Original Study

Efficacy of Neural Tissue Mobilization Versus Cervical Mobilization Along with Manualtraction and Surged Faradic Current on Pain, Disability and Rom in Chronic Cervical Radiculopathy Patients

Kartik Chhonker[1], Kalpana Jain[2], Namrata Srivastava[3]

[1,2]Assistant Professor, [3]HOD, Career College, Bhopal

How to cite this article: Kartik Chhonker, Kalpana Jain, Namrata Srivastava. Efficacy of Neural Tissue Mobilization Versus Cervical Mobilization Along with Manualtraction and Surged Faradic Current on Pain, Disability and Rom in Chronic Cervical Radiculopathy Patients. Indian Journal of Physiotherapy and Occupational Therapy 2023;17(2).

Abstract

Background: Cervical radiculopathy (CR) caused by disc disease is a disabling condition characterizedby radicular pain in one or both upper extremities, in combination with sensory, motor, and reflex changes in one or several affected nerve-root distribution.. Cervical mobilization refers to low velocity, sustained or oscillatory passive movements of varying amplitude applied at different range give by therapist to reduce pain and improve joint mobility. Neuro-physiological effect of cervical mobilization helps in reduction of pain through gentle small amplitude rhythmic oscillatory movement which stimulates the mechanoreceptors that inhibit the transmission of nociceptive stimulus at the level of spinal cord or brain stem and thus pain get reduced. All this helps in the normal functioning of the nervous tissue in the body.

Methods: The study was conducted at Department of Physiotherapy, Rajeev Gandhi College, Bhopal. 30 subjects meeting the inclusion criteria were recruited for the study. They were allocated randomly into two equal groups, Group A and Group B respectively. Subjects in both the group received Surged Faradic Stimulation & Manual Cervical Traction as a baseline treatment. In Group A, subjects received neural tissue mobilization in addition while in Group B subjects received Cervical Mobilization in addition. Treatment was given for 6 day per week for 4 week.

Conclusion: The results of this study show that neural tissue mobilization and cervical mobilization, in combination with manual traction and pulsed faradic stimulation, are equally beneficial in reducing pain, disability, and ROM.

Keywords: Chronic Cervical Radiculopathy, Neural Tissue Mobilization, Cervical Mobilization, Surged Faradic Stimulation, Manual Cervical Mobilization, Cervical ROM, Neck pain and Disability,Northwick Park Pain Questionnaire, Goniometry.

Introduction

Cervical radiculopathy (CR) caused by disc disease is a disabling condition characterizedby radicular pain in one or both upper extremities, in combination with sensory, motor, and reflex changes in one or several affected nerve-root distribution[1]. Typically, individual complains of neck pain and also physical-psychological disabilitypresent due to pathology. Reduced health and quality of life are

Corresponding Author: Kartik Chhonker, Assistant Professor Career College, Bhopal.

E-Mail: kartikchetan@gmail.com

often reported by patients with CR[2].

Epidemiological reported prevalence is 83 people per 100000 people and incidence of men is 107.3/100000 which is greater than female population that is 63.5/100000 and a peak in the age group 40-50 years was reported in some studies in a general population[3].

In patients with CR, neck muscle strength and neuro-muscular endurance (NME). Such impairments may contribute to the development of pain and disability in patients with CR is impaired.[5]

Patients commonly describe sharp radicular pain and tingling or burning sensations in the arm, and they sometimes have sensory, motor changes that correspond to the involved nerve root. Typically axial neck pain is also present, and some patients report headaches and dizziness[6]. Cervical nerve roots pass through the intervertebral foramina, which are located between the vertebral and facet joints; these joints are involved in degenerative processes in the cervical spine and in the intervertebral discs in patients with CR. The foramina are widest in the upper cervical spine and gradually narrow distally, which may explain why C7 (46.3 percent to 69 percent) is the most prevalent level of root compression, followed by C6 (17.6 percent to 19 percent)[7].

