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The Effectiveness of Traction in a Patient with Recurring Neck Pain: A Case Report

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THE EFFECTIVENESS OF TRACTION IN A PATIENT WITH RECURRING NECK PAIN: A CASE REPORT

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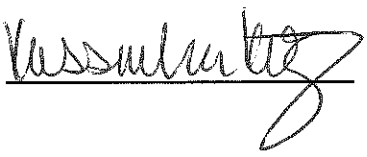
Signature 

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ABSTRACT

Background and Purpose: According to Hoya et al, neck pain is a common problem throughout the world, affecting 10.4-21.3% of the population each year.[1] 50-85% of people with a new episode of neck pain will have a recurrence of neck pain 1-5 years later.[1] Mechanical traction is an intervention commonly used to treat neck disorders; however, there is little current research supporting or refuting the effectiveness of the use of mechanical traction for neck pain. The purpose of this case report is to discuss the effectiveness of using mechanical traction in one patient with a recurring incidence of neck, shoulder, and temporomandibular (TMJ) pain. **Case Description**: A 40 year old female presented to physical therapy with neck, shoulder, and TMJ pain for the past eight months after a whiplash injury. She previously had this same problem two years prior and said it was completely resolved with mechanical traction, only after several unsuccessful attempts with other interventions. The patient was seen for five visits over a 15 day period. She was diagnosed based on findings during the examination and magnetic resonance imaging (MRI) results. Interventions were chosen based on her diagnosis and previous successful treatments with mechanical traction. **Discussion**: The use of mechanical traction appeared to have decreased the patient's neck, shoulder and TMJ symptoms. Other interventions were utilized including exercise, stretching, and STM. Therefore it is difficult to prove whether or not the use of mechanical traction improved the patient's symptoms

CHAPTER I

BACKGROUND AND PURPOSE

Neck pain is a common problem throughout the world, affecting 10.4-21.3% of the population each year. [1] The incidence of neck pain is on the rise, which is leading to more disabilities and an increased economic cost. Lost work days, increased worker's compensation claims and disability payments are the main contributors to the increased cost of work-related musculoskeletal disorders. [2] Research found that those with a history of headaches, low back pain, and previous whiplash or other traumatic injuries are more likely to have recurring cervical associated complaints.[3] This recurrence may be another contributing factor to the increased economic cost.

There are numerous causes of neck pain. Hoy et al[1] found that 50-85% of people with a new episode of neck pain will have a recurrence of neck pain 1-5 years later. These can range from muscles strains due to overuse injuries, to herniated discs causing nerve compression, to the stretching of soft tissues past their available range due to traumatic injuries.[4] One of the common causes is cervical degenerative disc disease (DDD). The cervical spine consists of seven cervical vertebrae which are separated from one another via intervertebral discs. The intervertebral disc consists of an inner "jelly-like" layer called the nucleus pulposus and a hard outer layer, the annulus fibrosus. The strong annulus fibrosus is made up of type I collagen fiber, and surrounds the soft nucleus

pulposus, which is made up of about 70-90% water. [5-6] The intervertebral discs act as shock absorbers when a compressive force acts on the vertebrae. When there is pressure on the vertebrae, the hydrated disc attains enough fluid pressure to absorb the impact of the force and prevent the vertebrae from coming into contact with each other.[6] Unfortunately, as people age the disc becomes less flexible as it loses some of its water content and thus, the hydrostatic pressure inside the disc decreases. This limits the discs' ability to absorb the impact of the compressive forces, which causes more of the load of the forces to be distributed around the periphery.[6] It was found that close to 95% of people over the age of 65 experience cervical DDD with or without symptoms[7]; however, it is not always caused as a result of aging. It may also occur from trauma or other gradual changes. Since cervical discs have no blood supply and have very limited nerve endings they are less likely to repair themselves over time.[8]

