

ORIGINAL ARTICLE

IJPHY

ESSENTIAL ASPECTS OF PHYSIOTHERAPY IN THE SUCCESSFUL TREATMENT OF A PATIENT WITH CERVICAL DISC HERNIATION: A CASE REPORT

^{*1}Rathish Manickam²Dirk Laubscher³Amjad Moiffak Moreden

ABSTRACT

Background: Cervical disc herniation is one of the major conditions resulting in neck pain, which in turn affects the patient's activities of daily living. The Conservative approach is always being challenging among these patients due to the feeling of insecurity and the related severity of symptoms. McKenzie's approach has been used worldwide for slipped disc issues in providing relief by reducing the disc pressure and radiating symptoms. Deep Cervical Flexors strengthening plays a vital role in providing neck stability and thereby improving the posture.

Case Summary: A case of neck pain with radiation into the left upper extremity going down to the left hand in a 47-year-old female was presented to physical therapy and has been referred by an orthopedic surgeon with a diagnosis of acute cervical disc prolapse at the C5-6 level. After the initial evaluation, muscle energy techniques were initially given to increase the ROM of the cervical spine as the neck was stiff. Mckenzie techniques were executed, including manual traction for 15 days along with basic ROM, neck isometrics, and DCF strengthening.

Outcome measures: Numeric Pain Rating Scale (NPRS), Cervical ROM, Neck Disability Index (NDI), Tampa Scale for Kinesiophobia (TSK) were used.

Conclusion: Mckenzie protocols combined with Muscle Energy Techniques (MET) and DCF strengthening exercises revealed that there was a significant improvement in the patient's functional ADL with a marked reduction in disc herniation and its associated symptoms.

Keywords: Mckenzie approach, neck pain, disc prolapse, deep cervical flexors strengthening.

Received 31st January 2020, accepted 27th March 2020, published 09th April 2020



www.ijphy.org

10.15621/ijphy/2020/v7i2/657

CORRESPONDING AUTHOR

^{*1}Rathish Manickam

Physiotherapist, Harley Street Medical Centre,
Marina Village, Villa A18- A23, P.O Box: 41475,
Abu Dhabi, U.A.E.
Email: rathish605@gmail.com

²Physiotherapist, Harley Street Medical Centre,
Marina Village, Villa A18- A23, P.O Box: 41475,
Abu Dhabi, U.A.E. Email: dirk.laubscher@hsmc.ae
³Orthopedic surgeon, Harley Street Medical Centre,
Marina Village, Villa A18- A23, P.O Box: 41475,
Abu Dhabi, U.A.E. Email: amjad.moredden@hsmc.ae

INTRODUCTION

Neck pain is the most typical condition that could lead to a state of disability at work among the public [1]. Most of the neck pain patients do not have a complete cure for their pain and its associated discomfort, especially in their workplace. Apart from the feeling of discomfort and stress, the pain also causes days off work and results in a subsequent financial loss to the employee and the employer. Neck pain is, therefore, considered a chronic disabling condition with periods of remission and exacerbation [2].

Intervertebral discs are structures like shock absorbers, which are located in between the vertebral bodies of the spinal column from cervical to the sacrum. Intervertebral disc are shock-absorbing cushions that are held responsible for taking all the loads into the spine. The cervical spine allows six degrees of freedom, and it was found flexion/extension is the most considerable motion that occurs in a sagittal plane [3]. As the disc loses its water content, it goes into a state of dehydration, and the annulus fibers become thicker by losing its flexibility, which leads to annulus fibrosis cracking. Once the intervertebral disc absorbs the compression forces, the nucleus pulposus protrudes out through the weak & cracked annulus fibers. The inability of the nucleus pulposus to receive and redistribute the loads efficiently could result in disc degeneration, and intumescence might lead to herniation [4].

The amount of disc protrusion can have adverse effects on the patient's symptoms. Each spinal nerve exits the vertebral column, and disc herniation at a particular level could impinge the spinal nerve resulting in radiating symptoms into the extremities. If flexion, extension, rotation, and their combined movements create a strong force exceeding the strength of annulus fibrosus and supporting anterior-posterior ligaments, it can end up in disc herniation. It was revealed that the cervical flexion movement exerts a huge amount of compression force on the disc [5]. These combined movements may increase the amount of pressure within the disc and eventually resulting in disc herniation [3].

The posterior longitudinal ligaments are weak compared to other structures surrounding the disc, and this is the reason where most of the disc herniation occurs in the posterior-lateral direction [6]. There are seven vertebrae in the cervical spine; C5-6 and C6-7 are the most expected levels of cervical disc herniations reported among 90% of all cases [7].

