

Neuromobilization, Exercise and Traction in Patients with Cervical Radiculopathy

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Abstract

Background: Cervical Radiculopathy (CR) involves compression of the cervical nerve roots leading to numbness, paraesthesias, muscle weakness, etc. in the upper extremity making the patient functionally disabled. There have been studies about treating the condition using Intermittent cervical traction. However, there have been controversial reviews regarding its use. The objective of the study was to find out the effectiveness of traction in patients with cervical radiculopathy, along with neuromobilization and exercises. **Methodology:** 30 patients diagnosed with CR participated in a Randomized Controlled Trial and were assigned to either - Group 1(traction group) or Group 2(no traction group). Group 1 was given neuromobilization, exercise and traction. Group 2 was given neuromobilization and exercise. The patients were treated for 10 sessions thrice a week for 3.2 weeks. The NPRS (Numeric Pain Rating Scale), NDI (Neck Disability Index), & PSFS (Patient-specific Functional Scale) were used to collect data on 1st, 5th and 10th sessions of treatment. **Results:** There was a significant improvement within each group. The post-mean NPRS for group 2 was 3.81(±0.54) and for Group 1 was 3.85(±0.55). The post-mean NDI for group 2 was 13.67 (±4.93) and for Group 1 was 12.73 (±4.72). The post-mean PSFS for Group 2 was 7.37(±1.04) and for Group 1 was 7.79(±0.88). However, no significant difference was found when the outcome measures were compared between the two groups. **Conclusion:** Neuromobilization along with exercise is an effective technique which can be used to treat patients of CR. But, in our study intermittent cervical traction did not have any additional significant benefit in the experimental group.

Keywords: Cervical Radiculopathy; Intermittent Cervical Traction; Neuromobilization.

Introduction

Cervical radiculopathy is a common disorder of neck. It is defined as radiating pain from cervical region because of compression of one or more cervical nerve roots. Mainly C5 to T1, are the ones usually involved. The symptoms of this condition include varying amount of pain in neck, shoulder, one or both upper extremities, near the scapular area. There is also complaint of tingling and numbness, as well as paraesthesia along the course of the affected nerve. Muscles which are supplied by the compressed nerve

are also affected and hence weakness is seen. Reflexes in the upper extremity may get affected in severe compression leading to less response or may sometimes even be absent [1,2].

The nerve roots come out from the spinal cord via the intervertebral foramen. Therefore, any pathology which can lead to a decrease in the space of the foramen and thereby causing compression of the nerve can lead to radiculopathy. These pathologies are mainly spondylosis of the facet joints or herniation of the intervertebral cervical disc [1].

The annual incidence of this condition is 83 per 1,00,000 in the population marking fifth decade of life by an increase in its prevalence [2]. C6 & C7 radiculopathies are the most common [3]. After that C5 radiculopathy is common [10].

Both the younger as well as the geriatric age groups are affected by CR [4]. Acute herniation of the disc is more common in young people, and is related to sudden onset of symptoms which tends to be more severe, whereas it is the chronic herniation and degenerative changes that cause compression in

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geriatric people such as decrease in disc space, osteophytes, or spurs and symptoms develop gradually and are less severe [4,9].

Diagnosis of CR can be done both on the basis of imaging as well as by using the Clinical Prediction Rule. Frequently, history of the patient and proper clinical examination can diagnose the condition in at least 75% of the patients as effectively as imaging [10]. EMG is considered to be the mainstay for diagnosis. However, performing imaging techniques can be an expensive affair for the patient [10].

Wainner et al in 2000 came up with a clinical prediction rule (CPR) to specifically diagnose CR. This includes the Spurling's test, the Neck distraction test, Upper limb tension test, less than 60° ipsilateral cervical rotation [10]. Specificity of 94% was found when 3 out of the 4 given criteria are fulfilled [12]. CPR has been effectively used in many studies for diagnosing CR [1-3,6,12,14].

