IS STABILIZATION EXERCISES AND NEURODYNAMICS EFFECTIVE FOR CERVICAL RADICULOPATHY?- A CASE STUDY

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Abstract

Background: Cervical Radiculopathy, a neurological disease characterized by radicular pain due to the involvement of cervical spinal nerves. Compression of nerves roots can be due to herniation. This study proposed to improve the recovery rate of the patients with ervical Radiculopathy and improve the quality of life along with the symptomatic relief.

Objective: This study was aimed to improve the recovery rate of patient with Cervical Radiculopathy to delay the recurrence, reduce symptoms and improve quality of life of patients through the stabilization exercises and neurodynamics.

Methodology: It's a single case study of Cervical Radiculopathy, meeting all the inclusion criteria. It's a case study in which the CARE guidelines protocol was followed. This subject was evaluated based on the outcome measure scale of Neck disabilty index, Numerical pain rating scale, Short form 36 quality of life and Cervical range of motion on the first day, fifteenth day and last thirty day of the treatment session in order to keep the follow up of the patient's condition progress.

Result: This patient has shown with the signs of progress in neck range of motion, reduced neck disability and proved it as clinically significant in quality of life.

Conclusion: The dramatic improvements following Stabilization and Neurodynamic exercise observed in this case warrant additional exploration of treatment efficacy and delineation of best practices in delivering these techniques. At the end he was able to return back to his normal daily activities with subsided symptoms.

Keywords: Neck pain disability, Stabilization exercises, Neurodynamic exercises, Cervical radiculopathy and case report.

INTRODUCTION

Cervical radiculopathy (CR) is a neurological disease characterized by radicular pain due to involvement of cervical spinal nerve roots or bilateral dysfunction[1]. Compression of nerve roots can be due to disc Herniation[2]. Neck dysfunction due to radiculopathy prevalence about 83 out of 0.1 million population in India[3]. Annual incidence has been reported to be 107.3/10000 for male and 63.5/10000 for female[4]. This problem more common in 40 to 50 years of life. The following risk factors included neck trauma, cigarette smoking, lifting heavy weight objects and jobs using vibration equipment (i.e., drilling workers)[5]. The impact of CR in society is more concerning since it decreases the normal daily life activities, disturb the sleep pattern, hinder the people to do any work related activity which have great impact on psychological factors leading to anxiety, depression, stress which overall lead to decrease in bodily functions[6]. Following the cervical nerve roots compression which lead to Radiating pain felt like burning, tingling, numbness or shooting pain arising from neck to shoulder, arm,wrist and fingers.

General physiotherapy interventions used for Cervical Radiculopathic conditions included with Cervical traction, neck isometric exercises, heat/cold pack, pulsed short wave diathermy, Transcutaneous electrical nerve stimulation and manual therapy techniques. In this study the Stabilization exercises and Neurodynamic exercises were used predominantly. This study proposed to improve recovery rate of the patients with CR and improve the quality of life[7].

Case description

The 60 year old mae patient who is right handed, was working in a power station but now retired from his service. He complained with neck pain on movement, restriction on neck movements, shooting like pain that radiates from neck to index and middle finger which interrupts in performing any activities. According to his medical history, he was not known as a diabetic or hypertensive. He was a Non smoker and non alcoholic and he was socially active.

There was no familial history but he had a past history of suffering from this similar pain over 15 years of remission and relapse of symptoms with analgesic medications and physiotherapy intervention included cervical traction, pulsed short wave diathermy, Transcutaneous electrical nerve stimulation and felt relieved. On other hand the symptoms revoked again, complaining of neck pain and restricted neck movements, shooting like pain radiated from neck to second to third finger on the right side despite donned with hard cervical collar for past 3 months.

Physical Examination and clinical finding

The most significant physical examination and important clinical findings were stiffness of the neck, reduced range of motion of the cervical region shooting like radiating pain from the neck till index and middle finger. On pain evaluation the pain was gradual, duration was intermittent and it was radiating pain from the lateral aspect of the neck to index and middle finger like shooting pain on the right side of the aspect. The aggravating factor was neck movement and walking and relieving factors was rest. The intensity on NPRS was 8/10.

On Observations the patient built was endomorphic and posture was normal. The attitude of the limb in standing was 90°elbow flexion and placed over the head since the patient felt a little relieved from the pain. There was no deformity present and the patient was on an external appliance of hard collar. His neck was palpated for any abnormalities or tenderness included with no swelling, edema and tenderness. The warmth of the skin was normal and Texture of the skin was rough. On Sensory examination, his superficial (touch/temp/pressure/pain), deep(vibration/proprioception/kinesthesia) and cortical (two point discriminations/stereognosis/ barognosis) were all intact and the tone was normal.

