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ORIGINAL ARTICLE

Comparison Between the Effects of Manual Traction and Opening Techniques in Cervical Radiculopathy

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A B S T R A C T

Background: Cervical radiculopathy is a common type of neck pain, it causes limitation of movement and disability. Manual therapy techniques and exercise therapy are common management of cervical radiculopathy.

Objective: To compare the effects of manual traction and opening techniques on pain, limitation of movement and disability in cervical patient with cervical radiculopathy

Methodology: This randomized controlled trail was carried out at Quaid-e-Azam International Hospital, Islamabad, Pakistan from January, 01, 2016 to June, 30, 2016.40 sedentary individuals of both gender, aged 30 to 40 years with radicular pain in upper extremity. All the study participants were randomly placed in group A treated with manual traction and segmental mobilization and group B treated with opening technique and cervical segmental mobilization for 3 weeks at 3 sessions per week. Outcome measures were pain, range of motion and Neck Disability Index assessed and documented at baseline and completion of 3 weeks intervention.

Results: Group of patients treated with manual traction with segmental mobilization more significantly improved pain (2.3 ± 0.92), NDI (35.55 ± 11.9), MMT extension (4.25 ± 0.26), MMT flexion (4.25 ± 0.26) and ROM (left rotation 14.3±1.49, right rotation 14.4 ± 1.47, left side flexion 14.6 ± 1.90, right side flexion14.5 ± 1.85, extension 18.4 ± 2.74, flexion 3.95 ± 0.69) as compared to the group of patients treated with opening techniques with segmental mobilization, postural education and hot packs. (Pain: pre= 7.1 ± 1.17, Post 2.25 ± 1.12),(NDI: Pre 56.3 ± 17.2, Post 30.6 ± 14.7).

Conclusion: It is concluded that both treatments improved pain, disability and cervical range of motion but manual traction and segmental mobilization are more effective to reduce pain and disability.

Introduction

Cervical or neck pain is a common musculoskeletal disorder with various pathologies encompass and are most commonly related to degenerative changes or inflammation of cervical structures such as intervertebral discs, articular facets joints or nerve roots.[1] According to a review by the neck pain task force pertaining the prevalence of neck pain in industrialized countries, annual prevalence is situated within 30 to 50% in adult populations. In accordance with these results, in Canada, a bi-annual prevalence of 54% has been reported.[2] Cervical radiculopathy forms an important subgroup of neck disorders and although less prevalent than general neck pain, it has been shown to lead more severe pain and disability.[3,4] Typical symptoms of cervical radiculopathy include pain in the cervical or peri-scapular region and in the upper limb, as well as neurological signs such as paresthesia, numbness, weakness and loss of reflexes in the affected nerve root distribution.[5,6]

While the clinical diagnostic process of cervical radiculopathies is relatively well documented. Asystematic review by Miller et al2010, concluded that there is little evidence supporting the efficacy of modalities in the treatment of cervical radiculopathies and combination of cervicothoracic mobilization and exercises is the most effective rehabilitation approach to reduce pain and disability.[7] Kuijperetal randomized 2005, concluded that the "active physiotherapy" approaches involved mobilizations and stabilization exercises; whereas the "cervical collar" approach included the use of a semi-hard cervical collar worn at all times for three weeks, then gradually weaned for three additional weeks. Functional improvement was also observed in both groups. According to the Quebec Task Force, cervical collar should be avoided due to its passive and decondition properties, and because it has been shown to hinder neck pain recuperation following motor vehicle accidents. These initial recommendations regarding the potential drawbacks of cervical collar use have recently been generalized to encompass all types of neck pain. Others studies have evaluated the effect of intermittent tractions on patients suffering from cervical radiculopathy. They have, however, obtained contradictory results: one demonstrated that the addition of traction to a conventional intervention does not increase treatment efficacy, whereas the other claimed that tractions supplementing a conventional intervention improves cervical and radicular pain, in comparison to a conventional intervention.[7]

Clinical approaches for cervical radiculopathies commonly include interventions targeting the opening of intervertebral foramen. It is well recognized that cervical movements causing the opening of intervertebral foramen, such as flexion, rotation and lateral flexion contralateral to the nerve root, increase the volume of the foramen and consequently might decompress a swollen nerve root. Inversely, movements of extension, rotation and lateral flexion ipsilateral to the nerve root close the intervertebral foramen around the root. Thus, for acute and sub-acute radiculopathies, intervention programs should include treatment modalities that allow the opening of the intervertebral foramen. On the other hand, movements and positions that lead to intervertebral foramen closure should be avoided. However, no studies have evaluated the effects of a treatment approach that specifically take into consideration these biomechanical principals. Due to the important incapacities related to cervical radiculopathy and to the few studies pertaining to the efficacy of rehabilitation in this population, we believe in the importance of better understanding the potential of cervical mobilizations and exercises that lead to the opening of the intervertebral foramen. The aim of this study to determine the effects of opening technique and segmental mobilization compared to the effects of manual traction and segmental mobilization in patients with cervical radiculopathy.[8]