A variety of treatment options are available for treating CR. Usually, a combination of approaches or treatments are used as they have been found to have a better outcome. Many studies have shown the use of physiotherapeutic interventions to be beneficial for patients by resulting in a significant reduction in the manifestation of the symptoms [2-6,17]. These include TENS, ICT [4], Cryotherapy [5] US in electrotherapy while manipulations, soft-tissue mobilizations, neural mobilizations, exercises, etc. in manual therapy and exercise therapy [5]. Other than these, soft collars are used for the purpose of stabilizing and restricting movement of neck in acute

phases and have proven to provide a better prognosis [8].

There are many types of traction which are used in clinic setups - Intermittent cervical traction (ICT), continuous traction, manual traction. Many studies are available which have tried to look into cervical traction as a definite treatment for CR [2,4,6,7]. Few of them supported its use by establishing an improvement [6,13,15,16,18]. Others could not find it as a superior treatment as compared to other approaches [2,4,7]. Vander Heijden et al found that traction cannot be taken as the most effective approach as there isn't enough clarity about its mechanism and proof regarding its contribution [15].

Till now the studies which have been done on effectiveness of traction in cervical radiculopathy patients have not been able to reach any clear conclusion and have shown varied results.

Through this study, we try to find out the effectiveness of intermittent cervical traction in patients suffering from cervical radiculopathy.

Methodology

52 patients presenting with neck pain in the physiotherapy department of Kailash Hospital and Heart Institute, Noida were assessed out of which 22 were rejected since these patients did not meet the inclusion and exclusion criteria (Table 1). The assessment was done by a chief assessor who was blinded to the study.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria:		Exclusion Criteria: ²	
1.	Both male and female between the age group of 25 to 45 years ³	1.	Any surgical history in past related to cervical and thoracic spine
2.	Pain, paraesthesia, tingling or numbness in one upper-extremity ²	2.	Symptoms in both upper-extremities
3.	At least 3 out of 4 Clinical Prediction Rule must be positive: ² <ul style="list-style-type: none"> • Spurling test • Distraction test • Upper limb tension test ^{3,7} • Ipsilateral cervical rotation less than 60degrees 	3.	Any signs or symptoms related to upper motor neuron disease
4.	Symptoms lasting for 2 weeks or more ⁷	4.	Presence of "red flags"
		5.	Steroids injected in cervical spine in past 2-3 weeks
		6.	Oral steroids for CR

A Randomized Controlled Trial was conducted. Lottery method was used for randomization of the subjects.

The names of the subjects were written on chits which were randomly drawn by an assessor II who was blinded to the objective and was not involved in the study. The subjects were divided in Groups 1 and 2.

A brief explanation of the procedure to be followed was given to each patient separately by the therapist and when the patients had agreed to participate, a written informed consent form was made to be signed by the patient. Baseline data was collected through NPRS (Numeric Pain Rating Scale) for assessing the pain, NDI (Neck Disability Index) for neck disability & PSFS (Patient Specific Functional Scale) for level of

functional activity for both the groups by the chief assessor who was blinded to grouping of patients.

All patients received the treatment in sequential order that is neural mobilization, exercises, postural education, and lastly traction or no traction. The patients knew what treatment was given to them for obvious reasons however, they were blinded to whether they were in the experimental or control

group. The therapist was not blinded of the groups. The same therapist gave treatment to both the groups.

The patients were treated for 10 sessions (thrice a week) for 3.2 weeks [2]. Post intervention data was again collected using the outcome measures at the end of 5th session and then at the end of 10th session by the chief assessor (Figure 1).

