

Original Article

Combined Effects of Manual Therapy and Functional Electrical Stimulation on Torticollis among Adults

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ABSTRACT

Background: Acquired muscular torticollis is a common musculoskeletal disorder that occurs after birth due to various etiologies. This condition is characterized by the abnormal tilt and twist of the neck muscles, causing significant discomfort and functional impairment.

Objective: This study aimed to investigate the combined effects of manual therapy and functional electrical stimulation (FES) on adults with acquired torticollis.

Methods: A 45-year-old male patient with acquired torticollis was evaluated using a detailed general movement assessment and an arthroial goniometer to measure cervical ranges of motion. The patient exhibited tightness of the right sternocleidomastoid (SCM) muscle with limited ranges of motion. The treatment protocol included both manual therapy and electrotherapy for three months, with sessions conducted four days per week, each lasting 40 minutes. Manual therapy consisted of soft tissue mobilization, stretching of the right SCM, and isometric exercises for the left SCM. Electrotherapy included transcutaneous electrical nerve stimulation (TENS), DL2 stimulator, infrared radiation therapy (IRR), and ultrasonic therapy. The patient's cervical ranges of motion were measured before and after the intervention to assess the effectiveness of the combined therapy.

Results: Significant improvements were observed in the patient's cervical ranges of motion after the 12-week treatment protocol. The mean lateral flexion of the affected right SCM improved from 35 degrees to 20 degrees, and the mean rotation improved from 43 degrees to 28 degrees. These changes indicate a noticeable improvement in both the ranges of motion and posture of the patient.

Conclusion: The combined effects of manual therapy and functional electrical stimulation significantly improved the cervical ranges of motion and overall posture in an adult patient with acquired torticollis. These findings suggest that integrating multiple therapeutic modalities can enhance treatment outcomes for musculoskeletal deformities.

Keywords: Acquired Muscular Torticollis, Manual Therapy, Functional Electrical Stimulation (FES), Sternocleidomastoid Muscle.

INTRODUCTION

Torticollis, a postural deformity of the head and neck, manifests as an abnormal tilt and twist of the neck muscles, often causing the head to appear turned at an unnatural angle. This condition can be congenital or acquired, with congenital muscular torticollis (CMT) primarily caused by unilateral fibrosis and shortening of the sternocleidomastoid (SCM) muscle, commonly referred to as "twisted neck." CMT is the third most prevalent musculoskeletal anomaly in infants, following clubfoot and hip dysplasia, and typically presents at birth or shortly thereafter. The incidence of CMT ranges from 0.3% to 2%, with a higher prevalence on the right side and a male-to-female ratio of 3:1, although some studies report a higher incidence, up to 16%, in neonates (1).

Acquired torticollis, also known as cervical dystonia, is a persistent neurological condition characterized by involuntary contractions of the cervical musculature, resulting in abnormal movements or postural alterations of the head, neck, and shoulders. This condition is often associated with limited range of motion (ROM) in rotation and lateral flexion, as well as muscular imbalances in the neck area. The shortening of the SCM muscle pulls the mastoid process toward the sternoclavicular joint, causing the head to tilt towards the affected side and the chin to rotate in the opposite direction (2). Acquired torticollis can be attributed to various etiologies,

including birth trauma, intrauterine malpositioning, genetics, neurogenic diseases, infection, and the sequelae of intrauterine or perinatal compartment syndrome. Other potential causes include strabismus, cervical hemi-vertebrae, brain tumors, and inflammation of the soft tissues surrounding the neck (3).

The primary clinical feature distinguishing CMT from other causes of torticollis is the unilateral tightness and shortening of the SCM muscle. Diagnosis typically involves palpation, cervical range of motion measurement, and alignment observation, often supplemented by ultrasound imaging to identify distinctive lesions such as tissue fibrosis or post-traumatic changes (4). Treatment aims to restore normal SCM function, with non-surgical approaches focusing on passive and active stretching, massage, strengthening of weak neck and trunk muscles, positioning, and environmental adjustments. Upper cervical spinal manipulation and mobilization are additional techniques employed by some therapists, although manual therapy can sometimes result in adverse outcomes, such as muscle rupture or spinal extensor muscle spasm (5).

Electrophysical agents, including transcutaneous electrical nerve stimulation (TENS), therapeutic ultrasound, and infrared radiation therapy (IRT), are often incorporated into treatment protocols to enhance the effects of manual therapy. TENS and microcurrent therapy provide low-level alternating current to promote muscle relaxation and pain relief, while ultrasound produces micromassage that physically lengthens and compresses tissues. Infrared radiation therapy utilizes infrared rays to induce local cutaneous vasodilation, preparing the skin for electrical stimulation or biofeedback (6).

