

IMMEDIATE EFFECT OF SELF NEURAL FLOSSING IN CERVICAL RADICULOPATHY A PRE AND POST EXPERIMENTAL STUDY

EFFECTUL IMEDIAT AL TEHNICII "SELF NEURAL FLOSSING"* ÎN RADICULOPATIA CERVICALĂ - STUDIU PRE - POST EXPERIMENTAL

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Key words: neural flossing technique, cervical radiculopathy, neck disability index

Cuvinte cheie: tehnica "neural flossing", radiculopatie cervicală, indexul Neck Disability

Abstract

Background. Cervical radiculopathy is a common clinical condition defined as a disorder of nerves and nerve roots and oftenly it is the result of a compressive or inflammatory pathology from disc herniation, spondylitic spur or cervical osteophytes. Patient usually presents with complaints of pain, numbness, tingling and weakness in upper extremity.

Objective. To study the Immediate effect of self neural flossing on pain, ROM and neck disability in patients with cervical radiculopathy.

Methodology. Convenience sampling method recruited 30 participants of age between 30-70 and self neural flossing was given. A pre-post value was measured using Neck Disability Index, Visual Analogue Scale, and Cervical Range of Motion.

Results. Self neural flossing technique reduced pain and increased neck function along with reduced painful range of motion. It's very simple and self releasing technique for neural tissue mobilization as well other surrounding soft tissues.

Conclusion. Immediate effect of Neural flossing technique for cervical radiculopathy was beneficial to reduce pain for short duration and improve neck function.

Rezumat

Introducere. Radiculopatia cervicală este o condiție clinică frecvență definită ca afecțiune nervoasă și a rădăcinilor nervoase, adesea fiind rezultatul unei patologii compressive sau inflamatorii data de o hernie de disc, cioc spondilitic sau osteofit cervical. De obicei pacienții acuză dureri, parestezii, furnicături, slăbiciunea membrului superior.

Obiectiv. Studiul își propune să scoată în evidență efectul imediat al autostretchingului neural asupra durerii, amplitudinii de mișcare și a disabilității gâtului la pacienții cu radiculopatie cervicală.

Material și metodă. S-a luat în studiu un număr de 30 de participant, cu vârste cuprinse între 30-70 de ani, care au efectuat autostretching neural. Pentru evaluările pre-post intervenție s-au folosit Neck Disability Index, Scala Visual Analogă Scale, și Amplitudinea de mișcare cervicală.

Rezultate. Tehnica de autostreching neural reduce durerea și crește funcția gâtului odată cu reducerea amplitudinii de mișcare dureroase. Este foarte simplă și care se poate autoadministra în scopul mobilizării țesutului neural și a altor țesuturi moi adiacente.

Introduction

Cervical radiculopathy is a common clinical diagnosis defined as a disorder of the peripheral nerves and nerve roots. Mostly, it is the result of a compressive or inflammatory pathology from disc herniation, spondylitic spur or cervical osteophytes resulting from inflammation of a cervical nerve root leading to narrowing of the intervertebral foramen. [1]

Clinical signs and symptoms include radicular pain around the peri capsular region, paresthesia, numbness, weakness and can lead to loss of sensation along the nerve root

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* (N.Tr. – self neural flossing = autostretching bidirecționat pe întreg arcul nervos)

distribution. Sensory symptoms numbness, tingling and pins and needle can present along the dermatomes whereas radiating, shooting pain and weakness along the myotomal courses. [2] Common dermatomal pain presents along C4 level (60% of cases), C7 level (34.2% cases) and C6 levels (35% of cases) among those scapular pain is found in 51.6%. [3]

On physical examination, often decreased cervical range of motion and diminished deep tendon reflexes presents around 5-36% of cases and C6, C7 have been found to be frequently involved nerve root. Involvement of the intervertebral disc is found around 21.9%, whereas 68.4% of cases of cervical radiculopathy are associated with the combination of discogenic and spondylitic pathology. [4] Level I evidence shows that cervical radiculopathy at C5 to C8 frequently causes pain in the scapular regions, arm, forearm or hand weakness of upper extremity. [5]

