Effect of Lateral Glide Mobilization on Pain and Functional Outcome in Patients with Cervical Radiculopathy: A Narrative Review

Yomna A. Ellawag[1], Nagwa Ibrahim Rehab[1], Ebtesam Fahmy[2], Mohamed H. Marzouk[1]

1. Department of Physical Therapy for Neurology, Faculty of Physical Therapy, Cairo University.
2. Department of Neurology, Faculty of Medicine, Cairo University.

Abstract

Cervical Radiculopathy is a common neurological condition caused by nerve root compression due to degenerative changes, disc herniation, or foraminal stenosis. It often presents with neck pain, radiating arm pain, sensory disturbances, and motor deficits, significantly impacting patients' quality of life. Purpose: This review was carried out to investigate the therapeutic effect of cervical lateral glide mobilization on pain, disability, cervical range of motion, grip strength and hand function in patients with cervical radiculopathy. A comprehensive search of PubMed, Google Scholar, and ScienceDirect was conducted using keywords such as Cervical Radiculopathy, Lateral Glide Mobilization, Neck Pain, Grip Strength, Hand Function, Cervical Range of Motion (ROM), and Functional Disability. Studies published between 1986 and 2024 were reviewed. Only English-language studies focusing on unilateral cervical radiculopathy due to cervical disc were included. Case reports, conference abstracts, and non-peer-reviewed studies were excluded. The research highlighted the clinical efficacy of cervical lateral glide mobilization as an adjuvant to conventional therapy in enhancing outcomes for patients with cervical radiculopathy. It emphasized the technique's role in reducing pain, restoring function, and improving quality of life in affected individuals. It could be concluded that Cervical lateral glide mobilization added to traditional treatment is effective for improving neck pain, neck disability index, hand function, cervical side bending range of motion and cervical rotation ROM in patients with cervical radiculopathy.

Key words: ***Cervical Radiculopathy, Lateral Glide Mobilization, Neck Pain, Grip Strength, Hand Function, Cervical Range of Motion, Functional Disability.***

Introduction

Cervical radiculopathy is a clinical condition resulting from compression of cervical nerve roots. For almost 21.9% of the patients, disc protrusion has been found as the causative factor, whereas in 68.4% patients the cause may be spondylosis, disc protrusion or both [1].

The clinical manifestations of cervical radiculopathy are broad. Patients with cervical radiculopathy exhibit pain in the cervical or periscapular region and in the upper limb, as well as neurological signs such as paresthesia, numbness, weakness and diminished or loss of reflexes in the affected nerve root distribution [2]. Cervical radiculopathy has a significant social and occupational impact as it may become unremitting and significantly affects a person's activities of daily living [3].

The lateral glide mobilization was originally described as a manual treatment, involving a small oscillatory movement, applied to the neck with an element of traction [4]. Cervical lateral glide (CLG) was shown to be more effective in short-term for improving pain intensity, range of motion (ROM) during upper limb neurodynamic test (ULNT1), and functionality than therapeutic ultrasound and manual cervical traction. Consistent findings from studies have supported that lateral glide has a hypoalgesic (pain reducing) effect beyond comparators (therapeutic ultrasound), placebos (manual contact intervention) and controls (no intervention) on at least one pain outcome measure [5].

Prevalence of neck pain and cervical radiculopathy

In the general population the annual incidence of cervical radiculopathy is reported to be 83.2 per 100000 people, and greater prevalence is observed in the 5th decade of life. A higher prevalence is found in males as compared to females [3].

Risk factors associated with cervical radiculopathy

Risk factors for cervical radiculopathy include white race, cigarette smoking, and prior lumbar radiculopathy. Other risk factors that have been proposed include lifting heaving objects, frequent diving from a board, driving equipment that vibrates, and playing golf. Generally speaking, the incidence of trauma preceding the onset of cervical radiculopathy is relatively low. Up to 30 % of patients report the onset of pain when sitting, walking, or standing [6]. Research has also emphasized that forward head posture (FHP), which often results from extended screen time, worsens cervical instability and nerve compression [7].

Hand grip and hand functions

The hand is the most active and important component of the upper extremity. Hand function can be defined as the ability to use the one's hand in daily activities. It is highly dependent upon the anatomical integrity, sensation, strength and coordination of hand muscles [8].