Physical therapy includes cervical traction and mobilization, exercises, and other electrotherapy modalities such as TENS, IFT, and Ultrasound to reduce pain.If significant compressiononthe nerve exists to the extent that motor weakness results, surgery may be necessary to relieve the pressure[11].

The study's neck pain and impairment were assessed using the Northwick Park Neck Pain Questionnaire. The questionnaire will be straightforward to complete and assess for patients with acute or chronic neck pain, and it will provide an objective measure of outcome. The Northwick Park Neck Pain Questionnaire evolved from the Oswestry Questionnaire (NPQ). In the appendix, the questionnaire was presented..[12]

MCT (Manual Cervical Traction) is one of the techniques used on CR patients to enhance vertebral body distance and foraminal space, reducing nerve root pressure[13]. Neural tissue mobilization (NTM) promotes joint range of motion (ROM), elevating dynamic adaptability and assisting body movement without resistance by improving neural flexibility, lowering dynamic sensitivity of the nervous system, and increasing blood flow, relieving pain[14].

Cervical Spine Mobilization (CSM) by oscillatory movements and traction to the cervical segments helps to break adhesion and stretch the hypo-mobile shortened structures. It also helps to maintain the extensibility and tensile strength of articular tissues[15].

Faradic type current is short duration interrupted direct current with pulse duration of 0.1–1 ms and frequencies between 50–100 Hz, used for the stimulation of innervated muscles. . Although its effects have been proven in treating muscle spasm due to inflammation and pain gate induced pain relief[16].

Material and Methods

30 subjects of chronic cervical radiculopathy were taken [15 in Group A treated with Neural mobilization along with Manual cervical traction and Surged Faradic Stimulation and 15 in Group B treated with Cervical Spine Mobilization (CSM) along with Manual cervical traction and Surged Faradic Stimulation. Following techniques mentioned below:

Goniometry

1. Cervical Extension:

Motion occur in the sagittal plane around a medial lateral axis. Mean cervical extension ROM measured by goniometer is about 50 to 60 degrees.

2. Cervical Lateral Flexion: Motion occurs in the frontal plane around an anterior- posterior axis. ROM for lateral flexion to one side measured by the goniometer is about 22 degrees in adults.

3. Cervical Rotation:

Motion occurs in the transverse plane around a vertical axis. ROM measured with goinometer is between 70-90 degrees.

Neural Tissue Mobilization

The patient was told to lie supine after receiving a neural tissue mobilization procedure for the median nerve. The'sliding' approach works by lengthening the median nerve bed with motions (elbow and

wrist extension alone or combined with neck lateral flexion or rotation away from the symptomatic arm). Shoulder abduction up to 90 degrees will preload the neural tissues in preparation for additional therapies and nerve gliding. Shoulder depression and abduction, elbow extension, forearm supination, wrist and finger extension, and cervical spine contra-lateral side flexion. Per session, two 20-30 slow oscillation repetitions with a 10-second hold will be delivered.

Fig 1: Neural Tissue Mobilization

CERVICAL SPINE MOBILIZATION (CSM)

(1) Cervical Postero-Anterior Central Vertebral Mobilization :

The subject lies face downwards and the therapist stands at the head of the subject/table.Therapist with his/her thumbs held in opposition and back to back, with the tips of the thumb pads on the spinous process of the vertebra to be mobilized. Apply symmetrical pressure through the articular pillars with both the thumbs. The therapist should progress to grade IV mobilizations for 30 seconds or 15–20 repetitions at desired level.

Fig 2: Cervical Poster-Anterior Cervical Vertebral Moblization

(2) Cervical Rotation Mobilization:

The subject is positioned supine with the head and neck extending over the end of the treatment table. The therapist cradles subject's head between the left forearm and chest wall with one arm, while the right hand's metacarpophalangeal area of the index finger is placed so that its radial side rests firmly against the articular pillar at the desired level. With the right hand, the therapist rotates the subject's head to end range while the left hand accentuates the rotation pressure in the plane of the apophyseal joints. The pressure is repeated rhythmically with a progressive increase of force to grade IV mobilizations for 30 seconds or 15–20 repetitions.