Treatment strategies for cervical radiculopathy ranges from conservative management to surgery. Evidences show that conservative management is the first choice of treatment because the surgical management has not been shown as a permanent solution in the management of cervical radiculopathy. [6] Conservative management, such as neck exercises, mechanical traction, and manual techniques has a role in prevention and maintenance of all typical radicular sign and symptoms although none of the treatment shows superiority. These conservative management techniques are therapist based and non cost effective. Neural mobilization concepts are based on the biomechanical structure of peripheral nerves. Studies have proved that the efficacy of 'neural sliding' in neural mobilization has an impressive result than simply neural tension. Because many studies have shown the peripheral nerves in upper limb and lower limb has greater excursions e.g. median nerve. [7, 8, 9] In vivo studies, and neural mobilization study of different nerves concluded that excursion of nerves along the course has a beneficial effect reducing the radicular sign and symptoms. [10,11] Nerve gliding technique which is based on the neural excursion [10, 11] that is almost similar to neural flossing technique, but it is not an active releasing technique and is therapist dependent.

Basically neural mobilization is a passive and therapist based technique to reduce mechanical interferences with the principle of biomechanics of peripheral nerve and mobilization of the nerve throughout the available range of motion resulting efficacy in both mechanically and physiologically. [12] Radicular pain is not always associated with vertebral or intervertebral pathology but decrease in excursion of nerve is another cause of radicular symptoms which is not purely based on nerve root e.g. carpal tunnel syndrome. [13] This suggest mobilizing neural course is not enough at root level but flossing pattern of neural pathway in relation to surrounding soft tissues or in relation inter neural tissues is required.

Various physiotherapy techniques such as manual and mechanical traction, neck exercises and Electrotherapy modalities, has not been proved best in practice. Neural flossing is an 'active, releasing technique' within the nerve course and mechanically and physiologically beneficial procedure. Chiropractic has been used widely as active, releasing technique. A study on sciatic nerve flossing has shown beneficial effect. [14] But there is a paucity of literatures about the effectiveness of self neural flossing in cervical radiculopathy. The Purpose of the study is to find out immediate effect of self neural flossing in patient with cervical radiculopathy.

Methods and materials

A pre- post experimental study was conducted on 30 subjects in a tertiary care hospital Inclusion criteria were, age between 30-70, diagnosed with cervical radiculopathy and absence of any contracture in upper limb and neck. Exclusion criteria - Osteoporosis, Undergone recent neck surgery, Vertebral basilar artery insufficiency, Thoracic outlet syndrome, Nerve repair /graft, Dizziness, Cervical canal stenosis, NDI more than 40 scores, VA 7/10. Ethical approval was obtained prior to the study. Informed consent was obtained from the subjects. For each patient baseline assessment was obtained and brief demonstration about self neural flossing techniques and positions was shown. All subjects were instructed to discontinue if they had any form of discomfort during the procedure.