The wrists are considered a functional part of the hand because they are complementary structures and most of their functions affect each other [8]. Weakness of wrist extensor and finger flexor muscles and wrist flexor and finger extensor muscles is the common motor deficit pattern associated with C6 and C7 root involvement. Considering the role of synergistic function of these muscles in hand grip, a decrease of grip strength is shown in patients with cervical radiculopathy [9]. When compared to unaffected side, patients with unilateral cervical radiculopathy had significantly worse grip strength, hand function [10].

Diagnostic challenges and assessment methods

Diagnosing cervical radiculopathy generally requires a combination of clinical assessments and Imaging techniques include plain radiographs, Magnetic Resonance Imaging (MRI), Computed Tomography (CT), and Nerve conduction studies (NCS). Plain radiographs may reveal osteophyte formation, narrowing of the neural foramen, or decreased disk height. MRI is best for evaluating disc herniations and nerve root compression, while CT scans can help visualize the pathology causing compression of the spinal cord or nerve roots. NCSs assess potential isolated or concomitant diagnoses of peripheral neuropathy. Any imaging study that is performed may result in false positives or false negatives and should be read within the context of clinical presentation to establish an accurate diagnosis [11].

Radicular pain can be elicited by maneuvers that stretch the impacted nerve root, including sneezing, coughing, and the Valsalva maneuver. Provocative tests to assist in the diagnosis of cervical radiculopathy include the Spurling test, the shoulder abduction test, Neck distraction, and upper limb tension test (ULTT). The Spurling test is the most commonly used of these examination maneuvers. Different variations of the Spurling test have been described (i.e., axial loading, rotation only, or rotation with neck extension). In theory, all three of these maneuvers should result in a narrowing of the neural foramen and reproduction of the patient’s symptoms [12].

Another physical exam maneuver, the Bakody test (shoulder abduction sign), assesses cervical radiculopathy involves the patient abducting the shoulder to 90°, flexing the elbow, and placing the palm on top of or behind the head. The test is positive if the patient describes relief of the radicular pain due to relief of compression on the affected nerve roots. Compared with the classical radicular signs, brachial plexus (BP) involvement is highly sensitive and reasonably specific in detecting mechanical lesions around the cervical spine and may suggest radicular involvement [13].

Neck distraction test assesses the presence of a cervical radiculopathy by gentle distraction force to the neck applied through both hand contacts as the thenar eminence of both hands resting on the patient's mastoid processes. The test is positive if there is a reduction in the patient's presenting symptoms [14].

Median Nerve Bias Neurodynamic Test is used to assess the neurodynamics of the median nerve. The patient lies supine with the head and neck in neutral the therapist standing facing the head of the patient on the side being tested, a closed fist is placed at the superior aspect of the shoulder to provide scapular depression. While maintaining this hand position, gently move the patient into the following positions: head and neck contralateral side bending, ipsilateral shoulder abduction and external rotation, elbow extension, forearm supination, and wrist/finger extension. Further differentiation may be determined by appreciating the effect of head and neck position on symptoms. The test is positive if there is a reproduction of pain or paresthesia into the median nerve distribution of the upper extremity and the therapist documents the location at which the symptoms are produced [15].

The Neck disability index is a commonly used method to determine the functional disability level of subjects with neck pain. It has test-retest reliability [16]. The Numeric Pain Rating Scale (NPRS) is a segmented numeric version of the visual analog scale (VAS) in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of his/her pain. The 11-point numeric scale ranges from '0' representing one pain extreme (e.g. "no pain") to '10' representing the other pain extreme (e.g. "pain as bad as you can imagine" or "worst pain imaginable") [17].

Assessment methods of hand grip strength and hand functions

Measuring the strength of hand muscles with dynamometer is frequently used as a parameter to assess hand function [18]. The hand held dynamometer measures cylinder grip strength and it is widely available to hand therapist, has a standardized method of use, has normative values established for its use, and is widely accepted by hand therapist. The normative values are particularly useful when it is necessary to compare the patient against norms [10].

Jebsen-Taylor hand function test evaluates unilateral grasp and prehension patterns. It consists of seven subtests, each test is timed, and there are published standardized times against which to evaluate the performance of the patient. It has been widely used to evaluate hand functions in a number of medical and surgical conditions. Although this test cannot be purchased commercially, the therapist can assemble it inexpensively. It is fast and easy to administer too [19].

