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Outpatient Physical Therapy Interventions for the Cervical Spine: A Case Report

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OUTPATIENT PHYSICAL THERAPY INTERVENTIONS FOR THE CERVICAL SPINE: A Case Report

by

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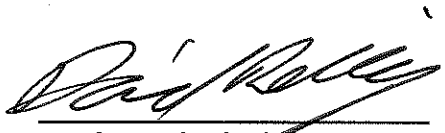
This Scholarly Project, submitted by Brandon Szklarski in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.



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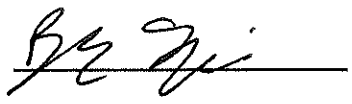
Signature 

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ABSTRACT

There is currently little evidence available to determine which conservative treatment options are best for management of patients with cervical pain and radiculopathy. The purpose of this case report is to describe a cost-effective, non-operative approach for symptom management with physical therapy interventions in individuals with cervical neck pain and radiculopathy. The patient's diagnosis was determined by the physical signs and symptoms that were presented, as well as classification of the patient's symptoms with the clinical prediction rules used to identify patients with cervical radiculopathy. The results of the examination were consistent with her primary care physician's referral and diagnostic imaging performed. Treatment provided included: patient education, manual therapy, and therapeutic exercise. Following physical therapy interventions, pain was reported at 0/10 at rest and with activity, and at 2/10 with prolonged positioning. Her score on the neck disability index improved to 2/50, demonstrating a substantial reduction in disability from 48% to 4% between the time of initial evaluation to discharge. All goals assigned to the patient were met throughout the therapy sessions except for the goal of maintaining 0/10 pain for one-week duration. Improvements were made with pain rating, postural alignment, cervical range of motion, centralization of symptoms, and overall strength.

CHAPTER I:

INTRODUCTION & LITERATURE REVIEW

Neck pain is described as pain perceived between the regions of the superior nuchal line, lateral margins of the neck, and an imaginary line which transverses the T1 spinous process. [1] Although patient's who have cervical pain generally have symptoms within this region, the pain in which they experience is boundless to these limits. Cervical pain with radiculopathy is a common presentation within the clinic, and is estimated that approximately 22% to 70% of all individuals will have some episode of neck pain throughout their life. [2] This incidence percentage may be in part due to the normal degenerative processes that occur with age. Gunner et al.(1995), found this increase in incidence with age to be true, occurring most commonly in women between the ages of 50 and 60 years of life. [2] In addition to increasing incidence rates with age, the risk of reoccurrence and an increased concern for chronicity of symptoms, also increases with time. [3] Approximately 5% of individuals whom reported symptoms longer than six months eventually became disabled. [3]

With this increase in incidence, prevalence rate, and concern for chronicity as a person ages, individuals are often forced to seek medical assistance for treatment of their symptoms. Physical therapists play a large role in management and treatment of individuals with cervical and radicular symptoms, and may be a cost-efficient option for treatment of patients and their symptoms. The purpose of this case report is to describe a cost-effective, non-operative approach for symptom management with physical therapy interventions in individuals with cervical neck pain and radiculopathy.

Literature Review

There are a variety of causes of neck pain that have been described in literature, including: degenerative disc disease, osteoarthritis, disc herniation, spondylosis, infection, myofascial pain syndrome, torticollis, and whiplash.[4] Although there are many categories in which neck pain can be classified, the diagnostic criteria for classification of these conditions are often indeterminate and can hinder the identification of the exact cause of pain.[5] A primary objective in clinical practice is for a clinician to determine the source and cause of pain in order to implement the correct measures for reversing, managing, or eliminating the pain. A randomized controlled trial on the impairment and function based diagnosis for cervical pain found that the majority of patients with cervical pain were diagnosed with having mechanical neck pain or a nerve root compromise.[6] Imaging can show abnormal findings, such as degeneration, disc herniation, nerve root impingements, or narrowing of the spinal cord, however, specific symptoms from these occurrences are not always present.[6] Approximately 14-18% of individuals with neck pain demonstrate a vast variety of abnormal findings.[7]

For an anatomical structure to cause pain, it has to be innervated. Some of the structures innervated in the cervical region include: the posterior neck muscles, zygapophysial joints, atlantoaxial joints, ligaments of the atlantoaxial joints, dura mater of the spinal cord, lateral muscles of the neck, and intervertebral disks. Although there are many areas innervated in the cervical region, degenerative conditions can cause symptoms that are nonspecific to their site of origin and often result in secondary conditions and symptoms. However, when a patient presents with radicular symptoms to their extremities, all these potential causes of pain share a common component, spinal nerve or nerve root compression.