The McKenzie approach to patients with disc issues was established in Sweden in 1985. It became popular in the 1990s as a biomechanically based treatment technique for all the issues of the spine associated with mechanical dysfunctions [8]. Even though there are many techniques and treatment approaches for treating disc pathology, the McKenzie approach plays a significant role in reducing the disc pressure, which helps in alleviating the symptoms for further recovery. The purpose of this case report is to present the management of a patient with cervical disc

herniation by using the McKenzie approach along with other manual techniques & strengthening exercises.

Patient information

A 47-year-old female visited our clinic complaining of a stiff neck with unbearable pain. She was diagnosed in another hospital as having cervical disc prolapse and was told that surgery was her only option. She was an accountant who works in front of a computer for around 8 -10 hours a day.

Physical examination

Informed consent was taken from the patient. She had complaints of neck pain and left upper extremity tingling & pain radiating to the left hand. The patient reported that she had these radiating symptoms for the past two months associated with neck pain.

Examination showed reduced sensation of the left C5-C6 dermatomes on the lateral aspect of arm & forearm, especially more on the thumb side of the hand. It was found muscle weakness of the corresponding myotomes, which is predominantly found in wrist extensors. Bilateral upper trapezius and sternocleidomastoid (Right more than the left) were found tight and tender on palpation. On examination, it was found that the grip strength was reduced compared to the unaffected side.

Diagnosis and assessment

MRI results revealed the diagnosis of cervical disc prolapse at the level of C5-C6. Coughing, the beginning of neck flexion, and left-sided rotation increased the pain and associated radiating symptoms. The pain score noted was 7/10 in NRPS. The patient also complained disturbances in sleep, which in turn affected her nature of work during the day. The patient approached our medical center and was consulted by an orthopedic surgeon who administered a cortisone injection to alleviate immediately her pain before she was referred to Physiotherapy. On observation, it was found the patient had forward head posture. ROM was not able to assess due to severe pain.

Interventions

Even though the patient felt less pain after the injection, stiffness of neck and radiating symptoms were present. The patient was in supine lying, and Muscle Energy Technique (MET) was applied carefully for increasing the movements of neck rotations and lateral flexions.

Flexion movements were avoided initially as it was found that flexion increased the radiating symptoms and extension resulted in centralizing the symptoms, therefore the initial plan of care to the patient was in extension movement.

The procedure was started with chin tuck / McKenzie retraction exercise in supine lying. The patient did retraction exercise with assistance and overpressure applied in accordance with the patient's tolerance, at least for about ten times of 3 sets. The McKenzie retraction exercise was taught to the patient in a comfortable sitting position, and she was told to sit erect to obtain the normal lumbar lordosis, which in turn helped to attain maximal cervical

retraction. Retraction with extension was not initiated as it increased the pain.

The patient was educated regarding the importance of posture and was told to avoid forward head posture. The Chin tuck exercises were continued every day. The patient was asked to sit upright and retract the chin and neck posteriorly as if the head was on the shoulder girdle, keeping the head & eyes at the same level. The patient holds the end position for one second and returned to a relaxed neutral posture. The patient was taught the techniques as mentioned earlier as a home program and advised to do at least three times a day with 5 to 10 repetitions according to the patient's tolerance.

The rotation was included bilaterally after retraction and extension have been done. Thus Mckenzie exercise program included in the patient's treatment protocol were retractions in supine and sitting positions, retraction - extension with bilateral rotations. Deep Cervical Flexors training was taught both in supine lying and sitting positions. The patient was asked to lie down, facing up on a firm surface. She was instructed to tuck her chin in (tilt and retract) and asked to open her mouth fairly wide, which in turn inhibits the sternocleidomastoid a bit. The patient was asked to lift her head slightly and hold for a few seconds. This was repeated until the patient felt enough muscle work or reached the fatigue level. The patient did chin tucks and held for a few seconds in a sitting position just to activate the DCF muscles. The patient was able to do DCF training effectively after the pain, and radiating symptoms were lessened.

The patient was treated for about 15 sessions. She was asked to continue Mckenzie exercises, neck isometrics & DCF training to strengthen the muscles and to lessen the chance of recurrence. She was also taught about postural awareness and to maintain proper neck mechanics.