Fig 3: Cervical Rotation Mobilization

(3) Cervical lateral glides:

Scapular depression, shoulder abduction, forearm supination, wrist and finger extension, shoulder external rotation, and elbow extension are all ULTT1 (median nerve bias) positions that a second clinician applies to the subject's upper extremities. The therapist cradles the subject's head and neck and conducts a lateral translation towards the contralateral side with the affected upper extremity in this position (away from the side of symptoms). Oscillatory translational mobilizations of the neck in the plane of the apophyseal joints are performed rhythmically for 30 seconds or 15–20 repetitions at each desired level, with a progressive increase in force to grade IV for 30 seconds or 15–20 repetitions at each desired level.

Fig 4: Cervical Lateral Glide Mobilization

MANUAL CERVICAL TRACTION

Position of patient was supine. The traction can be timed with the exhalation during a breathing cycle providing the traction force during exhalation. 5 repetitions of manual cervical traction was done by the therapist with 10 seconds of hold time.

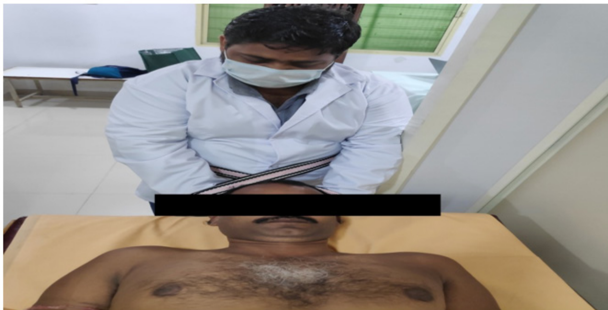

Fig 5: Manual Cervical Traction

SURGED FARADIC STIMULATION

The patient is made to sit in a chair, providedwith back rest. Strong contractions is given in pulse mode with pulse duration of 1ms and frequency is set in between 50 - 100 Hz. Surging is at its maximum and intensity is slowly increased till the strong visible contraction is seen. The time duration is 15 min.

Results

In the present study, for data analysis SPSS v25 was used. Both the groups had 15 subjects each and all the subject were assessed pre and post treatment by Northwick Park Pain Questionnaire (NPQ) for neck Pain, disability and Goniometer for Neck ROM. As the no. of sample in one group was 15 (<100), therefore Shapiro-Wilk test was used in the study.

To determine the significance of data of Group A and B normality test was done which showed non-significant value i.e. less than 0.05.

Therefore, in the present study both Group A and Group B were analyzed using parametric test. To compare the mean values within the groups Paired t-test was used while to compare the mean values between the groups i.e. Group A and Group B independent t- test was used.

Table 1: Comparison of Mean values of Pre- Pre & Post- Post data of NPQ and Goniometer in Group A& Group B using Independent t- test

Variables		N	Mean	S.D.	t= value	Sig. (2 tailed)
Pre NPQ	Group A	15	70.57	3.11	-0.307	0.761
	Group B	15	70.91	2.93		
Post NPQ	Group A	15	46.26	3.11	0.007	0.995
	Group B	15	46.21	3.44		
Pre Extension	Group A	15	37.46	1.92	0.092	0.927
	Group B	15	37.40	2.02		
Post Extension	Group A	15	56.60	2.19	-0.162	0.873
	Group B	15	56.73	2.31		
Pre Lateral Flexion	Group A	15	18.40	2.16	0.513	0.612
	Group B	15	18.00	2.10		
Post Lateral Flexion	Group A	15	38.80	1.37	-1.054	0.301
	Group B	15	39.33	1.39		

Continue......

Variables		N	Mean	S.D.	t= value	Sig. (2 tailed)
Pre Rotation	Group A	15	46.80	2.21	0.324	0.748
	Group B	15	46.53	2.29		
Post Rotation	Group A	15	72.26	2.15	-0.355	0.725
	Group B	15	72.53	1.95		

Discussion

In the present, total 30 patients of age 35-50 years that that were diagnosed with chronic cervical radiculopathy are included. These 30 patients were selected after pre- screening done using NPQ for neck pain and disability and goniometry for neck ROM and they were randomly assigned into two groups i.e. Group A and B; where Group A underwent Neural tissue Mobilization along manual traction and surged faradic current and Group B underwent Cervical Mobilization along with manual traction and surged faradic current to improve pain, disability and range of motion in cervical radiculopathy patients.