Diagnoses such as, cervical radiculopathy and myelopathy are most commonly linked to space occupying lesions, such as a cervical disc herniation or spondylosis.[8] These conditions are both capable of occurring secondarily to degenerative processes and causing involvement in other structures, such as bony or ligamentous tissues leading to cervical pain or radicular symptoms to other areas.[9] Space occupying lesions can compress and inflame nerve roots resulting in sensory impairments, motor deficits, and radicular pain.[6]

Compression of a nerve root or spinal nerve, however, does not directly invoke radicular symptoms involving pain, but is more so related to compression of a dorsal root ganglion.[9] Laboratory experiments on lumbar nerve roots have shown that mechanical compression of nerve roots does not elicit activity in nociceptive afferent fibers.[10] Compression of the dorsal root ganglion can evoke sustained activity in afferent fibers involving AB fibers and C fibers.[9] Radicular systems are commonly associated with paraesthesia, which is consistent with AB fiber involvement.[9]

Although inflammation of the cervical roots may be a cause of radicular pain, this theory should not be applied to individuals whom have radicular symptoms due to osteophyte formation because inflammation cannot be invoked by noninflammatory lesions.[9] Osteophytes, tumors, and cysts are all examples of noninflammatory lesions, which can only be a cause of pain from compression of the dorsal root ganglion. If the compression involving the spinal nerve or nerve root progresses or worsens, the individual may or may not experience motor loss due to a loss in the conduction velocity of the nerve.[9]

The previously stated definition of neck pain lays the foundation of what should be included in neck pain; however, it does not limit the boundaries of where pain is felt by the patient. Because pain may radiate outside of the anatomical boundaries, structures outside of these limits should be included as potential sources of pain.

The location of symptoms depends on the nerve root affected. Two commonly involved nerve roots are C6 and C7, which become compressed by the C5-C6 vertebrae. [11] Symptoms of C6 nerve root involvement include, pain and/or numbness in the neck, lateral forearm, dorsum of the hand, and lateral two digits, and motor involvement of the biceps, triceps, and wrist extensors.

Due to the increasing reoccurrence rates and problems with chronicity, individuals with neck pain are often compelled to seek medical assistance for management of their symptoms. Gunner et al., found that 44% of patients with chronic involvement visit their general practitioner within 12-months of the onset of their symptoms; 51% of whom where referred to physical therapy for treatment. [2] The onset of reoccurrence and the development of symptom chronicity can drastically impact an individual's ability to function, both at home and at work. Similarly, reoccurrence and chronicity can be a major concern for both the patient and their employers. A survey performed on working individuals with neck and upper extremity pain, found that approximately 42% of workers had missed one or more weeks of work due to their symptoms; while 26% of these individuals had experienced further reoccurrence within the next year. [12] Patients who are able to manage their symptoms independently are less likely to miss work, decreasing the cost of employee compensation for missed time. Neck pain is second only to low back pain in compensation costs required in the United States. [13] Few studies comparing the cost-effectiveness of conservative and surgical treatments has been performed. A study performed by van Geest et al. found that an average of 2000 patients a year in the Netherlands receive surgery, resulting in direct costs of about 30 million dollars. [14] Physical therapy may be the treatment of choice by patients in order to decrease the economic burden caused by the high treatment costs of surgical procedures, potential for lowered wages, and compensation expenditures due to hours lost at work. [5] Physical therapy interventions are often economical compared to other techniques. For

the majority of the population, neck pain is typically treated without surgical interventions by primary care personal and physical therapy providers. [15]

Waldrop [16] developed a clinical prediction rule of four clinical tests that demonstrated reliability and accuracy in diagnosing cervical radiculopathy. The four items included (1) Spurling Compression Test, (2) distraction test, (3) cervical spine rotation less than 60° to the ipsilateral side, and (4) upper limb tension test. The clinical prediction rules had 99% specificity when all four items were positive. [17] These findings suggest clinicians can incorporate a more cost-effective clinical prediction rule into the examination to help diagnose cervical radiculopathy and start appropriate treatment immediately.

