Fascial Manipulation in the Management of Carpal Tunnel Syndrome

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Abstract

Fascial manipulation is an effective tool in the management of the neural sensitivity disorders. This can be used to treat carpal tunnel syndrome patients. The specific objective of the study was to evaluate the efficacy of fascial manipulation in carpal tunnel syndrome. A total of ten samples participated in the study. Reduction in pain intensity was significant post fascial manipulation. The mechanism behind reduction of pain by the fascial manipulation is, muscular insertions allow the fascia to perceive stretch produced by a muscle and that this tension can be transmitted at a distance, both in a distal and proximal direction. The three-dimensional dispersion of forces within anatomical regions of the human body has yet to be thoroughly explored, studies of myofascial force transmission confirm that the actual stiffness of the general fascial compartments appear to be very important for the quality of myofascial force transmission. Patients underwent fascial manipulation made clinically relevant improvement as pain decreased. The role of fascial manipulation in Carpal Tunnel Syndrome supports the theory of myofascial continuity between the flexor carpi retinaculum and antebrachial fascia. Transformation of extra cellular matrix of deep fascia plays a major role in pathogenesis of Carpal Tunnel Syndrome. Increase in viscosity of extra cellular matrix may create an impairment in intrafascicular gliding and can alter signals gaining the mechanical connection of the nervous system may also assist patients in accepting why movement of body parts distant from the site of symptoms may be used as a treatment approach to mobilize neural tissues.

Design: Pre –Post Experimental Study design.

Participants: Carpal Tunnel Syndrome who have pain predominantly White collar occupation.

Intervention: Fascial manipulation technique for Carpal Tunnel Syndrome as described by stecco.

Outcome Measures: Pain was measured using visual analogue scale.

Results & Conclusion: The result concluded that fascial manipulation is effective in treatment of carpal tunnel syndrome patients and hence it can be an effective tool in the hands of the clinician with knowledge of Fascial, manipulation.

Keywords: Carpal tunnel syndrome; Fascial manipulation; Pain

Introduction

Carpal tunnel syndrome (CTS) is the most common compression neuropathy and is due to compression of the median nerve [1]. The median nerve sits deep under the flexor retinaculum. It became superficial to the flexor digitorum superficialis (FDS) muscle bellies just above 5cm proximal to the transverse carpal ligament. The median nerve is composed of 94% of sensory fibers and 6% of motor fibers at the level of carpal tunnel. However, the motor branch presents many anatomical variations, which create great variability of pathology in cause of CTS.
The main symptoms are pain and paresthesia in the first second and third fingers along the innervation of the median nerve. The etiopathogenesis of the CTS is multifactorial and in most cases, idiopathic [2]. In an acute form is uncommon is due to a rapid and sustained increase of pressure in the carpal tunnel.

Trauma (including fractures of the wrist or joint deformity), arthritis and arthrosis may increase the chance of developing this syndrome [3]. Other causes are mechanical such as deformation of median nerve. Stiffness and fibrosis of the transverse carpal ligament [4]. Hypertrophy of thenar eminence with increased pressure into the carpal tunnel [4] and fibrosis that reduce median nerve mobility.

Due to high incidence and prevalence of this disability and its economic consequences, CTS remains a challenge for health systems worldwide. Currently there is inadequate scientific evidence regarding conservative treatments.

The benefits and risks related to the use of night time orthotic exercises and mobilization, therapeutic ultrasound and equipments such as ergonomic computer keyboards [5] are not known.

Fascial manipulation is a manual therapy that focuses on deep muscular fascia. This technique considers the fascia as a three-dimensional continuum. The main stay of this manual technique lies in the identification and treatment of specific, localized areas of fascia. Fascia is formed by undulated collagen fibers and elastic fibers arranged in distinct layer the fibers are aligned in different directions.

In fascial manipulation, the body is divided into 14 segments as head, neck, thorax lumbar, pelvis, scapula, shoulder, elbow forearm, hand, hip, knee, ankle, and feet. Each body segment is served by six myofascial units consisting of monoarticular and biarticular muscle fibers, their deep fascia and the articulation that they move in one direction on one plane. A new functional classification is applied to body movements to facilitate analysis of motor variations. All movements are considered in term of directions on spatial planes and are defined as follows: retro lateral humerus (re-la-hu), latero-humerus (la-hu), extra cubitus (ex-cu). Within each myofascial unit, in a precise location of the deep muscular fascia a specific point, termed center of coordination (cc) is identified. Each cc is located in the point of convergence of the vectorial, muscular forces that act on the body segment during a precise movement. Biarticular muscles link unidirectional myofascial units to form myofascial sequence. One sequence is considered to monitor movement of several segments in one direction on the three planes. Other points, termed centers of fusion located on the intramuscular septa, retinacula, and ligaments, monitor movements in intermediate directions between two planes and three dimensional movements [6].