On motor assessment the cervical range of motion on the right side for cervical flexion-0°-20°, cervical extension was 20°-0°, cervical lateral flexion in right side was 0°-25° and left is 0°-25°and cervical rotation in right is 0°-30° and left was 0°-30°. The special test spurling test and ULTT was performed where the was positive for the median nerve and distraction test was positive which confirmed that the patient was suffering from the cervical Radiculopathy condition.

METHODOLOGY:

In this study subject was participated voluntarily with their written consent. The subject had met the requirement of this study and intervention used with Physiotherapeutic management alone. There was no use of any electrical modalities or equipment till the end of the whole treatment session. The authors excluded Pregnant women, Non cooperate with patients, Non-radiculopathic cervical spondylitis patients and Patients with CR indicated for surgery. The whole treatment session was divided in 3 parts and was evaluated accordingly with the help of the outcomes measure scale. The administration of intervention with doses were Stabilization exercises- Neck isometric with chin tucked in four levels with changing the position from supine with towel placed under the head and later to standing with the wall support and performing the cervical activity in these exercises.

1) Neck flexors and extensors (3 sets and 10 reps)
2) Lateral neck flexion both side (3 sets and 10 reps)

Along with stabilization exercises ; neurodynamic exercises are added later in the third week by stretching the median nerve through median nerve glide for 3 sets and 10 rep. Types of Therapeutic interventions given were the preventive i.e to prevent any further aggravation of the pain or any decline in overall health conditions and self care ;how to take care while being at home or workplace.

This study followed the Care checklist guidelines i.e The CARE Guidelines: (Consensus-based Clinical Case Reporting Guideline Development) for completeness, transparency and data analysis in case study and data from the point of care. Case study procedures evaluated and checked with 13 items on the CARE checklist.

Outcome Measures:

The scales were used to measure the progress of the patient's condition. (1)Neck Disability Index (NDI) It measures the neck-specific functional disability, a translated version of the original 10-item Neck Disability Index (NDI) will be used. The NDI covers 10 dimensions of neck-specific disability, namely pain intensity, personal care, lifting, reading, headache, concentration, work, driving, sleeping, and recreation. Each item assesses one dimension and is measured

on a 6-point scale from 0 (no disability) to 5 (highest disability). The overall score (out of 100) is calculated by adding the score for each item and multiplying by 2.The higher the number greater the pain and disability. (2)Numeric Pain Rating Scale: check the intensity of the pain from 0 to 10 scale ,where 0 is no pain and 10 is severe pain. (3)ROM: Cervical range of motion measured with a ROM device ;Flexion, extension ,side flexion, and rotation, along with symptom response, are being measured before and after each week of treatment. (4)Quality of life scale (SF-36 QoL): Explain the quality of life and improvement in patient condition.

Procedure of the interventions:

The patient's treatment is a combination of two interventions i.e Stabilization exercises and Neurodynamic exercises for Neck. The Stabilization exercises was asked to perform in the way that all the cervical movement that includes flexion/extension/lateralflexion/lateral rotation with chin tucked in supine position by placing the towel roll below the head in order to feel the pressure exerted while performing and it is to be performed in an isometric for 3 set of 10 repetitions and same exercise movement in standing position with the wall support for the 3 sets of 10 repetitions. Later, the same exercises were repeated but now in an isotonic form for 3 sets and 10 repetitions.

These stabilization exercises were given to the patient 3 times in a week. Simultaneously the Neurodynamic exercise, was started in the third week where the patient is given the median nerve stretch. Firstly by positioning the patient in a high sitting and placing the pillow under the elbow, head neutral position and elbow fully extended and in a supinated position. Later extend the wrist till the stretch is felt over i.e the median nerve and if still stretch is not felt then ask to laterally flex the neck in contralateral side and then extend the wrist till stretch is felt or it was performed in standing position, elbow fully extended and supinated, wrist supported to the wall and shoulder in 30° and was ask to do lateral neck flexion on contralateral side till the stretch is felt over the median nerve; if can't flex the neck then ask to turn the body in opposite direction and feel the stretch, performing these for 3 set and 10 repetitions. The patient performed all this activity under the supervision with sufficient rest in between and avoided doing it for a longer period of time and not irritating the involved nerve. These two interventions help in regaining strength to the muscle, control over the movement and some degree of pain relief along with an increase in ROM with decreased muscle stiffness. There was no change in any therapeutic intervention till the end of the treatment sessions.