Table 1: Interventions

Days	INTERVENTION
1 - 3	Muscle Energy Techniques
4-9	McKenzie retraction exercise in supine and sitting, Manual Traction
10-15	McKenzie retraction extension combined with rotations & DCF training

Follow-up & outcomes:

As discussed in the intervention, McKenzie's protocol was continued throughout the treatment period. On examination, it was revealed that there was improved cervical ROM in all directions. On sensory examination, the left arm was less numb and almost felt pins and needles, which indicate improvement in the sensory component associated with a herniated disc. Later on, the sensation in the upper arm was found normal, but showing sensations of pins and needles below the elbow throughout extremities. Sensory examination after few days showed normal sensations without any numbness, pins, and needles.

Grip strength and strength of the upper limb was found almost equal when compared to the unaffected side. Fear was much lessened during her work, according to TSK. The pain score was nearly zero, showing pain-free activities. NDI showed good results revealing that the patient started doing her ADLs normally with no more disability.

Follow-up was done by telephonic conversation for two months, and re-evaluation at the end revealed that there was no re-aggravation of symptoms and found a complete resolution of her complaints.

The Outcome measures used were the NDI (Neck Disability Index), Numeric Pain Rating Scale (NRPS), Cervical ROM, and Tampa Scale for Kinesiophobia (TSK).

Table 2: Outcome Measures

Days	NDI	ROM	NRPS	TSK
1-3	25	Unable to assess due to pain	7	>37 - 58
4-9	14	50% in all directions	4	>37 - 40
10-15	3	Normal	0	<37 - 25

DISCUSSION

Physical therapists most commonly use McKenzie techniques for cervical disc issues, and they have a strong belief that it resolves the disc conditions by easing the symptoms. Due to the symptoms and severity of pain, patients might think of pushing them to surgery, and it's relatively challenging to make decisions. In our case report, the patient was advised to go for surgery if physiotherapy fails.

There are plenty of studies that had been proven that Mckenzie's retraction exercises helped in getting relief from disc herniations and its associated symptoms. Despite the Mckenzie approach is successful in all disc cases by attenuating the intradiscal pressure for a speedy recovery, muscle spasm is the one which makes the neck stiffer. Thus MET could play a substantial role in reducing muscle spasm and pain so that McKenzie techniques can be applied by physical therapists more efficiently.

Muscle Energy Technique is one of the effective tools used among physical therapists to increase the movements by lengthening the tight or contracted muscles. It is also used to regain the normal motion between each segment of the vertebrae in the spine [9]. In our case study, MET was preferentially used to relax the cervical muscles by concentrating only on bilateral cervical rotations and lateral flexion because flexion seems to worsen the symptoms, and McKenzie concentrated on extension movements.

The biomechanically based McKenzie techniques are methods used for both treatment and diagnosis purpose, which relies on mechanical overloading and repetitive movements of the spine and its related symptoms. Even though the physical therapist strictly adheres to McKenzie protocols, they go for a specific type of exercise and technique based on the individual's symptoms. McKenzie's methods play a significant role by educating the patients about their posture and neck conditions. Also, it acts as

a self-treatment protocol, which can be limited based on their symptoms. Based on the patient's symptoms and response to loading on the spine McKenzie classify the conditions into postural, dysfunction, and derangement syndromes [8]. In this case study, the patient falls under derangement syndrome.

The McKenzie approach involves the patient to participate actively. However, the methodology is simple; it could be easily added in the treatment protocol in all the conditions of the neck with radiating symptoms. In our case study, the patient did McKenzie's retraction exercise in supine lying and sitting positions. The patient sat in a comfortable erect position just to maintain the lumbar lordosis as this helped in gaining maximum cervical retraction as well as retraction combined with extension in the end range. The patient was instructed to do the exercises, as mentioned above, along with bilateral rotations within a pain-free range of movements [10].

It was proven that McKenzie's retraction exercises relieved the pain; the hypothesis could be as follows, neck retraction resulted in an extension of the lower cervical segments, which helped in reducing the stress/pressure in posterior annulus [11,12]. In our case, manual cervical traction was given to the patient, followed by retraction and extension. This technique was applied later on until the radiating symptoms are much lessened, and it is based on the phenomenon of centralization and peripheralization [10].

Deep Cervical Flexor muscles (DCF) longus colli and capitis contributes to stabilizing the cervical spine in different positions of head and neck by Co-activation with cervical multifidus muscles. Apart from that, longus colli counteracts when the lordosis is increased in the cervical region related to the head weight and posterior neck muscles contractions. Thus Deep Cervical Flexors (DCF) and cervical multifidus act as segmental stabilizers of the cervical spine, whereas sternocleidomastoid is primarily responsible for torque production [13].