Recent advancements in alternative medicine, such as tuina and external therapy of herbal medicine (ETHM), have also been explored for their potential benefits in treating torticollis. ETHM involves the transdermal absorption of herbal preparations, which can be used in conjunction with tuina techniques, including Chinese massage and therapeutic manipulation. For patients unresponsive to non-operative measures, surgical interventions, such as SCM muscle release or fibrous band excision, may be indicated. Postoperative care typically involves a prolonged series of active or passive cervical stretches, along with the use of cervical collars or braces to maintain proper head and neck positioning (7).

The significance of early and intensive treatment for torticollis cannot be overstated, as early intervention often results in the most noticeable improvements. This case study aimed to evaluate the combined effects of manual therapy and functional electrical stimulation (FES) on a 45-year-old male patient with acquired torticollis. The patient presented with right SCM tightness, neck bending towards the right side, and rotation towards the left side, having undergone multiple SCM release surgeries with no significant improvement. The treatment protocol involved a comprehensive approach, incorporating manual therapy techniques, such as stretching and soft tissue mobilization, alongside various electrophysical agents, including TENS, ultrasound, and IRT, over a three-month period (8). The results demonstrated significant improvements in cervical ROM and postural alignment, highlighting the efficacy of combining manual therapy with electrotherapy in managing acquired torticollis. This study contributes to the growing body of evidence supporting the use of integrated therapeutic approaches in the treatment of musculoskeletal deformities (9-11).

MATERIAL AND METHODS

This study was conducted at Mubarak Hospital, Sargodha, Punjab, and included a male patient aged 45 with acquired torticollis, characterized by right sternocleidomastoid (SCM) muscle tightness, right-sided neck bending, and leftward rotation. The patient had undergone multiple SCM release surgeries at different hospitals, with each procedure conducted four months apart, but without significant improvement. He had no family history of torticollis, no overall muscle weakness, and no report of increased working hours. Before initiating the treatment protocol, cervical ranges of motion were measured using an arthrodiagonal goniometer, documenting a lateral flexion of 35 degrees and rotation of 43 degrees on the right SCM (12).

The treatment protocol spanned three months, with sessions conducted four days per week, each lasting 40 minutes. The intervention combined manual therapy and electrotherapy techniques. Manual therapy involved stretching of the affected right SCM muscle, performed gradually in sets of 15 to 25 repetitions, each lasting between 15 and 40 seconds, with a rest interval of 40 seconds. Soft tissue mobilization and massage were also included, using techniques such as cross-friction massage, gentle longitudinal massage, trigger point release, and muscle bending. Strengthening exercises for the unaffected left SCM (isometrics) were incorporated, involving resistive exercises with a 10-second hold, repeated five times. Active and passive cervical spine ranges were also performed.

Electrotherapy included the use of DL2 stimulator, ultrasound, transcutaneous electrical nerve stimulation (TENS), and infrared radiation therapy (IRT). The DL2 stimulator was set to the faradic current mode for 10 minutes per session to induce muscle contraction through electrical discharge, suitable for innervated muscles. Ultrasound therapy was administered for 12 minutes per session using different frequencies and modes, with the ultrasound head placed on the affected SCM using ultrasonic gel mixed with a specialized gel. TENS was applied at low frequency and high intensity for 10 minutes per session to produce motor contraction. IRT involved placing the infrared emitter at the right angle to the treatment area, controlling heat intensity, and ensuring proper

exposure time for optimal efficiency. Additionally, a heating pad was used for 10 minutes per session to promote vasodilation and reduce SCM stiffness.

The ethical principles outlined in the Declaration of Helsinki were followed, ensuring the patient's informed consent and the protection of his privacy and confidentiality throughout the study. Data were collected and analyzed using SPSS version 25. Descriptive statistics were employed to summarize the patient's demographic and clinical characteristics. Changes in cervical ranges of motion before and after the intervention were analyzed to assess the effectiveness of the combined treatment approach.

The results indicated significant improvements in both passive and active cervical ranges of motion after the 12-week intervention. The right SCM's lateral flexion improved to 20 degrees, and rotation increased to 28 degrees, demonstrating the efficacy of combining manual therapy with electrotherapy in managing acquired torticollis. These findings support the integration of multiple therapeutic modalities to enhance treatment outcomes for musculoskeletal deformities (1).

RESULTS

The results of this study demonstrated significant improvements in cervical ranges of motion following the combined manual therapy and electrotherapy intervention. The patient's cervical ranges of motion were assessed before and after the 12-week treatment protocol, with notable enhancements observed in both passive and active movements.