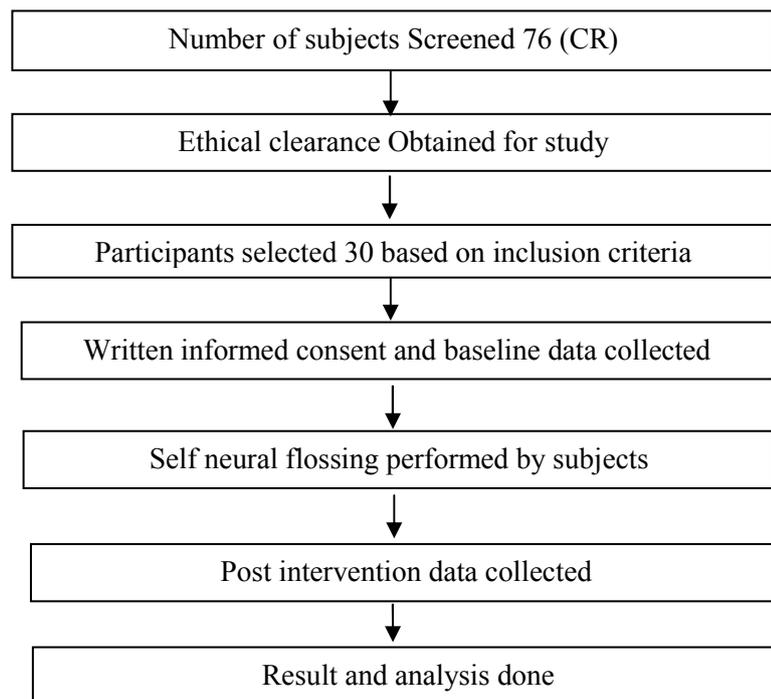


Fig 1 – Flow chart

Procedure

Before intervention all required procedure was demonstrated and well explained to the subjects by the principal investigator and asked to stop if any discomfort developed. Flossing was started from the root along with brachial plexus, individual nerve, depending upon the involved nerve. Since neural flossing is “active, releasing technique” all were performed actively by the subjects and positions were maintained by a physiotherapist. Each flossing was performed with 10 repetitions starting from neck, arm, elbow, wrist and then whole nerve flossing. At the end of the session again post assessment was documented for pain, movements of neck and level of disability of neck and upper limb using VAS [15], ROM [16] and NDI. [17]

Data Analysis

Series of analysis done by Qualitative variables were analyzed by Mann Whitney U test, Student paired t test for comparing pre and post within the group, Wilcoxon Rank Sum test.

Results

On analyzing the demographic profile we found that (table 1) the mean age for male was 44.8 ± 14 and for female was 50.4 ± 9.5 with M: F 14:16. There was no significant difference in gender and age of participants. This information suggests less possibility of influence on result from age and gender aspects.

Gender	N	Age	Significance
Male	14	44.8 ± 14	$t_{28} = 1.406$
Female	16	50.4 ± 9.59	$p = .171$
F+M	30	47.7 ± 11.04	

VAS Score – (table 2) Visual analogue score were assessed before and after the self flossing showing reduction of pain in male by $2.1 \pm .95$ and in female $2.3 \pm .93$. In assessing p value of student paired t test, for comparing the pre-post value it was found that p value of female was .047 and males was .077 and F-M.238. Hence we can infer that both the genders shown significant improvement in their VAS score with immediate reduction of pain.

Gender	Pre	Post	Diff.	Comparison F&M M-W Test	P Value		
F	5.9±.99	3.8±.97	2.1±.95	t= 2.137	p=.041	Pre	p=.047
M	6.7±.94	4.4±.73	2.3±.93	t= 2.092	p=.046	Post	p=.077
F+M	6.3±.1.02	4.1±.89	2.2±.92	t=.312	p=.758	Pre-Post	p=.238
Pre Post Comparison & F&M Paired T= 13.030 P=.001 , Wilcoxon Singed Rank Test P=.001							

Neck Disability Index (NDI) (Table 3) The pre-post comparison of the neck disability index within the gender and between the gender was performed on pre and post scores and found that it does not show any significance with a p value for M=.103, F .130 and F-M .485.

Gender	Pre	Post	Difference	Comparison	F &M	M-W Test
F	21.3±4.93	17.5±4.65	3.8±1.71	Pre	t=1.521	p=.140
M	24.9±9.69	20.4±5.68	4.5±3.34	Post	t=1.535	p=.136
F&M	3.2±6.71	19.4.2±2.69	4.2±2.69	Diff.	t= .719	p=.478

Neck ROM (Table 4) - Range of Motion for a neck was assessed for six different movements and comparison was done between pre and post values for L Lat. Fl, Rt Lat. Fl., L Rot., R Rot., Fl., Ext. However, none of the movement shows any significant improvement immediately after the neural flossing with lowest p value for R Lt. Fl. Male was .074.