Purdue Pegboard Test evaluates the fine manual dexterity, first with the right hand, followed by the left hand, and then both hands together. The patient is in a sitting position and is asked to move 1 peg at a time, from the cup to a hole in the board, as fast as possible for 30 seconds. The number of pegs moved during each test is recorded. Next, the patient is asked to, as quickly as possible in 60 seconds, takes a peg or a sailing grommet with their dominant hand, and a washer with their other hand, and put them together. Both

hands are required to work together. The number of assemblies placed in the board within the allocated time is recorded. All tests are repeated three times. The Purdue Pegboard Test has been reported to be of good reliability (ICC: 0.66–0.96) [20].

Treatment methods

The majority of patients diagnosed with cervical radiculopathy (75–90%) will improve with non-operative management according to two large prospective studies that evaluated treatment modalities [21, 22]. Non-operative treatments can include both active and passive therapy [23]. Passive therapy consists of collar immobilization and rest from activities that aggravate the condition [24].

Active interventions are more favored. The majority of studies that describe non-operative therapy document the usage of multiple modalities of treatment. One such study compared range of motion exercises, ergonomic neck instruction, neck relaxation, and superficial heat to manual cervical traction. The group receiving traction had significantly better pain scores and range of motion following a 6-week treatment period. Other studies include the usage of Transcutaneous electrical nerve stimulation (TENS), cervical pillow, massage, acupuncture, and ultrasound [25].

Manual therapy is form of conservative treatment. It is thought to produce a variety of effects including improved tissue extensibility and range of motion; relaxation; altered muscle function; modulation of pain; and reduction of soft tissue swelling and inflammation [26]. There was moderate evidence that cervical joint mobilization has an immediate effect on reducing pain in neck and upper limb musculoskeletal conditions. A systematic review by Schmid et al., reported that cervical mobilization could reduce pain by approximately 20% more than control approaches. Eight of the 15 studies in the review used the lateral glide technique [27].

The lateral glide technique described by Elvey [4] is a manual treatment, involving a small oscillatory movement, applied to the neck with an element of traction. Cervical lateral glide (CLG) were more effective in short-term for improving pain intensity, range of motion (ROM) during upper limb neurodynamic test (ULNT1), and functionality than therapeutic ultrasound and manual cervical traction [5].

Conclusion

Lateral glide mobilization combined with conventional physical therapy is more effective than conventional therapy alone in reducing pain and improving functional outcomes in patients with cervical radiculopathy. Improvements in cervical ROM and hand function further support the inclusion of lateral glide mobilization in rehabilitation programs for these patients.

References

1) **Thoomes EJ, Scholten-Peeters G, DeBoer AJ, et al. (2012).** Lack of uniform diagnostic criteria for cervical radiculopathy in conservative intervention studies: a systematic review. Eur Spine J; 21:1459–70.
2) **Langevin P, Roy, J and Desmeules, F. (2012).** Cervical radiculopathy: Study protocol of a randomized clinical trial evaluating the effect of mobilisations & exercises targeting the opening of intervertebralforamen. Bio Med Central Musculoskeletal disorders.13(10):1-8.
3) **Hassan F., Osama M., Ghafoor A., et al. (2019).** Effects of oscillatory mobilization as compared to sustained stretch mobilization in the management of cervical radiculopathy: A randomized controlled trial. Journal of Back and Musculoskeletal Rehabilitation, 1–6.