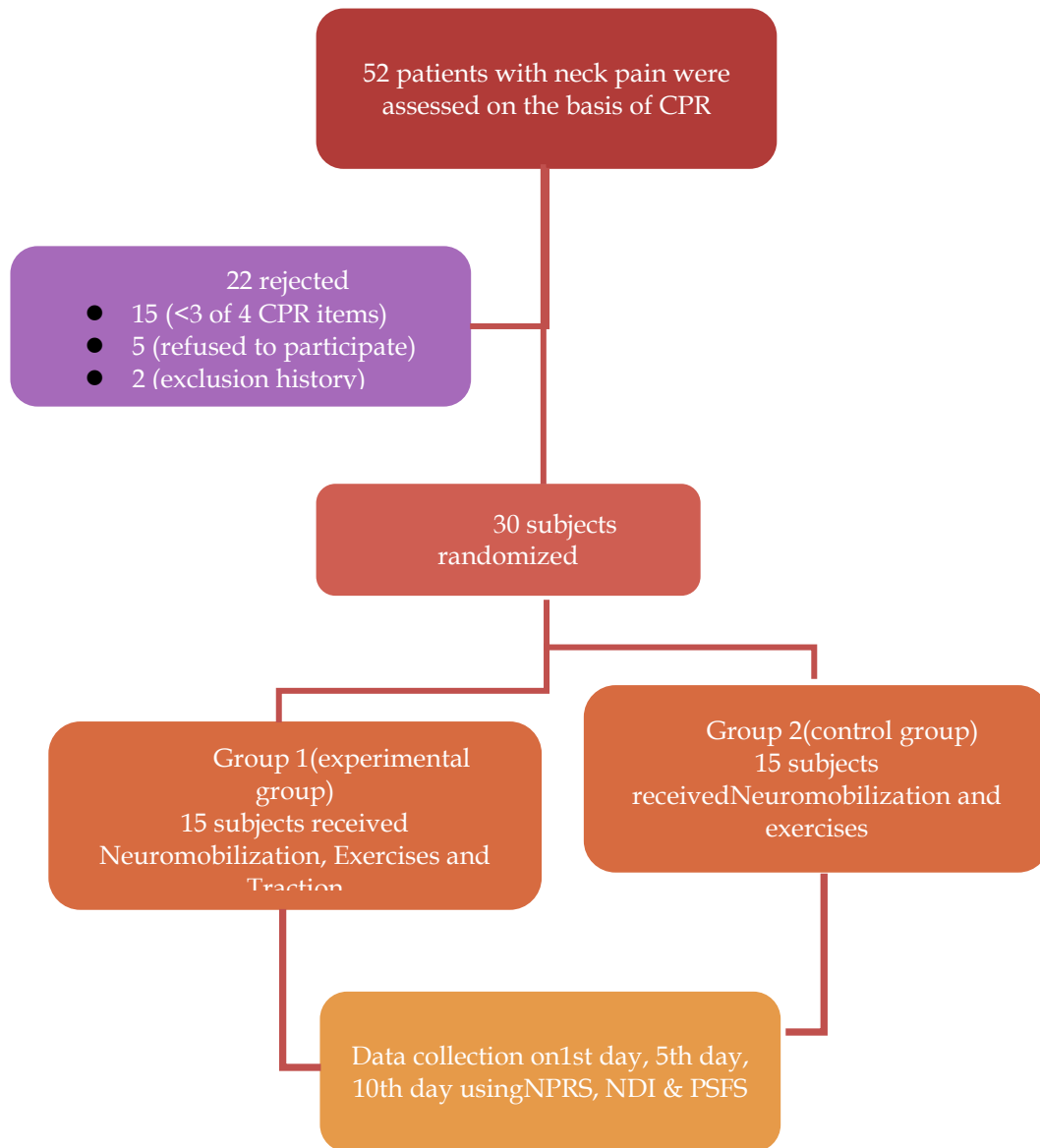


Fig. 1: Flow chart showing distribution of subjects

Results

SPSS software version 24.0.0 was used to analyse the data. Student’s t-test was applied, using p value equivalent to 0.05 i.e., t value was considered at 5% significance level. Result was interpreted as significant if t-value exceeded the value of $t = 2.05$ as

given under $p = 0.05$ at $df = 28$ for unpaired t-test and $t = 2.15$ at $df = 14$ for paired t-test, else insignificant.

The mean age of the subjects in Group 2 was 36.80 ± 5.65 having a range of 28-45 while that in Group 1 was 34.93 ± 4.57 having a range of 28-43. Number of males in this study were 16 and number of females were 14.