Pre and Post ROM of neck						
Flexion						
Gender	Pre	Post	Diff	Diff. F&M		
F	49.3±10.71	50.3± 7.95	1±5.94	Pre	t28=1.423	P=.166
M	43.4±11.65	45.7±12.5	2.25±3.29	Post	t28=1.731	P=.095
F&m	46.1±11.42	47.8±10.45	1.7±4.67	Pre post	t28=.683	P=.500
A Comparison result paired t test and p value i.e group t=1.994, p=.056						
Extension						
Gender	Pre	Post	Diff	F&M		
F	50.9±9.82	51.4±8.21	.5±4.98	Pre	t=1.471	p=.152
M	45.3±10.92	45.4±10.41	.1±4.30	Post	t=0.712	p=.482
F&m	47.9±10.63	48.2±9.77	.3±4.55	Pre-post	t=.221	p=.827
A comparison of both group result paired t test and p value i.e t=.361 ,p=.721						
Lt. Lat. Flexion						
Gender	Pre	Post	Diff	F&M		
F	40.5±7.92	42.1±10.4	1.6±3.45	Pre	t=1.154	p=.258
M	37±8.59	40.3±7.49	3.3±3.45	Post	t=0.712	p=.482
F&m	38.6±8.33	41.1±6.68	2.5±3.51	Pre-post	t=1.376	p=.182
A comparison of both group result paired t test value i.e t=3.900 ,p=001						
Rt.lat. Flexion						
Gender	Pre	Post	Diff	F&M		
F	41.1±9.85	42±10.44	.9±3.73	Pre	t=1.844	p=.076
M	35.1±8.9	35.4±8.74	.4±3.30	Post	t=1.858	p=.074
F&m	37.9±9.26	38.6±9.97	.7±3.45	Pre-post	t=0.382	p=.705
A comparison of both group result paired t test and p value i.e t=3.900 ,p=.001						
lt rotation						
Gender	Pre	Post	Diff	F&M		
F	42.3±5.19	45.1±6.67	2.8±6.20	Pre	t=.353	p=.727

M	43.4±10.91	44.5±11.09	1.1±4.85	Post	t=.176	p=.862
F&m	42.9±8.60	44.8±9.15	1.9±5.49	Pre-post	t=.822	p=.418
A comparison of both group result paired t test and p value i.e t=1.895,p=.068						
Rt. Rotation						
Gender	Pre	Post	Diff	Between F&M		
F	39.2±9.29	44.3±8.95	5.1±7.55	Pre	t=.473	p=.640
M	40.9±9.83	43.6±10.50	2.7±4.66	Post	t=.184	p=.855
F&m	40.1±9.46	43.9±9.64	3.8±6.18	Pre-post	t=1.026	p=.314
A comparison of both group result paired t test and p value i.e t=3.393,p=.002						

Discussion

In this study self neural flossing was performed by patients with radicular signs and symptoms and we could note that there was a reduction in symptoms compared to the pre intervention score. Visual Analogue Scale shows significant decrease in pain and minimally improved neck mobility and enhanced neck function. Active stretching and flossing technique facilitates to decrease adhesion, simultaneously and temporarily altering the mechanical interference within intraneural and extra neural structure, followed by reducing radicular induced sign and symptom. [18] Physiologically flossing effect helps in evacuating intraneural edema, increases blood and axoplasmic flow, oxygenates the nerve and decreases ischemic induced pain. [1]

Compared to neural tension technique and neural gliding techniques, neural flossing produces effects throughout the nerve that is root to nerve ending hence the active release of nerve takes place, which is beneficial for reducing pain. On the other hand neural flossing technique is active movements which may control pain at central level activating pain gate theory. During active movement mechanoreceptors are activated which helps pain inhibition at spinal cord level [19]