After completing 4 weeks protocol, when mean values of post treatment data were compared of both the group using Independent t test , it revealed non-significant result that means both the groups had similar improvement in terms of pain, disability and ROM.

RJ Nee and D Butler Neural mobilization enhances intraneural circulation, which improves axoplasmic flow, therefore enhancing neural connective tissue visco-elasticity and lowering AIGS sensitivity (Abnormal impulse generating sites).

Kim DG, Chung SH, Jung HB In their study concluded that there was significant difference between the pre intervention and post intervention in NPRS, NDI, ROM and deep flexor endurance in the group who received neural tissue mobilization.

Based on the statistical analysis, while comparing the vas between group A and group B the result of the study shows that the average improvement in group A was 1.6000 with S.D is 1.18766. in group B the average improvement was 3.0000 with the S.D 1.2390 and t-value was 3.829, p-value o.ooo p<0.05 which shows that there issignificant improvement in group B than group A on VAS score.

Based on the statistical analysis, while comparing the NDI between group A and group B the result of the study shows that the average improvement in group A was 4.7000 with S.D is 1.52523. in group B the average improvement was 6.6500 with the S.D 1.72520 and t-value was 3.727, p-value o.ooop<0.05 which shows that there is significant improvement in group B than group A on NDI score The results of this study demonstrate that both the cervical mobilization alone verses cervical mobilization with thoracic thrust manipulation experienced significant improvements in pain, functional status following 12 treatment sessions (3 days /week for 4 weeks). But the group B experienced better outcomes for all variables in comparison to one another.

Gore V in their study states that cervical manual traction is effective in relieving pain due to cervical radiculopathy. The study is concluded that the effect of cervical manual traction, TENS and Neural Tissue Mobilization are more effective than the only cervical manual traction.

Mehta, et. al, their study was designed to determine and compare the effect of low level laser therapy and strong surge faradiccurrent on trapezius spasm.

Group A consisted of 15 subjects who received Low Level Laser Therapy andGroup B consisted of 15 subjects who received Strong Surge Faradic current. On the 1st and 5th day Numerical pain rating scale(NPRS) was taken to measure pain intensity, Hubbard's "Tenderness grading scale" was used for assessment of soft tissuetenderness and Cervical side flexion and rotation range of motion was measured using universal goniometer.

The results of thisstudy demonstrated that LLLT and SSF current both the interventions are effective for treatment of trapezius spasm. But SSF currentis more effective than LLLT in improving cervical rotation range of motion.

Conclusion

The present study concludes that application of neural tissue mobilization and cervical mobilization along with manual traction and surged faradic stimulation is equally effective in improving pain, disability and ROM. The study shows non significant result and thus we accept the null hypothesis.

Consent: Informed consent was taken from all participants in the study for the publication work in the journal.

Ethical Clearance: This study was approved by our institutional ethical committee. Career College, Bhopal, Approval Date: 16/02/2023, Approval/ Reference Number: CC/BPT/22/294