Recent studies have been revealed that there was an impaired activation of deep cervical flexor muscles among individuals with neck pain. It was proven deep cervical muscle activity was necessary and acted in synergy with superficial muscles for stabilizing the neck in the midrange of movements of the cervical spine. Indeed evidence are revealing that people with neck pain are more prone to get into forward head posture when they are stressed or distracted. It was also proven that retraining the DCF will significantly reduce the symptoms of neck pain and assists in attaining a good posture [14].

Even though cortisone injection helped the patient to get rid of pain rapidly, it did not have any effect on the radiating symptoms. This case report is unique because the patient was given injection initially to reduce the pain which helped in to start manual therapy techniques which emphasize MET in relaxing the rotators and side flexors to enhance the neck movements, McKenzie techniques – a biomechanical approach in reducing the discal

pressure which in turn resulted in centralization and DCF strengthening to provide neck stability.

CONCLUSION

Mckenzie approach, combined with Muscle Energy Techniques and DCF strengthening, revealed a significant reduction of cervical disc herniation and its related symptoms. In this case report, Mckenzie protocols and DCF training were utilized in the treatment of cervical disc herniation in one individual. Further studies are required to reveal the effectiveness of the Mckenzie techniques in different neck conditions, within a larger sample size.

Acknowledgments

Authors would like to thank Dr.Hady Jerdak, CEO, Harley Street Medical Centre, Abu Dhabi, and Department of Orthopaedic & Physiotherapy for their unconditional support & motivation in this project. The authors have declared no conflict of interest.

REFERENCES

- [1] Côté, Pierre DC., Cassidy, J. David DC. & Carroll Linda. The Saskatchewan Health and Back Pain Survey: The Prevalence of Neck Pain and Related Disability in Saskatchewan Adults. *Spine*. 1998; 23(15), 1689-1698.
- [2] Bongers, P.M., Ijmker, S. & Van Den Heuvel, S. Epidemiology of work related neck and upper limb problems: psychosocial and personal risk factors (part I) and effective interventions from a bio behavioral perspective (part II). *J Occup Rehabil*. 2006; 16(3): 279-302.
- [3] Callaghan, J.P. and McGill, S.M. Intervertebral disc herniation: studies on a porcine model exposed to highly repetitive flexion/extension motion with Compressive force. *Clin. Biomech (Bristol., Avon)*. 2001; 16(1):28-37.
- [4] Costi, J.J., Hearn, T.C. and Fazzalari, N.L. The effect of hydration on the stiffness of intervertebral discs in an ovine model. *Clinic. Biomech.(Bristol., Avon)*.2002; 17(6): 446-55.
- [5] Pospiech, J., Stolke, D., Wilke, H.J. and Claes, L.E. Intradiscal pressure recordings in the cervical spine. *Neurosurgery discussion*. 1999; 384-5, 44(2):379-84.
- [6] Hoff JT, Papadopoulos SM. Cervical disc disease and cervical spondylosis. In:Wilkins RH, Rengachary SS, editors. *Neurosurgery*, New York:McGraw-Hill. 2nd ed; 1985.
- [7] Constantoyannis, C., Konstantinou, D., Kourtopoulos, H. and Papadakis, N. Intermittent cervical traction for cervical radiculopathy caused by large-volume herniated disks. *J. Manipulative Physiol. Ther*. 2002; 25(3):188-92.
- [8] McKenzie RA. *The cervical and thoracic spine. Mechanical diagnosis and therapy*. Waikanae. Newzealand: Spinal Publications; 1990.
- [9] Goodridge JP. Muscle energy technique: definition, explanation, methods of procedures. *J Am Osteopathic Assoc*. 1981; 81(4): 249-54.
- [10] Gary Jacob. *Rehabilitation of the spine*, A Practitioners

manual. Chapter 15, McKenzie spinal Rehabilitation Methods. 345

- [11] Fennell AJ, Jones AP, Hukins DW. Migration of the nucleus pulposus within the intervertebral disc during flexion and extension of the spine. *Spine*. 1996; 21 (23):2753-57.
- [12] Ordway RN, Seymour RJ, Donelson RG, Hojnowski LS, Edwards WT. Cervical Flexion, Extension, Protrusion and Retraction. A radiographic segmental analysis. *Spine*. 1999; 24(3):240-47.
- [13] Deborah L.Falla, Gwendolen A.Jull & Paul W. Hodges. Patients with neck pain demonstrate reduced electromyographic activity of the deep cervical flexor muscles during performance of the craniocervical flexion test. *Spine*. 2004; 29(19):2018-2114.
- [14] Deborah Falla, Shaun O Leary, Amy Fagan & Gwendolen Julla. Recruitment of the deep cervical flexor muscles during a postural-correction exercise performed in sitting. *Manual Therapy*. 2007; 12(2): 139-143.