The baseline data for group 1 & 2 under all 3 scales i.e., NPRS, NDI & PSFS showed no significant variation (Table 2).

Intra-group Analysis

The results showed a significant improvement for both the groups in all 3 scales indicating that subjects in both the groups had better outcome after 10

treatment sessions (Table 3, Table 4). Also, 5th day treatment analysis showed significant improvement for group 2 subjects with mean NPRS score of 5.14(\pm 0.65), mean NDI score of 22.20(\pm 4.45) and mean PSFS score of 5.35(\pm 0.93). Similarly, 5th day analysis of group 1 subjects showed significant improvement with mean NPRS score of 4.96(\pm 0.67), mean NDI score of 20.53(\pm 4.62), and mean PSFS score of 5.83(\pm 0.69).

Table 2: Baseline Data for Group 2 and 1

	Group 2	Group 1	t value
NPRS	5.94 (\pm 0.63)	5.76 (\pm 0.64)	0.769
NDI	29.07 (\pm 4.21)	27.13 (\pm 4.73)	1.18
PSFS	3.82 (\pm 0.68)	4.02 (\pm 0.75)	0.73

Table 3: Pre-Post Scores of Group 2

Group 2(no traction)	PRE	POST	t value
NPRS	5.94 (\pm 0.63)	3.81 (\pm 0.54)	44.05
NDI	29.07 (\pm 4.21)	13.67 (\pm 4.93)	28.43
PSFS	3.82 (\pm 0.68)	7.37 (\pm 1.04)	26.43

Table 4: Pre-Post Scores of Group 1

Group 1 (traction)	PRE	POST	t value
NPRS	5.76 (\pm 0.64)	3.85 (\pm 0.55)	29.63
NDI	27.13 (\pm 4.73)	12.73 (\pm 4.72)	21.12
PSFS	4.02 (\pm 0.75)	7.79 (\pm 0.88)	26.15

Table 5: Post scores comparison between Group 2 and 1

	Group 2	Group 1	t value
NPRS	3.81 (\pm 0.54)	3.85 (\pm 0.55)	0.198
NDI	13.67 (\pm 4.93)	12.73 (\pm 4.72)	0.52
PSFS	7.37 (\pm 1.04)	7.79 (\pm 0.88)	1.18

Inter-group Analysis: The results did not show any significant superiority of any one combination of treatment (Table 5).

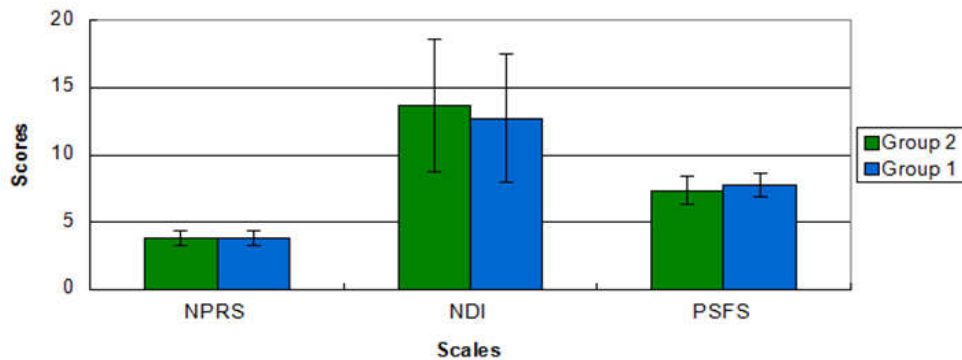


Fig. 2: Post scores comparison between Group 2 and 1

Discussion

The aim of our study was to find out the effectiveness of traction on cervical radiculopathy patients.

The results were found to be insignificant for the effect of traction when both the groups were compared as there was no significant difference between the mean post scores of both groups.