There are many interventions that may be utilized to treat neck pain; one intervention includes mechanical traction. Mechanical traction is an intervention commonly used by physical therapists in attempt to decrease neck pain and improve patient outcomes; however, there is little current research supporting or refuting the effectiveness of the use of mechanical traction for neck pain. There is less research comparing the different types of traction and which is the most beneficial.[9] The theory behind traction is that it separates the space between the vertebrae, which decompresses the discs, thereby relieving pain and promoting healing.[10] Traction may also be used to relax muscles, stretch soft tissue, and mobilize joints.[11]

Hoy et al found that the individuals most affected by neck pain include those employed in an office setting, women, and those who live in an urban area or in a high-

income country.[1] This case report will focus on the treatment of a female patient who resides in a high-income country and works in an office setting environment. This case study explores the use of mechanical traction as one of the interventions utilized in the treatment of neck, shoulder, and temporomandibular joint (TMJ) pain. Despite the limited evidence supporting mechanical traction, the patient reported successful reduction of her previous neck symptoms with this treatment intervention. Therefore, the purpose of this case report is to discuss the effectiveness of using mechanical traction in one patient with a recurring incidence of neck, shoulder, and TMJ pain.

CHAPTER II

CASE DESCRIPTION

PATIENT DESCRIPTION

A self-referred 40 year old Caucasian female presented to physical therapy with complaints of neck, shoulder, and TMJ pain for the past eight months, following a whiplash incident in which the patient stated her neck "quickly went back into extension." It should be noted that this was the second time the patient had experienced this type of pain. Similar symptoms presented with an insidious onset approximately two years prior. She reported that the pain intensity limited her ability to close her jaw. She was evaluated by a physician for her neck and jaw pain and was informed she did not have a TMJ dysfunction, rather, the TMJ became restricted due to straining of her cervical muscles. Magnetic resonance imaging was performed on the patient, which revealed cervical degenerative disc disease. The patient was unaware of the affected levels. The physician informed her that her cervical spine was "too straight" and that it should be slightly curved. When the cervical spine has a decreased lordosis, or is "too straight," there is a misalignment of the vertebrae that occurs. This misalignment can cause an increased compression on the intervertebral discs and may lead to degeneration of these discs.[6]

In attempts to decrease her pain, the patient received chiropractic and massage therapy treatment with minimal to no symptom reduction noted. Physical therapy treatment was also received with no initial change of symptoms; however, following months of physical therapy interventions mechanical traction was utilized. The patient reported her symptoms abolished following a few treatment sessions of mechanical traction. She maintained her pain free status for two years, until her recent episode of care which began approximately eight months ago. She stated the pain and tightness would sometimes be so severe she would have difficulty breathing and sleeping. At the initial visit the patient rated her current pain equal to 4/10 on a 0-10 pain scale and said it would elevate to 9/10 at its worst. The patient consumed Aleve as needed for pain relief during the day and/or prior to sleeping. She worked as an attorney and would spend much of her day seated at her computer in her office. Her job required frequent traveling, particularly by car or airplane, which elevated her symptoms secondary to extended periods of sitting. Previously she had no difficulties with traveling. Her work production reduced due to her increased symptoms, which at times caused her to miss work. Prior to this episode of care she was able to work eight hours or more per day, symptom free. The patient was able to, but currently cannot, complete activities of daily living independently, secondary to neck, shoulder, and TMJ symptoms. Her other medical history was unremarkable.