Methodology

This randomized controlled trail was carried out at Quaid-e-Azam International Hospital, Islamabad, Pakistan from January, 01, 2016 to June, 30, 2016. Inclusion criteria was sedentary individuals of both gender and age ranged 30 to 40 years with positive symptoms of radicular pain in any of the upper extremity by spurling and distraction test, while patients with the history of trauma, surgery, Vertebrobasilar insufficiency and ligamentous were excluded. Screening was carried out as per the inclusion criteria, where a total of 40 patients were considered eligible for the study. Ethical approval was taken from the Research Ethical Committee (REC) of the Riphah College of Rehabilitation Sciences, Riphah International University Islamabad, Pakistan. Permission of the study was also taken from the management of the Quaid-e-Azam International Hospital, Islamabad, Pakistan, where the study was conducted. Written informed consent was taken from the study participant in Urdu/English languages and confidentiality of the data was completely insured.

All the study participants were randomly placed in group A treated with manual traction and group B with opening technique, while cervical segmental mobilization, postural correction and hot packs were the common treatment. Total intervention period was 3 weeks, 3 sessions per week and a single session per day. Pain, range of motion and neck function were the outcome measures and assessed by numerical pain rating scale (NPRS), Goniometer and Neck Disability Index (NDI).

Participants in both groups were assessed and documented for the outcome measures initially at baseline and completion of 3-weeks period of intervention. Data was analyzed by SPSS software and statistical test were applied based on normality to estimate the effects of intervention in both the treatment groups and applied at 95% level of significance. Statistical parameters calculated were mean, standard deviation (SD) and p-values for all the outcome measures.

Manual traction was applied in supine lying position by left hand placement at patient chin and right hand placement at the occiput. Traction force applied as per the patient tolerance intermittently for 6-8 times. Opening technique was applied in sitting position with passive reinforcement of neck rotation in the direction of movement limitation. Segmental mobilization techniques applied were central posterior-anterior (CPA), unilateral posterior-anterior (UPA), and transverse glide in prone lying position, 6-8 repetitions and 30-40 seconds hold time. Postural correction program were included the chin tuck in, cervical extension, shoulder depression and retraction, and thoracic extension. Hot packs were applied prior to every treatment session for 8-10 minutes to gain muscle relaxation and improve circulation.

Results

In this study the manual traction and segmental mobilization postural education and hot packs more significantly improved pain, neck disability index and cervical range of motion. Statistically, the result showed significant improvements in cervical ROM and pain as shown in table I.

In paired t-test showed significant improvement in pain, disability and cervical ranges in both the groups. The p-value < 0.001 as shown in table II.

Discussion

All of the participants received mobilization, in addition to opening technique, over the course of treatment that addressed symptoms of cervical radiculopathy. After the application of this treatment

Table I: Independent t-test

Variables	Group A	Group B		Group A	Group B	
	1st Visit			Last visit		
	Mean ± SD	Mean ± SD	p-value	Mean ± SD	Mean ± SD	p-value
Neck Disability Index	56.3 ± 17.2	55.1 ± 13.5	0.81	30.55 ± 14.8	35.6 ± 11.87	0.25
Numeric Pain Scale	7.1 ± 1.17	7.1 ± 1.12	1	2.25 ± 1.12	2.3 ± 0.92	0.88
MMT Extension	3.73 ± 0.413	3.63 ± 0.39	0.44	4.35 ± 0.24	4.25 ± 0.26	0.21
MMT Flexion	3.73 ± 0.39	3.63 ± 0.39	0.44	4.25 ± 0.24	4.25 ± 0.26	0.21
Left Rotation	16.9 ± 2.25	17.6 ± 1.61	0.27	13.7 ± 2.08	14.3 ± 1.49	0.26
Right Rotation	16.6 ± 2.48	17.6 ± 1.50	0.15	13.4 ± 1.88	14.4 ± 1.47	0.07
Left Side Flexion	17.8 ± 2.20	17.7 ± 1.76	0.88	14.9 ± 2.15	14.6 ± 1.90	0.65
Right Side Flexion	17.8 ± 2.49	17.9 ± 1.92	0.83	14.7 ± 2.3	14.5 ± 1.85	0.77
Extension	15.3 ± 2.89	14.9 ± 2.58	606	19.3 ± 2.43	18.4 ± 2.74	0.28
Flexion	6.45 ± 1.19	6 ± 0.86	0.18	4.1 ± 0.91	3.95 ± 0.69	0.56