CHAPTER II:

CASE DESCRIPTION

A 38-year-old, right hand dominant female patient was seen by physical therapy for evaluation and treatment of cervical neck pain with radicular symptoms to bilateral upper extremities. In May of 2013, the patient began experiencing pain throughout her neck along the lateral aspects and into the back of her head. These symptoms progressed until radicular symptoms occurred to the upper thoracic musculature and into bilateral upper extremities. Numbness and tingling sensations were reported along her lateral forearm, dorsum of her hand, and into the first and second lateral digits; involving the left upper extremity to a greater extent than the right.

The patient lived on a rural farm and worked as a part time employee for a seeding company that her husband owns. Symptoms first began during the spring when she was working more often and with increased durations due to high demand for seeding supplies by farmers in the local area. During that time, the patient was performing both office work and physical labor. This included activities such as sitting at a desk, performing "book work" on the computer, answering phone calls, bending over to package and lift supplies from the ground, and positioning packages at a waist or above head position.

Following symptom onset, a chiropractor was seen for treatment, which primarily consisted of spinal mobilizations that temporarily relieved her symptoms. Magnetic resonance imaging (MRI)

was performed by her family physician and revealed mild disc narrowing and degeneration at the C5 – C6 level, along with degenerative spondylosis involving the facet joints and bone spur formation along the vertebrae in this area.

The patient's personal past medical history proved non-contributory in that she did not have major health concerns or previous surgical interventions. The patient was a non-smoker and an occasional alcohol consumer. Her families past medical history, however, revealed complications with osteoarthritis and heart disease. At the same time, the patient denied any signs or symptoms of cardiovascular disease.

Current function included increased difficulty with performance of everyday tasks such as self-care, home management, and work activities due to increased pain with task performance. Symptoms were reported as being worse in the morning when long periods of immobility had occurred. Situations that involved prolonged positioning of her neck, such as when driving or while seated at a desk, were increasingly painful for the patient. Due to radicular symptoms, there was increased difficulty with overhead activities, especially when dressing or grooming, putting away dishes, or lifting objects overhead at work. Symptom improvement occurred with movement of the neck and upper extremities after onset occurred, however, no specific motions were preferred. The patient stated to be a fairly active individual, but did not perform specific exercises regularly.

Evaluation, Examination, and Diagnosis

The physical therapy examination began with a postural assessment which began as the patient walked into the therapy department revealing a forward placed, ridged neck position with protracted shoulders, and reduced cadence and arm swing during ambulation. In a seated position, the patient presented with a protracted cervical spine, increased thoracic kyphosis, decreased lumbar lordosis, and suspected winging of the scapulae due to her forward placed shoulders.

The patient completed the Neck Disability Index (NDI), a self-report functional assessment of her perceived level of disability and impact on activities. [18] She scored 24/50, indicating a 48% disability. Riddle and Stratford identified that the NDI provided adequate sensitivity for the magnitude of change observed for patients reaching their functional goals. [19] The test-retest reliability of the NDI has been reported to be moderate in patients with cervical radiculopathy. [20]

A vertebral artery test was completed prior to the physical assessment. In a supine position, the therapist passively extended and rotated the patient's head maximally to the right for 10 seconds, returned to neutral for 10 seconds, and then extended and rotated her head to the left as tolerated for 10 seconds. The patient did not experience any symptoms associated with vertebral artery occlusion, nor did the patient present with any red flags based on history.

Cervical active range of motion was measured throughout the course of treatment with the Universal Goniometer Method, as described by Norkin and White. [21] Cervical motions assessed during the examination included: flexion, extension, lateral side bending right and left, and rotation right and left. These motions were performed in a seated position with the patient in proper posture and recorded in degrees from the universal standard as indicated. Data gathered from the cervical range of motion initial assessment can be found in Table 1. Information regarding active range of motion in subsequent treatment sessions can be found in Table 2. Subjective reports

during cervical assessment included; increased radiation to the left elbow during extension, left lateral flexion, and right rotation.