EXAMINATION, EVALUATION AND DIAGNOSIS

The patient's posture was observed in the seated position. She had a forward head with decreased cervical lordosis. A forward head posture (FHP) places excessive force on structures of the cervical spine.[12] When viewing someone's posture from the

side, the earlobe should be in line with the tip of the shoulder (acromion process).[12] For every inch the head moves forward from the center of gravity, there is a force increase of approximately 10 pounds on cervical structures.[12] A FHP may also place tension on the suprahyoid and infrahyoid muscles.[12] This tension could cause the mandible to be pulled inferiorly and posteriorly, thereby altering the position of the mandibular condyle in the TMJ.[12] This malpositioning of the mandible could explain why the patient was experiencing pain in her TMJ. Perri et al studied the relationship between extended computer use and TMJ disorders. 92 individuals completed an online survey with questions regarding medical history, computer use, pain symptoms, lifestyles and moods. The majority of pain reported by those in the study included neck (73/89 [82%]) and shoulder (67/89 [75%]), with almost half having reported TMJ disorder symptoms (40/91 [44%]).[13] There was a strong correlation between the duration of computer use and the duration of pain, and more notably a strong correlation between the duration of computer use with symptoms of TMJ disorder and the duration of pain. Regression analyses were performed and the intercept was found to be close to zero years, suggesting pain and computer use began around the same time. The patient's extensive use of a computer required by her job likely influenced the pain she experienced in her neck, arm and jaw.[13]

The patient's cervical and upper extremity range of motion (ROM) was assessed. Cervical spine active range of motion (AROM) was performed with the patient seated, feet flat on the floor, and good postural alignment. Cervical flexion and extension AROM were within normal limits (WNL) with aberrant movement noted. Bilateral cervical rotations equaled WNL and pain free. Left lateral cervical flexion equaled 15° and right equaled 10° with pain noted throughout both motions. See Table 1. Cervical

passive range of motion (PROM) was assessed in the supine position with her head relaxed off of the plinth and supported by the therapist. All cervical PROM were full and pain free. Her bilateral upper extremity AROM and strength were assessed with the patient in a standing position. Her upper extremity AROM equaled within normal limits; however, pain was present along the vertebral border of the right scapular during right shoulder flexion and abduction movements. See Table 2. Upper extremity strength was assessed via manual muscle testing. The patient was asked to hold a position against therapist pressure for five seconds. Shoulder flexion was tested with the patient's shoulder flexed to 90° with full elbow extension.[14] Shoulder abduction was assessed with the patient's shoulder abducted to 90° with full elbow extension.[14] Shoulder internal and external rotation strength were assessed with the patient's shoulder in neutral position with elbow flexed to 90°.[14] Her strength equaled normal (5/5) bilaterally, however, pain was noted along the right scapula vertebral border during right shoulder flexion, abduction, and external rotation resistance.

Table 1. Approximate Range of Motion for Cervical Spine

Cervical Motion	Approximate Range (in degrees)
Flexion	45-50
Extension	85
Lateral Flexion	About 40
Rotation	90

(From McGee DJ: Orthopedic Physical Assessment, p. 147, St. Louis, 2008, Saunders Elsevier)

Table 2. Approximate Range of Motion for Shoulder

Shoulder Motion	Approximate Range (in degrees)
Flexion	160-180
Extension	50-60
Abduction	170-180
External Rotation	80-90
Internal Rotation	60-100

(From McGee DJ: Orthopedic Physical Assessment, p. 247, St. Louis, 2008, Saunders Elsevier

The Vertebral Artery Test (VAT) was performed bilaterally with the patient supine. The patient's eyes were opened with her head off the plinth and supported by the therapist's hands. The therapist fully extended, laterally flexed, and rotated the patient's neck to one side and held for 30 seconds. Any reports or observations of dizziness, nausea, diplopia, drop attack, dysarthria, nystagmus, disorientation, or slurred speech would be reported as a positive test indicating vertebral artery compromise.[12] The results of the VAT were negative. The sensitivity and specificity levels of this test as reported by McGee are 0% and 67%, respectively.[12]

The foraminal compression, or Spurling's test, was performed with the patient in a seated position. Spurling's test has a sensitivity of 77% and a specificity of 92%, as reported by McGee.[12] The Spurling's test involves laterally flexing the patient's head to one side while pressing downward on the patient's head. A positive test is reported when there is a reproduction of the patient's symptoms into the upper extremity to which the head is tilted, and is indicative of nerve root compression.[13] During bilateral testing the patient reported an onset of pain into her right shoulder and scapula when her head was laterally flexed to the right, indicating a positive test on the right. The test did not reproduce symptoms when performed on the left indicating a negative test.