Source of funding: self, **Conflict of interest:** Nil

Refrence

1. Carette S, Fehlings MG. Clinical practice. Cervical radiculopathy. N Engl J Med. 2005;353(4):392-9.
2. Daffner SD, Hilibrand AS, Hanscom BS, Brislin BT, Vaccaro AR, Albert TJ. Impact of neck and arm pain on overall health status. Spine (Phila Pa 1976). 2003;28(17):2030-5.
3. Radhakrishnan K, Litchy WJ, O'Fallon WM, Kurland LT. Epidemiology of cervical radiculopathy. A population-based study from Rochester, Minnesota, 1976 through 1990. Brain. 1994;117 (Pt 2):325-35.
4. Bono CM, Ghiselli G, Gilbert TJ, et al. An evidence-based clinical guideline for the diagnosis and treatment of cervical radiculopathy from degenerative disorders. Spine J. 2011;11(1):64-72.
5. Peolsson A, Vavruch L, Öberg B. Disability after anterior decompression and fusion for cervical disc disease. Advances in Physiotherapy. 2002;4(3):111-24
6. Goldstein B. Anatomic issues related to cervical and lumbosacral radiculopathy. Phys Med RehabilClin N Am. 2002;13(3):423-37.
7. Tanaka N, Fujimoto Y, An HS, Ikuta Y, Yasuda M. The anatomic relation among the nerve roots, intervertebral foramina, and intervertebral discs of the cervical spine. Spine (Phila Pa 1976). 2000;25(3):286-91.
8. Tong HC, Haig AJ, Yamakawa K. The Spurling test and cervical radiculopathy. Spine (Phila Pa 1976). 2002;27(2):156-9.
9. Woods BI, Hilibrand AS. Cervical Radiculopathy: Epidemiology, Etiology, Diagosis and Treatment. J Spinal Disord Tech. 2015;10.1097.
10. Kuijper B, Tans JT, Schimsheimer RJ, et al. Degenerative cervical radiculopathy: diagnosis and conservative treatment. A review. Eur J Neurol. 2009;16(1):15-20.
11. Salt E, Wright C, Kelly S, Dean A: A systematic literature review on the effectiveness of non-invasive therapy for cervicobrachial pain. Man Ther. 2011;16(1):53-65.
12. Leak AM, Cooper J, Dyer S: The Northwick Park Pain Questionnaire Devised to measure neck pain and disability. British Journal of Rheumatology 1994;33:469-474.
13. Colachis SC, Strohm BR. A study of tractive forces and angle of pull on vertebral interspaces in the cervical spine. Arch Phys Med Rehab.1965;46:820-30.
14. Lamba D, Rani D, Gaur N, Upadhyay R. The effect of neural mobilization with cervical traction in cervical radiculopathy patients. Indian Journal of Physiotherapy & Occupational Therapy. 2012; 6(2): 45-48.
15. S NG, Vora K.P, Jhaung M. Cervical spine mobilization versus Thoracic spine manipulation in subjects with unilateral C6 and C7 Cervical Radiculopathy - Comparative study, International Journal of Advanced Scientific and Technical Research. 2013 January-February; 1(3): 304-319
16. Shetty KS, Raj AJO: Effect of Surged Faradic Current on Myofasciaal Trigger Point Of Upper Trapezius Muscle as Compared with Manual Pressure Release,I JSR.2017;6(3):2304-2307
17. Erik E Swartz, R. T Floyd, and Mike Cendoma. Cervical Spine Functional Anatomy and the Biomechanics of Injury Due to Compressive Loading. J Athl Train. 2005 Jul-Sep; 40(3): 155–161
18. Mercer S, Bogduk N: Joints of the cervical vertebral column. J Orthop Sports Phys Ther31(4):174, 2001.
19. Mercer S: Structure and function of the bones and joints of the cervical spine. Journal of Orthopaedic& Sports Physical Therapy 2OOl;31(4):174-182
20. Oatis C (ed): Kinesiology: The Mechanics &Pathomechanics of Human Movement.Philadelphia, Lippincott Williams & Wilkins, 2004.
21. Pal GP, Routal RV: The role of the vertebral laminae in the stability of the cervical spine. J Anat188:485, 1996.
22. Pal GP, Sherk HH: The vertical stability of the cervical spine. Spine 13:447, 1988.
23. . Nordin M, Frankel VH: Basic Biomechanics of the Musculoskeletal System, 2nd . Philadelphia, Lea &Febiger, 1989
24. Maroney SP, Schultz AB, Miller JAA, et al.: Loaddisplacement properties of lower cervical spine motion segments. J Biomech21:769, 1988.
25. Shea M, Edwards WT, White AA, et al.: Variations in stiffness and strength along the cervical spine. J Biomech24:95, 1991