4) **Elvey, R L. (1986).** Treatment of arm pain associated with abnormal brachial plexus tension', Australian Journal of Physiotherapy, 32, 225-231.
5) **Kim, D.G.; Chung, S.H.; Jung, H.B. (2017).** The effects of neural mobilization on cervical radiculopathy patients' pain, disability, ROM, and deep flexor endurance. J. Back Musculoskelet. Rehabil. 30, 951–959.
6) **Schoenfeld AJ, George AA, Bader JO, et al. (2012).** Incidence and epidemiology of cervical radiculopathy in the united states military: 2000 to 2009. J Spinal Disord Tech; 25:17–22. doi: 10.1097/BSD.0b013e31820d77ea.
7) **Chu, E. C. P., Lo, F. S., & Bhaumik, A. (2020).** Plausible impact of forward head posture on upper cervical spine stability. Journal of Family Medicine and Primary Care, 9(5), 2517–2520. https://doi.org/10.4103/jfmpc.jfmpc_95_20
8) **Duruöz, M. T., (2014).** Assessment of hand functions. In Hand Function (pp. 41-51). Springer, New York, NY.
9) **Joghataei, M. T., Arab, A. M., & Khaksar, H. (2004).** The effect of cervical traction combined with conventional therapy on grip strength on patients with cervical radiculopathy. Clinical rehabilitation, 18(8), 879-887.
10) **Faisal M, Mathew N, Mathias, L, et al. (2012).** Grip strength and hand function changes in unilateral cervical radiculopathy. Int J Cur Res Rev, Nov. Vol 04, Page 82-90.
11) **Jajeh H, Lee A, Charls R, et al. (2024).** A clinical review of hand manifestations of cervical myelopathy, cervical radiculopathy, radial, ulnar, and median nerve neuropathies. J Spine Surg; 10(1):120-134.
12) **Tong, H. C., Haig, A. J., & Yamakawa, K. (2002).** The Spurling test and cervical radiculopathy. Spine, 27(2), 156-159.
13) **Abbed KM and Coumans JV. (2007).** Cervical radiculopathy: pathophysiology, presentation, and clinical evaluation. Neurosurgery; 60: S28. DOI: 10.1227/01.NEU.0000249223.51871.C2
14) **Wainner RS, Fritz JM, Irrgang JJ, et al. (2003).** Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for
15) **Bertilson BC, Grunnesjo M, Strender LE. (2003).** Reliability of clinical tests in the assessment of patients with neck/shoulder problems-impact of history. Spine.; 28:2222-2231. DOI: 10.1097/01.BRS.0000089685.55629.2E
16) **Vernon, H., (2008).** The Neck Disability Index: state-of-the-art, 1991-2008. Journal of manipulative and physiological therapeutics, 31(7), 491-502.
17) **Rodriguez, C. S. (2001).** Pain measurement in the elderly: a review. Pain ManagementNursing, 2(2), 38-46.
18) **Videler, A. J., Beelen, A., Aufdemkampe, G., et al. (2002).** Hand strength and fatigue in patients with hereditary motor and sensory neuropathy (types I and II). Archives of physical medicine and rehabilitation, 83(9), 1274-1278.
19) **Barbara G. Stanely, Susan M. Tribuzi. (1992).** Concepts in Hand Rehabilitation. F.A.Davis Company. Philadelphia; pg: 5, 7.
20) **McMorland G, Suter E, Casha S, et al. (2010).** Manipulation or micro-discectomy for sciatica? a prospective randomized clinical study. J Manip Physiol Ther; 33:576–84.
21) **Radhakrishnan, K., Litchy, W. J., O'fallon, W. M., et al. (1994).** Epidemiology of cervical radiculopathy: a population-based study from Rochester, Minnesota, 1976 through 1990. Brain, 117(2), 325-335.
22) **Sampath, P., Bendebba, M., Davis, J. D., et al. (1999).** Outcome in patients with cervical radiculopathy: prospective, multicenter study with independent clinical review. Spine, 24(6), 591-597.
23) **Arnasson, O., Carlsson, C. A., & Pellettieri, L. (1987).** Surgical and conservative treatment of cervical spondylotic radiculopathy and myelopathy. Acta neurochirurgica, 84(1), 48-53..
24) **Caridi, J. M., Pumberger, M., & Hughes, A. P. (2011).** Cervical radiculopathy: a review. HSS Journal®, 7(3), 265-272.
25) **Mintken PE, DeRosa C, Little T, et al. (2008).** AAOMPT clinical guidelines: A model for standardizing manipulation terminology in physical therapy practice. J Orthop Sports Phys Ther; 38(3): A1–6.
26) **Jette, D. U., & Jette, A. M. (1996).** Physical therapy and health outcomes in patients with spinal impairments. Physical Therapy, 76(9), 930-941.
27) **Schmid, A., Brunner, F., Wright, A., et al. (2008).** Paradigm shift in manual therapy? Evidence for a central nervous system component in the response to passive cervical joint mobilisation. Manual therapy, 13(5), 387-396.