Table II: Paired t-test

Variables	Group A			Group B		
	1st Visit	Last visit		1st Visit	Last visit	
	Mean ± SD	Mean ± SD	p-value	Mean ± SD	Mean ± SD	p-value
Neck disability index	55.05 ± 13.5	35.55 ± 11.9	0.001	56.3 ± 17.2	30.6 ± 14.7	0.001
Numeric pain scale	7.1 ± 1.12	2.3 ± 0.92	0.001	7.1 ± 1.17	2.25 ± 1.12	0.001
MMT extension	3.63 ± 0.39	4.25 ± 0.26	0.001	3.73 ± 0.41	4.35 ± 0.24	0.001
MMT flexion	3.63 ± 0.39	4.25 ± 0.26	0.001	3.73 ± 0.41	4.35 ± 0.24	0.001
Left rotation	17.6 ± 1.61	14.3 ± 1.49	0.001	16.9 ± 2.26	13.7 ± 2.09	0.001
Right rotation	17.6 ± 1.50	14.4 ± 1.47	0.001	16.6 ± 2.48	13.4 ± 1.88	0.001
Left side flexion	17.7 ± 1.76	14.6 ± 1.90	0.001	17.8 ± 2.2	14.9 ± 2.15	0.001
Right side flexion	17.9 ± 1.92	14.5 ± 1.85	0.001	17.8 ± 2.49	14.7 ± 2.3	0.001
Extension	14.9 ± 2.59	18.4 ± 2.74	0.001	15.3 ± 2.89	19.3 ± 2.43	0.001
Flexion	6 ± 0.86	3.95 ± 0.69	0.001	6.45 ± 1.19	4.1 ± 0.91	0.001

intervention along with other treatment modalities, improvements in numeric pain rating scale and neck disability index scores were documented.

A study in which 61 patients with assumed CR were managed with cervical traction (30–100 lbs, 1–3 minutes twice daily) reported that significant improvement at early follow up was experienced by 67.2% of the patients and 77.2% patients showed significant improvement at late follow up with a mean of 23 months.[8] However, the mean interval of symptoms before the application of traction was not provided, and no radiological studies to demonstrate compression of nerve root were done.

British Association of Physical Medicine (BAOPM) sponsored a cooperative study to assess different management options for neck and arm pain including cervical traction.[9] Patients were divided into two groups and compared by applying traction in one group for 20 minutes constantly, one time a day, thrice a week, with the patient in supine position; in the other group, placebo treatment was given with patients assuming precisely the same position as undergoing traction barring that traction was not applied[9]. No inter-group difference was noted between the groups in relation to outcomes after treatment as both groups showed 70% success rate.

A comparison of other treatment options including electrotherapy, cervical collars, and pain killers was also carried out with on-specific SWD (short-wave diathermy), placebo tablets, and postural care, and these groups demonstrated no intergroup difference as well. Plain radiographs were only carried out and consequently no nerve root compression was demonstrated, and neurological deficit was not exhibited by majority of patients.

A study aimed to assess the effects of cervical traction on pain and disability in unilateral cervical radiculopathy, the researchers found that adding intermittent cervical traction with TENS and exercise results in more effective management of cervical radiculopathy, and that intermittent cervical traction should be an integral part of the cervical radiculopathy management regimen.[10] The current literature provide inconclusive evidence on the efficacy or effectiveness of continuous or intermittent traction for pain decrease, enhanced function or global perceived effect in comparison to placebo traction, tablet or heat or other conservative therapies in patients with chronic neck problems.[8]

A systemic review was performed to evaluate the evidence for the management of non-specific neck pain by manipulation and mobilization of cervical spine and their effectiveness.[11] Another systemic review was carried out to evaluate the evidence for the management of neck pain and headache through manipulation and mobilization of cervical spine and to assess the effectiveness and complications associated with treatment method.[12] An instant benefit of cervical mobilization for acute neck pain was shown by two out of three randomized controlled trials. In order to compare spinal manipulation with other interventions for subjects with chronic or sub-acute neck pain, the combination of three of the RCTs demonstrated an improvement of 12.6 mm on a 100mm VAS (visual analogue scale) of pain at 3 weeks (95% C.I, -0.15, 25.5) when compared with muscle relaxants or usual medical care. The RCT with highest quality showed that tension-type headache gets short-term relief from spinal manipulation when applied to patients. An estimated 5 to 10 cases per 10 million manipulations have been shown to develop complications with cervical spine manipulation.

A RCT was conducted to assess the therapeutic effectiveness of cervical traction in the treatment of CR. The pre-treatment and post-treatment pain intensity showed marked improvement ($t=10.75$, $p<0.001$) as well as the neck disability score ($t=2.42$, $p=0.03$) of patients in the experimental group. The experimental (cervical traction) and control group exhibited a considerable difference ($t=-3.98$, $p=0.006$) in the intensity of pain after the treatment.[13] Cervical radiculopathy can be caused by herniated intervertebral disc which is a common one and it induces pain or causes damage to the internal disc organization.[14] By raising the pressure in the intervertebral disc of a cadaver, it could result in annular rupture and disk herniation as demonstrated experimentally by an earlier study.[15] This result implies that pain related to disc herniation and healing in damaged discs may be improved by decreasing pressure within the disc and it may play an important part. A herniated disc causes the intradiscal pressure to be greater than capillary pressure in the vertebral body which results in obstruction of oxygen diffusion to the disc. Since there is no vascular

supply to the discs and they mostly obtain nutrients by diffusion, this in turn, may delay the progression of repairing the damaged disc.[16]

Conclusion

It is concluded that both treatment interventions, manual traction and opening technique combined with segmental mobilization improved pain and disability but manual traction and segmental mobilization are more effective to reduce pain and disability as compared to the opening technique and segmental mobilization.

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