Table 1. Patient Cervical Range of Motion Values Compared to Norms

Motion	Patient Values (Degrees)	Normal Values (Degrees)
Flexion	55 Degrees	60 Degrees
Extension	28 Degrees	56 Degrees
Right Lateral Flexion	41 Degrees	43 Degrees
Left Lateral Flexion	20 Degrees	41 Degrees
Right Rotation	65 Degrees	72 Degrees
Left Rotation	50 Degrees	73 Degrees

Table 2. Cervical Range of Motion Throughout Course of Treatments

Motion	Initial Evaluation	Week 2	Week 3	Week 4
Flexion	55 Degrees	57 Degrees	58 Degrees	58 Degrees
Extension	28 Degrees	33 Degrees	40 Degrees	45 Degrees
Right Lateral Flexion	41 Degrees	41 Degrees	42 Degrees	42 Degrees
Left Lateral Flexion	20 Degrees	29 Degrees	35 Degrees	38 Degrees
Right Rotation	65 Degrees	65 Degrees	67 Degrees	66 Degrees
Left Rotation	50 Degrees	52 Degrees	57 Degrees	60 Degrees

A scan of peripheral joints was performed in a seated position for all joints of the upper extremity, including the shoulder, elbow, wrist, and fingers. Shoulder range of motion was assessed with utilization of the Apley Scratch Test maneuver, as described by Gulick (2005).[22] The

test was performed bilaterally and decreased internal rotation was noted with the right upper extremity, and external rotation of left upper extremity. The patient was able to reach to T3 vertebral body with internal rotation of the right upper extremity and T7 with external rotation of left upper extremity. However, she was able to grasp the hands together when external rotation of right upper extremity and internal rotation of left upper extremity was performed. No functional measurement of individual joints was taken. Elbow, wrist, and finger assessment was performed with active range of motion for all motions of the involved joints; no abnormalities or limitations were noted during assessment of these joints.

Resisted isometric movements of the cervical spine were performed for flexion, extension, lateral side-bending right and left; with all motions demonstrating strong and pain free responses.

Special tests performed during the evaluation included the vertebral artery test, Spurlings compression test, distraction test, and the upper limb tension test #1. Spurlings compression, distraction, and the upper limb tension test are tests which are recommended when radicular symptoms are present.[6] All tests were performed as indicated by Gulick (2009).[22] Spurlings test was performed with the patient in a seated position. Active compression was applied with slight extension and lateral flexion of the patient's head. This test reproduced the patient's symptoms with slight extension and lateral flexion to the right side; however, it was negative on the left. According to Tong et al. (2002) the test is highly specific (93%) for a diagnosis of cervical radiculopathy, with low sensitivity (30%).[23] The distraction test was also performed in a seated position. One hand was placed under the patient's chin and the other around the occiput followed by a slowly applied upward force. This test was positive with elimination of the patient's radicular symptoms as the patient subjectively reporting to have symptom relief and mild centralization of symptoms. According to Wainner et al. (2003), the test is highly specific for a diagnosis of cervical

radiculopathy (0.86), with lower sensitivity (0.50).[17] The final special test performed during the evaluation was the upper limb tension test #1 for assessment of nerve roots C5-C7. This test was first performed on the patient's left upper extremity and was found to be negative. Subjective reports were provided that the upper limb tension testing did not cause a reproduction of the symptoms, however, it was reported that she had increased stretch at the elbow and that the test was uncomfortable. Upper limb tension test #1 was performed and positive on the right side. When testing was performed on the right side, there was decreased range of motion during extension.

Palpation of the cervical thoracic musculature found increased hypertonicity in the musculature, including cervical scapulae, paraspinals, and upper/middle trapezius. Minor tenderness was noted throughout the cervical and upper thoracic musculature, however, there was no increase in tenderness along the insertion points or bony prominences. No mobility deficits were noted with vertebral assessment of C2-T5 with posterior/anterior glides.

Diagnosis, Prognosis, and Plan of Care

Based on the physical examination findings, the physical therapy services provided were appropriate in order to reduce pain and inflammation, increase cervical ROM and strength, and improve body mechanics, work ergonomics, and posture.

The physical therapy diagnosis for this patient was cervical pain with radiculopathy (left > right), representative of the preferred PT practice pattern: musculoskeletal pattern F- impaired joint mobility, motor function, muscle performance, range of motion, and reflects integrity associated with spinal disorders.[24]

The clinical prediction rules were used to determine the patient's physical therapy diagnosis. The patient had all items present for the diagnosis, including a positive Spurlings compression test, positive distraction test, cervical rotation less than 60 degrees on the ipsilateral side, and a positive upper limb tension test #1.[25] The examination results revealed that the patient had signs and symptoms indicative of a C6 nerve root compression. The patient was experiencing increased difficulty with function at work, home, and with performance of self-care activities due to increased pain, impaired posture, and cervical thoracic muscular weakness. The results of the examination were consistent with her primary care physician's referral, and diagnostic imaging performed.