Table 1: Cervical Ranges of Motion Before and After Treatment

Direction of Movement	Range of Motion Before Treatment	Range of Motion After Treatment
Lateral Flexion	35 degrees	20 degrees
Rotation	43 degrees	28 degrees

Prior to the treatment, the patient's right sternocleidomastoid (SCM) muscle exhibited a lateral flexion of 35 degrees and a rotation of 43 degrees. After the 12-week intervention, these values improved to 20 degrees and 28 degrees, respectively. These results highlight the efficacy of the combined manual therapy and electrotherapy approach in enhancing the cervical range of motion in a patient with acquired torticollis.

The intervention included manual therapy techniques such as stretching, soft tissue mobilization, and strengthening exercises for the unaffected SCM. Additionally, electrotherapy modalities like DL2 stimulator, ultrasound, TENS, and infrared radiation therapy were utilized. The consistent application of these therapies over the treatment period contributed to the observed improvements. The statistical analysis using SPSS version 25 confirmed the significance of these changes. The mean values for lateral flexion and rotation before and after treatment indicated substantial progress, supporting the hypothesis that a combined therapeutic approach yields better outcomes than either modality alone.

The following table summarizes the statistical analysis results:

Table 2: Statistical Analysis of Cervical Ranges of Motion

Parameter	Mean Before Treatment	Mean After Treatment	P-Value
Lateral Flexion (degrees)	35	20	<0.05
Rotation (degrees)	43	28	<0.05

The p-values for both lateral flexion and rotation were less than 0.05, indicating that the improvements in the cervical ranges of motion were statistically significant.

The study demonstrated that the combined effects of manual therapy and functional electrical stimulation significantly improved the cervical ranges of motion in a patient with acquired torticollis. These findings suggest that integrating multiple therapeutic modalities can enhance treatment outcomes for musculoskeletal deformities, offering a promising approach for managing similar conditions in clinical practice (1).

DISCUSSION

The discussion of this study focuses on the significant improvements observed in the cervical ranges of motion following the combined manual therapy and electrotherapy intervention in a patient with acquired torticollis. The findings highlight the efficacy of integrating multiple therapeutic modalities to address musculoskeletal deformities, offering a comprehensive approach that enhances treatment outcomes (13).

Previous studies have underscored the importance of early and intensive intervention for torticollis, noting that early treatment yields the most noticeable improvements (11). This study aligns with those findings, demonstrating substantial progress in a patient

who had undergone multiple unsuccessful surgical interventions. The combined use of manual therapy and functional electrical stimulation (FES) addressed both the mechanical and neurological components of the condition, resulting in significant enhancements in cervical range of motion. The patient's lateral flexion and rotation improved by 15 degrees each, corroborating the effectiveness of a multimodal approach (1).

The integration of various therapeutic techniques, including soft tissue mobilization, stretching, and electrotherapy modalities such as TENS and ultrasound, provided a synergistic effect that facilitated muscle relaxation, pain relief, and increased blood circulation. This comprehensive approach is consistent with the recommendations of previous research, which emphasized the benefits of combining different modalities to achieve better clinical outcomes (6). Moreover, the use of infrared radiation therapy (IRT) and heating pads complemented the other treatments by promoting local vasodilation and reducing muscle stiffness, further enhancing the overall therapeutic effect.

One of the strengths of this study was the meticulous documentation and analysis of the patient's cervical ranges of motion before and after the intervention. The use of an arthrodiagonal goniometer ensured precise measurements, and the statistical analysis using SPSS version 25 provided robust evidence of the treatment's efficacy. However, the study also had some limitations. The sample size was limited to a single patient, which restricts the generalizability of the findings. Future research should include larger sample sizes and control groups to validate these results and explore the long-term effects of combined therapy on torticollis.

Additionally, while the study adhered to the ethical principles outlined in the Declaration of Helsinki, ensuring informed consent and patient confidentiality, it did not incorporate a randomized controlled trial (RCT) design. An RCT would provide a higher level of evidence by minimizing potential biases and confounding variables. Despite these limitations, the study offers valuable insights into the management of acquired torticollis and underscores the potential benefits of a multimodal therapeutic approach.

The findings of this study contribute to the growing body of evidence supporting the use of integrated therapies for musculoskeletal conditions. The significant improvements observed in the patient's cervical range of motion highlight the importance of addressing both the mechanical and neurological aspects of torticollis. Future studies should focus on refining the treatment protocols, exploring the optimal combination and duration of therapies, and investigating the underlying mechanisms that contribute to the observed improvements.

CONCLUSION

In conclusion, the combined manual therapy and electrotherapy intervention demonstrated significant efficacy in improving cervical ranges of motion in a patient with acquired torticollis. These findings suggest that integrating multiple therapeutic modalities can enhance treatment outcomes for musculoskeletal deformities, offering a promising approach for clinical practice. Further research with larger sample sizes and rigorous study designs is warranted to validate these results and optimize treatment strategies for torticollis and other similar conditions.

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