RESULTS

There was greater improvement in the patient's condition. Outcome measures scale used before the treatment for the Neck Disability Index (NDI) was 72% , SF-36 Qol is 55.27/100, Cervical Range of Motion for Was cervical flexion-0°-20°, cervical extension was 20°-0°, cervical lateral flexion in right side was 0°-25° and left is 0°-25°and cervical rotation in right is 0°-30° and left was 0°-30° .On the NPRS the intensity of pain obtain was 8/10. While the outcome results after the treatment session for the NPRS after the treatment was 5/10 and the rest are given in the table below according to the day wise.

Table no.1.Neck Disability Index (NDI)

Components	**Day 1**	**Day 15**	**Day 30**
Pain Intensity (0 to 5)	**3**	3	2
Personal Care (Washing, Dressing, etc.)	**1**	1	1
Lifting	**4**	3	2
Reading	**2**	2	1
Headaches	**0**	0	0
Concentration	**1**	1	1
Work	**4**	3	3
Driving	**2**	2	2
Sleeping	**0**	0	0
Recreation	**1**	1	1
Total	**36**	32	24

NDI %	**72%**	64%	48%

Table no.2. SF-36 Quality of life scale

SF 36 QoL Components	**Day 1 (In %)**	**Day 15 (In %)**	**Day 30 (In %)**
Physical functioning	60	75	95
Role limitations due to functioning/physical	0	25	100
Role limitations due to functioning/emotional	66.7	66.7	100
Energy/fatigue	60	60	90
Emotional well-being	72	80	96
Social functioning	62.5	75	100
Pain	45	55	90
General health	60	75	100
Health change	75	75	100

Table no.3. Cervical and Shoulder range of motion :

Movements	**Day1**	**Day15**	**Day30**
Cervical flexion	$0^0 - 20^0$	0°– 25°	0°– 30°
Cervical extension	$0^0 - 20^0$	0°– 25°	0°– 30°
Cervical lateral flexion right	0°– 25°	0°– 30°	0°– 35°
Cervical lateral flexion left	0°– 25°	0°– 30°	0°– 35°
Cervical rotation right	0°– 30°	0°– 35°	0°– 40°
Cervical rotation left	0°-30°	0°-35°	0°-40°

Discussion

There was more than one intervention to treat the CR cases that are used by the researcher in their study. According to Xia Xu et al , in Orthopedics of traditional Chinese medicine theory hold on to both that, the static and dynamic are essentially important in maintaining the normal position and function of cervical spine and where is applied these theories and got the outcomes in relieving muscle spasm, improved muscle strength and regained the function of neck. The second Author Kim et al, they applied the neural mobilization in the cervical region and there were some significant differences in the results when the patients were compared to four week before and eight weeks after the intervention and there was decrease in the pain and increase in ROM of the cervical region. Similarly, the third author Sadaf Shafique et al used the Manual therapy techniques i.e spinal mobilization while incorporating the mulligan techniques with arm movement along with neurodynamic and manual traction in CR patients. After comparing both the groups, the result was the patient treated with spinal mobilization was having better outcomes in reduction of pain and increased ROM

than the neurodynamic with manual traction. In his study he helps the patient to reduce pain and symptomatic Relief to some extent and regains the muscle strength and attainability of the range in the neck to certain extent.

The intervention given to this case study i.e Stabilization and Neurodynamic exercises were observed with the result of improvement in the patient condition. There was decrease in pain in the starting of the second week and was measured by NPRS, increase in CROM in the third week and increase in the functional activity and improved life quality taken through SF-36Qol and decrease in neck disability by NDI scale at the nearing the end of fourth week. The outcome scale was taken before and after the treatment session in order to check for the level of improvement of the patient. The patient condition compared to before the 14th day and at the 30th days was improved in strength, decreased pain and improved quality of life with decreased pain neck disability to some extent.

Limitations: Limitation of the patient was the age factor, even though the treatment was going efficiently due his age the patient was emotionally stressed and was anxious which would affect the outcomes of the intervention to some degree.

Conclusion

The Stabilization and Neurodynamic exercise alone had shown the great impact in a patient's condition. The patient was able to return back to his normal daily activities with the minimum symptom. Special tests ULTT was performed for the median nerve on the 15th day and results came down in radiating pain and on the NPRS the score was 6/10.There was improvement in the cervical range and The patient gained some strength at the end of the second week and range of motion was also attained to some extent in the third week was having control over the neck by application of stabilization exercises . The patient was simultaneously started with the neurodynamic exercises in order to reduce the radiating nerve by giving glide to the median nerve and thereby stretching the nerve and helping to improve the range of motion.

The stabilization exercises were to increase the stability and control on the movement and neurodynamic exercises were to increase the range and reduce the muscle stiffness and decrease in radiating pain to some extent. The patient who underwent treatment did not face any adverse effect.

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