The patient had a positive foraminal compression test, so a cervical distraction special test (k=.88)[12] was performed to determine if the patient may benefit from cervical traction. This was performed with the patient seated comfortably in a chair. The therapist cupped the side of the patient's head and provided a slow, upward force. [12] This provided relief of patient's symptoms indicating a positive test, which is suggestive of nerve root compression.[12]

The patient's cervical spine and back musculature were palpated. She reported tenderness over her bilateral upper trapezius muscles and along the right medial border of her scapula. Increased muscle tone of her right upper trapezius was apparent with palpation. In addition, there were three significant active trigger points located along the medial border of her right scapula.

After evaluating the data gathered during the examination it was determined that the patient's signs and symptoms were consistent with the diagnosis of cervical DDD with nerve root involvement. Her impairment produced increased pain, decreased range of motion, and decreased function. These impairments directly impacted her work productivity, ADL's, sleeping, and at times eating and breathing. The patient's diagnosis fits into the American Physical Therapy Association's (APTA) Guide to Physical Therapist Practice Pattern 4F: Impaired Joint Mobility, Motor Function, Muscle Performance, Range of Motion, and Reflex Integrity Associated with Spinal Disorders, ICD-9 code 722.4-degeneration of cervical intervertebral disk.[15]

PROGNOSIS AND PLAN OF CARE

The prognosis as stated by the APTA Guide to Physical Therapist Practice Pattern 4F: "Over the course of 1 to 6 months, patient/client will demonstrate optimal joint mobility, motor function, muscle performance, range of motion, and reflex integrity and the highest level of functioning in home, work (job/school/play), community, and leisure environments"[15] (p. 221). The expected range of number of visits per episode of care for this practice pattern is 8-24. However, "this range represents the lower and upper limits of the number of physical therapist visits required to achieve anticipated goals and expected outcomes. *It is anticipated that 80% of patients/clients who are classified into*

this pattern will achieve the anticipated goals and expected outcomes within 8 to 24 visits during a single continuous episode of care. Frequency of visits and duration of the episode of care should be determined by the physical therapist to maximize effectiveness of care and efficiency of service delivery"[15] (p. 221).

The estimated length of time for recovery for this patient was determined to be four weeks. Factors contributing to this timeline were the patient's motivation, excellent success with previous mechanical traction for similar problems two years prior, adequate finances to cover the costs of treatment, and she was in good health overall.

The short term goals established for the patient were to decrease pain to a minimum of 1/10 on a 0-10 pain scale to allow jaw movement without restrictions to allow for eating; achieve full and pain free AROM of right upper extremity to allow for reaching above the head and behind the back to allow for dressing and grooming; and to demonstrate proper seated posture with no cues to allow for extended periods of sitting for up to two hours in order to travel for work. Short term goals were to be achieved in two weeks. The long term goals to be achieved in 4 weeks were to decrease pain to 0/10 to allow patient to lay down for a minimum of 6 hours in order to allow sleeping through the night uninterrupted by pain and to achieve full and pain free cervical AROM to be able to perform work-specific duties to allow patient to return to a full time workload. To achieve these goals, a plan of care was developed with the patient that included physical therapy treatment two times per week for four weeks. Treatment included stretching, strengthening, modalities, soft tissue mobilization (STM), manual and mechanical traction, instruction in a home exercise program (HEP), and continued patient education. It was determined that the patient would be discharged from physical therapy upon goals

being achieved. The goals would be evaluated at each visit to determine if they were still appropriate for the patient and would be adapted if necessary. Changes to the plan of care would have occurred if the patient's condition were to have worsened or plateaued over time. The patient would have been referred to a physician if medically necessary or appropriate.