According to the *Guide to Physical Therapist Practice*,[24] 80% of patients with cervical radiculopathy should achieve expected outcomes within 8 to 24 visits over the course of 1 to 6 months. Cleland et al. (2007)[26] established a predictive model for positive outcomes following therapeutic interventions. These variables included an age less than 54 years, non-dominant hand affected, no symptom exacerbation with a downward facing gaze, and interventions performed in a multi-dimensional approach, including: manual therapy, cervical traction, and strengthening of the deep

cervical neck flexors. [26] According to these four variables, the patient was classified into all, indicating a positive outcome potential with physical therapy intervention.

The goals assigned to this patient for achievement with physical therapy can be found in Table 3.

Table 3. Long Term and Short Term Physical Therapy Goals

Long Term Goals	Short Term Goals
This patient will demonstrate full, pain-free motions of the cervical spine for flexion, extension, lateral flexion right/left, and rotation right/left in order to perform work and activities safely, such as driving.	This patient will report centralization of symptoms from her fingers to the elbow in order to progress towards being pain-free while performing activities, such as placing boxes of above head while at work.
This patient will report 0/10 pain for duration of one week with performance of daily activities, such as work and self-care activities, to allow the patient to be able to sleep throughout the night pain-free.	This patient will be compliant with the home exercise program in order to progress.
This patient will be independent with home exercise program in order to discharge from therapy to home management.	

The timeframe for completion of the short-term goals was two week while the long-term goals timeframe was set for a one-month.

CHAPTER III:

INTERVENTIONS

The patient was seen for a total of 6 visits over a 4-week period. Treatment consisted of patient education, therapeutic exercise, and manual techniques to address impairments found during the examination as well as functional limitations. The goals of therapy were to decrease pain, improve mobility, and improve strength to increase tolerance of functional activities and return to full-time work duties.

During the initial treatment session, the patient was educated on the importance of correct postural alignment during sitting, standing, and activities of daily living. The patient was provided with verbal cues throughout subsequent treatment sessions when necessary.

Manual therapy techniques included soft tissue mobilization, cervical posterior to anterior (PA) glides, traction, cervical passive range of motion (PROM), and stretching. Soft tissue mobilization was focused on the most tender or restricted cervical and scapular musculature. The patient was supine with the cervical spine in neutral alignment. Non-painful manual pressure was applied to the soft tissues until the tissue restrictions were released. [27] Cervical traction was performed with the patient in a supine position with her head off the table while the therapist performed the manual distraction of the vertebral bodies. Manual PA glides were performed with the patient prone with the cervical spine in neutral alignment. All manual techniques were performed to decrease pain and improve mobility and the frequency and duration of intervention was based on symptom relief.

Stretching, when performed as an intervention by itself, is not strongly supported by evidence-based literature. When incorporated into a treatment plan with other interventions, such as

therapeutic exercise and manual therapy, stretching can be considered an overall beneficial addition to a treatment prescription. Manual therapy interventions have also been shown to reduce pain and improve symptoms when incorporated with other therapeutic interventions.[3] Ho et al. (2009), suggested that clinicians should consider incorporating soft tissue and joint mobilization techniques in conjunction to therapeutic exercise.[28]

Isometric strengthening of the cervical musculature was initiated when the patient's pain subsided. This intervention was performed with the patient seated, allowing for neutral alignment of the cervical spine, while the therapist applied resistance in all six directions. The patient progressed to strengthening of the deep cervical flexors, as well as, scapulothoracic musculature when she was able to perform ten repetitions with five-second holds for the isometric exercises with proper form and technique.

Chin tucks were performed to target the deep cervical flexors. The patient performed this intervention initially in a supine position with the cervical spine in neutral and instructed to flatten the curve of the neck by nodding her head. This position was held for ten seconds and repeated ten times. When the patient was able to perform this intervention with proper technique, and in a pain-free manner for ten repetitions, it was progressed with application of pressure to the chin.