Statement of the study

A Study to find out the effectiveness of manual therapy technique called fascial manipulation in carpal tunnel syndrome.

Need of the study

This study as aimed to introduce fascial manipulation in the management of carpal tunnel syndrome.

Hypothesis

It is hypothesised that there may be significant difference in pain following fascial manipulation treatment for carpal tunnel syndrome.

Operational definition

Fascial Manipulation: It is a manual technique, the aim of which is to restore normal fluidity to the ground substance and to eliminate adherences between collagen fibers by exploiting the malleability of the fascia [6].

Visual Analog Scale (VAS): Visual Analog scale is one of the basic pain measurement tools which consist of 10cm horizontal line with two end point labelled respectively. One end is labelled as no pain and other is labelled as severe pain.

Carpal tunnel syndrome: It is a painful condition of the hand and fingers caused by compression of major nerve where it passes over the carpal bones through a passage at front of the wrist.

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Methodology

Study setting: The study will be conducted in the outpatient department of RVS college of physiotherapy.

Selection of subjects: 10 subjects were randomly selected who fulfilled the inclusion and exclusion criteria.

Variables

Dependent variable
- Pain

Independent variable
- Fascial manipulation

Measurement tools:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Visual analog scale</td>
</tr>
</tbody>
</table>

Study design: The study design used will be pre-and post experimental study.

Inclusion criteria

Pain in the first three fingers, wrist and forearm.
Paraesthesia over first three fingers, wrist and forearm.
Positive Phalens and Tinel’s test Positive
Nerve conduction studies showing decrease in nerve conduction within last 6 months
CTS patients aged between 20-40 years

Exclusion criteria

Congenital coagulopathies.
Use of oral anti-coagulant therapy.
Concomitant tumours.
Systemic neurological and rheumatologic pathologies.

Orientation to the patient

- Before the collection of data, all the subjects were explained about the purpose of the study. The investigator had given a detailed orientation about outcome measurement.
- The concern and full cooperation of each participant was sought after complete explanation of the condition and demonstration of the procedure involved in the study.

Materials used

Pillow
Couch
Client consent form
Fascial manipulation assessment chart
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Test administration

Pain assessment by visual analogue scale (VAS)

- The VAS is a subjective measure of pain. It consists of a 10 cm line with two end points representing 'no pain' and 'worst pain imaginable'. During the visit patient are asked to rate their pain by placing a mark on the line corresponding to their current level of pain (Figure 1).

![Visual Analog Pain Scale](image)

*Figure 1: Shows movement verification for intra humerus.*

Procedure

10 subjects were included in the group will be given facial manipulation. All the subjects had symptoms for more than 3 months. Prior to commencing treatment subjects were asked to evaluate the severity of their pain on a visual analogue scale from 1 to 10. This subjective evaluation was repeated after three treatment session and the session were then suspended. At a follow-up, 3 months after the end of treatments, a third measurement was recorded. The first two treatment sessions were effectuated one week apart from each other and a third treatment two weeks later.

Myofascial unit of intra-humerus

Center of coordination

The center of coordination of these forces is beneath the pectoralis major tendon over the coracoclavicular fascia which is continuous with the subscapularis muscle.

Movement verification

Ask the patient to rotate the arm such that palm faces outward against manual resistance at the forearms; sometimes the movement is not painful but a difference in strength between the two limbs is noticeable.

Treatment

Patient is lying on his back; the therapist uses elbow or knuckle just below the shoulder; and guided by the patient's sensations, palpates for the point that provokes symptoms (Figure 2).

Myofascial unit of intra-carpus

Center of co-ordination

The center of co-ordination of these vectorial forces is over the proximal part of pronator quadratus (between the tendons of Palmaris longus and flexor carpi radialis).

Movement verification

Ask the patient to rotate the forearm such that palm faces downward against the manual resistance at the wrist a noticeable difference between strength is common when one arm is suffering. In the acute phase, the patient simply may not be capable of carrying out this movement, even without resistance (Figure 3).

Treatment

The patient is in sitting position with arm resting over the table the therapist uses his elbow or knuckle in the mid of forearm, and guided by the patient’s sensations, palpates for the point that provokes symptoms (Figure 4).

Myofascial unit of laterohumerus

Site of pain or Centre of perception (CP)

At a times pain localizes beneath the cc (biceps tendon); at other times, it manifests in the distal deltoid tendon.

Origin of dysfunction or cc;

Three vectors converge beneath the acromion: the supraspinatus, the long head of biceps and the middle or lateral head of deltoid.