In a recent RCT of 7session of sciatic neural flossing the pre VAS was 7.01±1.10 and day 6th it was 1.39±0.59 resulting highly significant reduction of pain. [14] Our study shows a reduction in pain but not as much as above mentioned study as our study was only one session. Lt Lateral flexion (2.5±3.51) and Rt. Rotation (3.8±6.18) range of motion is increased, but was non clinical significance. Reduction in pain in our study is due to flossing effect because the intervention was not given in combination with other modalities [14, 18] many studies have used neural flossing in combination with either TENS or Hot pack. In the present study the neural flossing was entirely performed by subjects actively throughout the neural courses depending upon their pain threshold. Marginal increased in ROM may be due reduced pain and mechanical interference of the affected nerve. During neural flossing not only neural tissues will be flossed but all soft tissues such as muscle, fascia will be mobilized. It was noticed in a case study [20] in which VAS baseline was 8 before treatment and after four weeks of neural mobilization it reduced to 1 on activity. Suggests neural flossing would be highly significant if the session frequency increases. The NDI score in the same study shows highly reduced neck disability and increased function.

Clinical signs such as pain, numbness, were reduced because of the self flossing effect. However, disability of the neck did not change. At 4 weeks follow up study noted that only 46% decrease in Neck disability Index i.e. change of at least 7 points on the NDI, which shows a direct relation on duration of treatment and its effect. [21] It may also be the cause that NDI is self reporting measure in all types of neck disorder, hence the outcome depend on patients' perception also, which likely affects the outcome. Our study was only one session study, hence many functional changes cannot take place, however symptom like pain reduced significantly.

To see effects of disability level, the multi session trial may be useful.

A systemic review [22] suggest range of motion was an impairment measure for only one of the four included studies measured cervical range of motion and reported equal and statistically significant improvement in cervical rotation in all three treatment groups in our case, two movements has been improved which could be due to the immediate relief of pain and decreased muscle spasm.

Conclusion

Thus, we conclude the immediate effect of the self neural flossing technique for cervical radiculopathy was beneficial to reduce pain for short duration, improve neck function however negligible improvement was noted in neck movement. The Neural Flossing Technique is simple to apply and non therapist dependent treatment method. This technique not only mobilizes neural tissues, but all soft tissues present along the course of flossing route and gives beneficial effect.

Scope of future study

Control trial with an increase in sample sizes, increase in trail sessions would be recommended further study.

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References

- [1] Pierre Langevin, (2012) Cervical radiculopathy: Study protocol of a randomized clinical trial evaluating the effect of mobilizations exercises targeting the opening of intervertebral foramen, *Biomed Centre Musculoskeletal disorder*, 13:10, <http://www.biomedcentral.com/1471-2474/13/10>
- [2] Khalid M. Abbed, et.al, (2007) Cervical radiculopathy: pathophysiology, presentation, and, clinical and evaluation, *Neurosurgery* 60[Suppl 1]: S-28-S-34
- [3] Robert J Ronine Bsc DC, Howard Vernon, DC, (2012) Cervical radiculopathy: A systemic review on treatment by spinal manipulation and measurement with the Neck Disability Index, *Journal of Canadian Chiropractic Association*; 56(1), 18-28
- [4] Radhakrishnan K, Litchy WJ, O'Fallon WM, Kurland LT, (1990) Epidemiology of cervical radiculopathy. A population-based study from Rochester, Minnesota, 1976 through, *Brian* 19954 April, 117(Pt 2): 325-35
- [5] Christopher M. Bono et.al, (2010) Diagnosis And Treatment Of Cervical Radiculopathy From Degenerative Disorder, *North American Spine Society, Evidence - Based Clinical Guidelines For Multidisciplinary Spine Care* , ISBN:1-929988-25-77
- [6] Markus Engquist et.al, (2013) Surgery versus nonsurgical treatment of cervical radiculopathy, *the spine journal*,; 38(20):1715-1722
- [7] Michel W. Coppieters, David S. Butler, (2008) Do 'sliders' slide and 'tensioners' tension? An analysis of neurodynamic techniques and consideration regarding their application, *Manual Therapy* 13213-221, www.sciencedirect.com
- [8] Richard F. Ellis, Wayne A. Hing, (2008) Neural Mobilization: A systematic review of randomised controlled trail with an analysis of therapeutic efficacy, *The journal of manual and manipulative therapy*, Vol.16 No.1, 8-22
- [9] Michel W. Coppieters, Alan D. Hough, Andrew Dilley, (2009) Different nerve-gliding exercises induce different magnitudes of median nerve longitudinal excursion: An in vivo study using dynamic ultrasound imaging, *Journal Of Orthopedics & Sports Physical Therapy*, Number 3, Volume 39
- [10] Richard F Ellis, Wayne A. Hing, Peter J.Mcnair, (2012) Comparison of Longitudinal Sciatic Nerve Movement with Different Mobilization Exercises: An In Vivo Study Utilizing Ultrasound Imaging, *Journal of Orthopaedic and Sports Physical Therapy*, Volume 42 Number, 8 August
- [11] Jennifer M Medina McKeon and Kathleen E. Yancosek, (2008) Neural gliding techniques for the