Scapulothoracic exercises included serratus anterior, middle and lower trapezius, and rhomboid major and minor strengthening. Scapular retraction was performed in a standing position with a resistance band held in both hands and pulled in a horizontal direction to target the rhomboid major and minor musculature. Middle and lower trapezius strengthening exercises were also performed with the patient in a standing position with the use of a resistance band, and were targeted by having the patient pull the resistance band in "Y" and "T" movement patterns. The patient was instructed to slowly raise her arms as high as possible by squeezing her shoulder blades together then lowering her arms to the floor, performing both movements in a slow and controlled manner.

Dumbbell incline shoulder raises were performed in sitting on an incline bench to target serratus anterior. The patient was instructed to position the weights above her shoulders with elbows extended while raising her shoulders toward the dumbbells as high as possible. Elbow flexion and wrist extension strengthening exercises were performed in a standing position while using dumbbells or a therapeutic resistance band. All scapulothoracic strengthening exercises were progressed through increasing resistive bands or dumbbells when three sets of ten repetitions were performed at the previous resistance.

Throughout the patient's therapy sessions, she was provided a home exercise program, which consisted of the interventions performed during the treatment sessions. The patient was instructed to perform the exercises twice daily within a pain-free range and discontinue if pain arose. Resistance and repetitions progressed with therapy intervention.

Following the first week of physical therapy, the patient demonstrated rapid improvements in pain rating and postural alignment. The patient significantly improved her cervical range of motion, while at the same time centralization of peripheral symptoms, and improved overall strength were observed. By discharge, pain was at a 0/10 level both at rest and with activity, but at 2/10 with prolonged positioning. Her score on the neck disability index improved to a score of 2/50, demonstrating an improvement from a 48% to 4% disability from the time of initial evaluation to discharge. All goals assigned to the patient were met throughout the therapy sessions except for the goal of maintaining 0/10 pain for one-week duration.

CHAPTER IV:

DISCUSSION

The purpose of this case report is to describe a cost-effective, non-operative approach for symptom management with physical therapy interventions in an individual with cervical neck pain and radiculopathy. Physical impairments included limited range of motion, decreased strength, peripheral radicular symptoms, and an overall decrease in functional ability. Significant improvements in pain and postural alignment were made during the first week of physical therapy intervention, with improvements in cervical range of motion and peripheral symptoms during the second week. These improvements were maintained throughout the remainder of the treatment sessions as indicated by decrease pain, centralization of peripheral symptoms, and an improved score on the neck disability index. Throughout the treatment sessions, the patient reported having improvements in her ability to perform functional tasks at home and at work.

Research has previously shown that patients who meet the diagnostic criteria for cervical radiculopathy may benefit from a multi-treatment approach, including cervical traction, manual therapy, and therapeutic exercises [16,29,30] More recent research indicates that cervical traction, in addition to manual therapy and therapeutic exercises, provides no additional benefit towards pain, function, and overall disability. [31] Individuals who perform a multi-treatment intervention program have a more positive outcome when compared to individuals who only receive a single intervention. [26]

The patient in this case study received interventions including postural education, manual therapy, and therapeutic exercise. Cervical traction was provided with manual techniques as a

component of the manual therapy intervention. Since the patient presented with a positive Spurlings compression and distraction test, cervical traction was performed with the belief that it would assist with relieving her radicular symptoms.

There is moderate evidence in literature to support the use of intermittent cervical traction in patients with cervical radiculopathy, which has been shown to decrease both pain and perceived disability. [6,32,33] Approximately 70% - 92% of patients who perform cervical traction in the clinic have good relief with cervical traction combined with physiotherapy interventions. [34-36] The angle of traction has been studied by Colachis and Strohm [37], whom found that the maximum intervertebral distance achieved with traction is applied with forces at an angle of 24 degrees of cervical flexion. Although moderate evidence supports the use of cervical traction with cervical radiculopathy, there are still conflicting reports regarding the benefits of this intervention. [36,38]

Findings from Cleland and Whitman [29] where similar to those found by Moeti [32], whom reported the better outcomes in patients treated with a multimodal approach consisting of cervical intermittent traction, neck retraction exercises, scapular muscle strengthening, and mobilization/manipulation techniques. In these studies, all patients received intermittent cervical traction for 15 minutes with a traction force initiated at 18 lbs. [39] This force was adjusted by 1-2 lbs. in accordance to the response of the treatment per patient to produce centralization of reduction of their symptoms. [39]