Movement verification

Ask the patient to abduct their arms against a resistance placed at the elbow level; a noticeable difference between strength is common when one arm is suffering. In the acute phase, the patient simply may not be capable of carrying out this movement, even without resistance (Figure 5).

Treatment

Patient side lying on non-painful side; the therapist uses the elbow or knuckle over the deltoid, in correspondence to the long head of biceps tendon. In acute cases, it is preferable to avoid this point, reducing spasm along the sequence first by working on the cc of la-sc and la-cu (Figure 6).
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Myofascial unit of laterocarpus

Center of co-ordination

The center of co-ordination of these vectors is over the muscle belly of the two extensor carpi radialismuscles.

Movement verification

Ask the patient to abduct and extend the wrist against the manual resistance over the dorsal aspect of wrist; a noticeable difference between strength is common when one arm is suffering (Figure 7).

Treatment

The patient is on sitting position with arm resting on the table the therapist uses elbow or knuckle just below the elbow joint (Figure 8).

Data Analysis and Results

Data analysis

This analysis deals with the systematic presentation of the analysed data followed by the interpretation of the data.

a) paired ‘t’ test

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Mean</th>
<th>Mean difference</th>
<th>Standard deviation</th>
<th>Paired ‘t’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>6.6</td>
<td>3.2</td>
<td>0.79</td>
<td>12.8*</td>
</tr>
<tr>
<td>Post test</td>
<td>3.5</td>
<td></td>
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</tr>
</tbody>
</table>

Table 1: The table shows mean value, mean difference, standard deviation, and paired ‘t’ value between pre-test and post-test scores of pain.

*12.8 significant is 0.05 level

In this group for pain the calculated paired ‘t’ value is 12.8 and ‘t’ table value is 1.833 at 0.05 level. Since the calculated ‘t’ value is more than ‘t’ table value above the study shows that there is significant difference in pain following fascial manipulation technique for carpal tunnel syndrome subjects (Figure 9).

Figure 8: Shows treatment for latero carpus.

Figure 9: Shows the graphical representation of the pre-and post-test mean values of pain among Group.

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Results
10 clinically diagnosed subjects were treated with fascial manipulation for carpal tunnel syndrome.

Analysis of dependent variable in pain in Group A: The calculated paired ‘t’ value is 12.8 and the table ‘t’ value is 1.833 at 0.05 level of significance. Hence, the calculated ‘t’ value is greater than the table ‘t’ value there is significant difference in pain following fascial manipulation in carpal tunnel syndrome patients.

Discussion
The study was conducted on 10 subjects with carpal tunnel syndrome. The subjects were treated with fascial manipulation using center of co-ordination.

The study aimed on find out the effectiveness of fascial manipulation using points of cc on subjects with carpal tunnel syndrome a costly disorder resulting in considerable pain and disability.

The effectiveness of fascial manipulation was earlier experimented by various physical therapists. Elisa pratelli., et al. [7] proved that fascial manipulation technique is effective in reducing pain in carpal tunnel syndrome patients.

In the present study, the effectiveness of the fascial manipulation technique. The mechanism behind reduction of pain by the fascial manipulation is explained by Elisa pratelli., et al. [7], he said that on these muscular insertions allow the fascia to perceive stretch produced by a muscle and that this tension can be transmitted at a distance, both in a distal and proximal direction. While the three-dimensional dispersion of forces within anatomical regions of the human body has yet to be thoroughly explored, studies of myofascial force transmission confirm that the actual stiffness of the general fascial compartments appear to be very important for the quality of myofascial force transmission.

Patients under went fascial manipulation made clinically relevant improvement as pain decreased. The success of fascial manipulation in CTS supports the theory of myofascial continuity between the flexor carpi retinaculum and antebrachial fascia [8].

Transformation of extra cellular matrix of deep fascia from sol to gel plays a major role in pathogenesis of CTS [9]. Increase in viscosity of extra cellular matrix may create an impairment in intra fascicular gliding and can alter signals [10].

Conclusion
The study was conducted to find out the effectiveness of fascial manipulation technique in carpal tunnel syndrome patients.

10 subjects were included in this study and were treated with fascial manipulation. From the statistical results, it can be conclude that there is significant difference in reduction of pain in the group after fascial manipulation. Fascial manipulation is effective in reducing pain in carpal tunnel syndrome patients. The method of fascial manipulation is effective and non-invasive providing excellent pain reduction among CTS patients and thereby improve functional work of wrist and hand. The treatment assumed to help alteration of fascial viscosity. Further research on the myofascial diagonals and spirals may govern the CTS may provide more clear idea and guidelines.

Limitations
• Number of subjects was small.
• Psychological factors were not considered.
• Short term study.

Suggestions
• Similar study can be carried out for larger sample size.
• Study can also be carried out for different age groups.
• The study can do long term period.

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Bibliography


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