deltoid and rotator cuff muscles was present. Active movements were painful at the end range, combined movements like hand behind the neck and behind the lumbar region reproduced the symptoms. Patient-reported that during working days he had less discomfort but, in the evening, at night, and till he took a bath discomfort was considerable. The left shoulder reach test was positive. Average NPRS for active shoulder movements was 8, constant shoulder score was 47 and active shoulder flexion elevation was 155 degrees, abduction elevation 120 degrees, and external rotation was 20 degrees. **Investigation:** Shoulder X-ray in anteroposterior view with glenohumeral joint in the neutral rotation was normal and supraspinatus outlet view and axillary lateral views revealed no abnormality. **Consent:** After examination, the

The therapist explained the findings, the procedure, and the requirement of the procedure and asked for his consent in writing.

Pre-therapy scores: Pain on active shoulder movements were 8 on NRPS (Numerical Pain Rating Scale), constant shoulder score was 47 and active shoulder flexion elevation was 155 degrees, abduction elevation 120 degrees and external rotation was 20 degrees. NPRS was used as an outcome measure since it is reported as unidimensional pain measure of pain intensity in adults including those with chronic pain [11-13] and constant shoulder pain has been reported as one of the common clinical methods of functional assessment of the shoulder.

^[14] **Patient position:** Supine lying for initial twenty minutes and then long sitting for the next ten minutes to do active movements with simultaneous TENS application. Application of TENS was considered since it has been reported to significantly increase pain free range of motion more than heat combined with exercise and manipulation. ^[15] **Procedure:** Before the treatment, the protocol was explained, and his co-operation was requested for the active movements along with TENS. For the initial twenty minutes, the patient was supine lying and LF TENS (frequency 30 Hz, modulated TENS with high or tolerable intensity) was applied with the anteroposterior application of self-adhesive disposable electrodes over shoulder joint lines. After twenty minutes, the patient was in long sitting and instructed for active shoulder flexion, abduction, and external rotation for ten repetitions (figure1 & 2). Immediately after this, a re-assessment of outcome measures was done by the same therapist. Further, it was found that there was a significant increase in the range of active flexion and abduction elevation along with TENS due to relief of pain and a decrease in fear of pain. Participant's pain on active movement got reduced to 1/10 on the NPRS scale and he felt comfortable in doing movements and the range of active flexion elevation increased by 15 degrees. After one week the constant shoulder score was 45.



Figure 1, 2: Application of TENS with active shoulder flexion and abduction

DISCUSSION

This case provides information on the immediate effect of simultaneous use of TENS along with active movement as an innovative treatment approach in the treatment of the frozen shoulder. There is hardly any published research that exists about the combination of active movements along with TENS application. Although, clinical practice guidelines recommend TENS and end range stretching as a part of physiotherapy management so far there is hardly any study that has reported the simultaneous application of TENS along with active movements in the treatment of frozen shoulder. Hence, interpretation of the results concerning previous evidence becomes difficult at this juncture. In the present study, an investigator could not study the exact cause and effect relationship, and considering the nature of this study design, the generalization of the results of this study has limitations.^[16] Hence, evidence from a larger, placebo-controlled trial is needed with adequate follow-up to determine whether combination therapy of TENS with active movements (TWA) will reduce the pain and improve shoulder function in patients with shoulder pain and stiffness due to various pathologies.

In summary, this case showed the feasibility of TENS with active movements as a combination therapy in the treatment of the frozen shoulder. It resulted in immediate improvement in pain-free active range of motion, physical and functional well-being, body dissatisfaction, body attitude, and thereby, quality of life. TENS with active movements may be considered as an adjunct to the management of frozen shoulder.

CONCLUSION

Pain-free active flexion elevation demonstrates an immediate improvement in range. The results warrant further research and exploration in clinical applicability.

REFERENCES

1. Pribicevic, M. The Epidemiology of Shoulder Pain: A Narrative Review of the Literature. In: Ghosh, S., editor. Pain in Perspective [Internet]. London: Intech Open; 2012 [cited 2022 Mar 03]. Available from: <https://www.intechopen.com/chapters/40393> Doi: 10.5772/52931
2. Caroline Mitchell, Ade Adebajo, Elaine Hay, and Andrew Carr: Shoulder pain: diagnosis and management in primary care BMJ. 2005 Nov 12; 331(7525): 1124–1128. Doi: 10.1136/bmj.331.7525.1124
3. Jaquet P: Clinical Chiropractic: A Study of Cases. Geneva, Switzerland, Grounauer, 1978.
4. Toralf Hasvold & Roar Johnsen: Headache and neck or shoulder pain - frequent and disabling complaints in the general population. Scandinavian Journal of Primary Health Care: 1993;11:3:219-224. <https://doi.org/10.3109/02813439308994834>
5. Roy Rama Chandran, Charvakan Suthan, Santhosh Kothirappallil Raghavan, Mitu Chirakkalthazhath Sankar and Dhanya Raj: A study on the aetiological profile of pain around shoulder among patients attending physical medicine and rehabilitation department of a tertiary care centre. Journal of Evolution of Medical and Dental Sciences, 2017;6:46:3595.
6. Albnght JP, VanGilder J., El-Khoury G: Head and Neck Injuries in Sports. In Scott WN, Nisonson B, Nicholas JA: Principles of Sports Medicine. Baltimore, Williams & Wilkins, 1984, pp 41, 43, 68-70.
7. Andrews RA, Harrelson GL: Physical Rehabilitation of the Injured Athlete. Philadelphia, W.B. Saunders, 1991, 367-394, 409-418.
8. Barham JN, Wooten EP: Structural Kinesiology. New York, Macmillan, 1973, pp 305-316.
9. Basmajian JV: Recent Advances in the Functional Anatomy of the Upper Limb, American Journal of Physical Medicine, 48:165- 177, 1969.
10. Wise, Sean R., Seales, Paul, Houser, Alex P, Weber, Chase B: Frozen Shoulder: Diagnosis and Management. Current Sports Medicine Reports 22(9): p 307-312, September 2023.
11. Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. Spine 2005; 30:1331–4.
12. Jensen MP, McFarland CA. Increasing the reliability and validity of pain intensity measurement in chronic pain patients. Pain 1993;55: 195–203.
13. Rodriguez CS. Pain measurement in the elderly: a review. Pain Manag Nurs 2001; 2:38–46
14. Constant CR, Murley AH. A clinical method of functional assessment of the shoulder. Clin Orthop Relat Res. 1987 Jan;(214):160-4
15. Green S, Buchbinder R, Hetrick S. Physiotherapy interventions for shoulder pain. *Cochrane Database Syst Rev.* 2003; CD004258, doi:10.1002/14651858.CD004258.
16. Flyvbjerg B: Five Misunderstandings about Case-Study Research, *Qualitative Inquiry.* 2006.12:2:219-245.