Another intervention technique used with this patient was the McKenzie Method, which is commonly used for both low back and cervical pain with radicular symptoms. This method was developed based on the theory of pain centralization, which states that progressive elimination of pain occurs in a distal to proximal direction until symptom abolishment is complete. [40]

The McKenzie Method was philosophically developed on the concept that sitting posture, frequency of flexion, and loss of extension range of motion are predisposing factors for

development of spinal complications.[41] Diagnoses with this method are obtained according to the type of syndrome the individual presents with, as compared to identification of a specific structure. Maitland [41,42] and McKenzie[40,43] indicate that identification of the involved structure is not always possible, nor is it necessary in order to prescribe and deliver safe and appropriate therapeutic interventions. When providing interventions with the McKenzie Method, a strong emphasis is placed on the use of active, repeated motions for self-treatment by the patient with movements that positively influence the patient's symptoms.[41]

In research performed in patients with low back pain, a number of reviews have concluded that the McKenzie Method is effective for treatment of low back pain.[44] In general, these studies suggest that McKenzie's therapy is more effective when compared to other treatments, including: NSAIDS, educational booklets, back massage and care advice, strength training, and spine and general mobilization exercises.[44]

While extension is commonly the direction of movement prescribed with for patients with low back pain, other repeated movement patterns prescribed to patients include flexion and side glide-rotational movement patterns. [44-46] Based on the movement patterns prescribed, patients are classified into groups based on the direction exercises are performed in relation to the patient's directional preference, which include directions which match, are opposite, or nondirectional.[47] Research has shown more significant reduction in pain, pain medication use, and disability when exercise is performed in the opposite direction of the patients directional preference.[47] Long and Colleagues[48] concluded that patients who received the extension-oriented treatment approach experienced greater reductions in disability compared to those subjects who received lumbopelvic strengthening exercises at 1 week, 4 weeks, and 6 months.

While the McKenzie Method is highly researched as an intervention technique for individuals with low back conditions, there is a lack of evidence in literature in order to determine whether or

not this method is beneficial for patients with cervical pain. McKenzie's texts do not suggest that the therapy is more effective for a particular subgroup of patients, and literature review does not provide distinction between patients with back pain compared to back pain with symptoms radiating into their extremities.[44] Murphy et al. found that there has not been a clinical trial that recruited patients with only cervical radiculopathy.[30] Because of this, it is not possible at this time to comment on the efficacy of the McKenzie Method for this subgroup of patients. Childs et al. found that utilization of McKenzie Method techniques are just as beneficial, however, are not more beneficial in reducing disability when compared to other forms of treatment interventions.[6]

Research should consider evaluating the McKenzie method as an intervention technique, compared to an untreated control group, for individuals with cervical pain and radiculopathy. Evaluating a comparison between an untreated control and treatment group could help determine the degree and extent in which recovery occurs, as well as the duration in which improvements may occur.

Reflective Practice

The multi-treatment approach was used to treat this patient and included the use of both traction and the McKenzie Method as an intervention. Based on literature review, there are contradictions between whether or not traction for the cervical spine is beneficial. Although previously thought to assist with relieving radicular symptoms, more recent research indicates that patients receive no additional benefits from performing the interventions. Literature review regarding the McKenzie Method as an intervention also has limitations due to the lack of research available regarding its benefits when applied to the cervical spine. Because the techniques used in the McKenzie Method are easy to learn and can be easily progressed, they allow for greater independence with home exercises when compared to cervical traction. Since patients may or may

not experience benefits with the use of cervical traction, the McKenzie Method may be a more beneficial treatment option for patients in order to decrease the cost of treatments, compensation from missed time at work, as well as, a more beneficial option to promote independent management of symptoms.

Conclusions

This case report was not intended to serve as a standard of care for each individual diagnosed with cervical radiculopathy. Each patient in the clinic may present with symptoms that may be linked to several factors. Clinicians should consider all patient information, including clinical data, the treatment operations available, patient values, preferences, and their own personal expectations when determining an individualized standard of care for their patient. Although there is minimal evidence to support a conservative treatment approach at this time, research does support a multi-dimensional treatment approach, including manual therapy and therapeutic exercise. This case report provides an example of a conservative, multi-dimensional treatment approach that resulted in positive patient outcomes. Further research on conservative treatment methods, including cervical traction and the McKenzie method, is required.

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