However, there was a significant change in the score on last day of treatment when compared to the baseline score within both groups implying the effectiveness of the treatments given to both groups. The reason for not having found a significant effect of traction may be because of the fact that neural mobilization was given to both the groups. Neural mobilization has been used by lot of researchers and its effectiveness on cervical radiculopathy has been

found as promising [3,5,7,11].

Smati Sambyal & Sandeep Kumar in their study showed that neural mobilization was more effective than traction in a group of 20 patients with CR. One group received neural mobilization along with traction while the other group was treated using only traction plus exercises [3]. Sahreen Anwar, in a group of 30 patients, performed a RCT by giving one group traction and neck exercises while in the other group same treatment plus neural mobilization was given. His study supported neural mobilization as being more beneficial in treating CR [11].

Neural mobilization consists of creating movement of specific nerves in the body whose functions have been altered due to some pathology. This method is useful in increasing the impulse conduction which helps in reducing the symptoms of numbness & tingling by resulting in a change in the flow within the nerve and blood supply [3,5,7]. In our study, the effect of neural mobilization could have prevailed over traction thereby negating its effects.

There have been a lot of studies on traction on patients with CR. It is used commonly for this condition. But still, traction studies have shown varied conclusions. Young et al, in his study including 81 patients, tried to examine the effect of traction mainly, along with manual therapy & exercises. He divided them into 2 groups, one group receiving all 3, other group receiving sham traction along with manual therapy & exercises. His study couldn't find any significant effect of ICT although patients felt improvement in their condition. The study was conducted for a period of 4 weeks; treatment sessions being given thrice a week. Young incorporated CPR for diagnosing the condition [2].

Our study was conducted for a period of about 3.2 weeks, treatment being delivered thrice a week. We utilised the technique of neural mobilization, and we created a control group which did not receive traction at all to properly examine the effects of ICT. Our diagnostic criteria were also based on positive findings from CPR.

The usage of CPR, given by Wainner et al, is 94% accurate for diagnosing the condition when at least 3 tests come out to be positive [10]. Although its use has still not been validated properly, it has been used by researchers in their studies [2,3,6,12] and continues to be an effective measure for diagnosing CR.

The position of head used for giving traction may also have been a factor that effect of traction wasn't identified in our study. There are normally 3 neck positions which can be used - flexion, neutral and

extension, depending upon whether lower cervical roots, mid cervical roots or upper cervical nerve roots have been affected. Very commonly position of neck flexion is used in supine for giving ICT. Head was kept in flexion position in our study for all the patients irrespective of the nerve bias as we wanted to see what effect it would have on the symptoms of the patient. Though head flexion position did not seem to have relieved the symptoms effectively in patients whose upper and mid cervical root got affected, but also it did not have any worsening effect as well.

Exercises are widely used in CR. The main objective involves taking the spine off load by strengthening all the muscles - anterior, posterior- of neck. This helps to prevent the relapse of the condition.

Our study made use of cervical neck retraction exercises, neck extension exercises, strengthening of the deep neck flexors along with scapular muscles.

As far as studies on cervical radiculopathy are concerned, there are still varied results and conclusions regarding the worth of traction. While some studies seem to fully support it, others couldn't find its significance when compared to another technique or method.

Our study could not find the effect of traction despite having a control group. In our study, neuromobilization has proven to benefit the patients a lot. There was a significant change under all scales (NPRS, NDI & PSFS) in both the groups.

Future Research

The study can be replicated on a statistically suitable sample size to predict the differences more accurately. Different types of traction can also be compared along with the technique of nerve mobilization. Also, different positions of neck used for traction can be analysed in detail in accordance to nerve bias which can help to identify a more precise role of traction in CR.

Conclusion

CR can turn into an incapacitating condition, by becoming a hindrance in performing daily living activities as the upper extremities are affected leading to economical problems specially in acute condition as the patient is unable to go to work, affecting social relationships in patient's life, disturbing sleep in turn creating a psychological disturbance in patient's mind [9].

Therefore, it is of the utmost importance that proper studies be conducted in order to find the most beneficial and effective treatment approach for cervical radiculopathy patients.

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