- treatment of carpal tunnel syndrome: A systematic review *Journal Of Sport Rehabilitation*, 17, 324-341
- [12] Ettema AM, Zhao C, Amadio PC, O'Byrne MM, An KN, (2007) Gliding Characteristics of flexor tendon and tenosynovium in carpal tunnel syndrome: a pilot study, *Clinical anatomy (New York)*, April, 20 (3):292-9
- [13] Hough AD, Moore AP, Jones MP, (2007) Reduced Longitudinal Excursion Of The Median Nerve In Carpal Tunnel Syndrome, *Archives of Physical Medical Rehabilitation*, May, 88(5):569-76
- [14] Kranthi Pallipamula, Singaravelan, RM, (2012) Efficacy Of Nerve Flossing Technique On Sciatic Nerve Function In Patients With Sciatica –RCT, *Romanian International Journal VOL 18,NR30*,
- [15] Ferreira Valente MA, Pais – Ribeiro JL, Jensen MP, (2011) Validity Of Four Pain Rating Scales, *International Association For The Study Of Pain* , Oct;152(10):2399-404
- [16] Tousignant M, et.al, (2000) Validity of the Cervical Range of Motion Goniometry For Cervical Flexion And Extension, *Spine (Phila pa 1976)*. Feb 1; 25(3):324-30
- [17] Chiu TT, Sing KL, (2002) Evaluation of Cervical Range of Motion and Isometric Neck Muscle Strength: Reliability and Validity, *Clinical Rehabilitation*, Dec; 16(8):851-8
- [18] Sarkari1, E. And Multani2, N.K. (2007) Efficacy of Neural Mobilizations in Sciatica, *Journal of Exercise Science and Physiotherapy*, 3(2): 136-141
- [19] Andrew J. Robinson, Lynn Snyder-Mackler, *Clinical Electrophysiology Electrotherapy and Electro physiologic Testing*, Williams and Wilkins, Second edition, 213-278, ISBN0-683-07817-8
- [20] McCracking HV. (2008), The Long-Term Effects of a Neurodynamic Treatment Technique Using A Treatment-Based Classification Approach To Low Back Pain. *Journal of Manual & Manipulative Therapy*; 16(3): 161–181.
- [21] Ian A. Young Lori A. et.al. (2009) Manual therapy, exercise, and traction for patients with cervical radiculopathy: a randomized clinical trial, *American Physical Therapy*, , 89:632-642
- [22] Robert Boyles et.al, (2011) Systemic Review: Effectiveness of Manual Physical Therapy in the Treatment Of Cervical Radiculopathy: a systematic review, *Journal of Manual and Manipulative Therapy*, 19:3, 135-142