CHAPTER III

INTERVENTIONS

After the initial evaluation was performed, interventions for therapy were discussed with the patient. Moist heat was applied to the patient's upper back and neck with the patient in a supine position for 20 minutes. This was followed by massage to these areas with the patient seated. Heat and massage were applied to reduce muscle spasms, release trigger points, and decrease her pain. The patient was instructed in a HEP, which included bilateral upper trapezius stretching performed three repetitions with 15 second holds, ten repetitions of cervical retractions, and ten repetitions of cervical extensions. Proper posture was only briefly discussed with the patient due to time constraints. Posture is very important in this patient's care, it should have been discussed first and in greater detail. Correct posture is essential because it is the position in which there is minimal stress on a majority of the joints of the body.[12]

The second physical therapy visit began with moist heat being applied to the patient's neck and upper back followed by STM. The patient performed five bilateral upper trapezius stretches with 15 second holds each, followed by ten repetitions of cervical retractions and cervical extensions exercises. It was suggested that the patient perform her stretches and exercises whenever she had increased pain. Education consisted of reviewing proper ergonomics for the office and workplace. She was encouraged to position her computer monitor closer in order to reduce forward head

posture. She was also advised to adjust her keyboard and mouse placement to a comfortable distance from her body. To improve posture awareness the patient was asked to imitate proper standing and seated posture following the therapist's demonstration. Finally, static mechanical traction was initiated at ten pounds of force for ten minutes with the patient supine. There is no current evidence that clearly supports or refutes the use of traction.[16]

The stretches, exercises, moist heat, and massage utilized during the patient's third, fourth, and fifth physical therapy sessions were all performed in similar ways as previously discussed. Work setting modifications were reviewed with the patient during her third physical therapy session and proper posture was reviewed during the third, fourth, and fifth sessions. Recommendations for positioning during travel and pillow modification were discussed with the patient on her fourth visit. She was instructed to move her seat closer to the steering wheel to avoid excessive reaching with her upper extremities while driving. The patient was also educated to use a smaller pillow while sleeping on her back as compared to a thicker pillow while sleeping on her side in order to allow a more neutral alignment of her spine.

Table 3 provides an overview of the settings for the application of traction throughout the patient's care. A study found no significant differences in terms of outcomes between static, intermittent, and manual traction, however, intermittent traction had better results in terms of pain and mobility outcomes than no traction at all.[17] Because the patient had previous success with mechanical traction and her symptoms were similar to her previous neck pain, it was decided that traction would be used again as an intervention, despite the limited supportive research on traction.

Table 3. Mechanical Traction Settings

Visit	**Type**	**Force** (in pounds)	**Hold Time** (in seconds)	**Release Time** (in seconds)	**Total Time** (in minutes)
2	Static	10	---	---	15
3	Intermittent	13	15	5	10
4	Intermittent	13	15	5	15
5	Intermittent	15	15	5	15

CHAPTER IV

OUTCOMES

The patient was seen for five sessions over the course of 15 days. The patient had met all of her goals by the final visit. Again, the goals were to decrease pain to a minimum of 1/10 on a 0-10 pain scale to be able to be able to comfortably sleep and eat, achieve full and pain free cervical and right upper extremity AROM to be able to return to work full time, and centralize pain to neck to be able to complete ADL's.

During the initial visit the patient reported her pain level at 4/10 on a 10 point scale and by the end of the session she was already feeling more relaxed. Her pain decreased to a 3/10 by the beginning of her second visit and further decreased to 2/10 by the end of the visit. She states feeling as if "her jaw was starting to go back into place." The patient had no pain at her third visit, but did say there was one incident at work where her pain level reached a 7/10. She did not say a specific event triggered the incident. At the end of the visit she remained pain free and said it felt like her jaw was completely back in place. The patient was still pain free at her fourth session and fifth sessions and was able to independently perform her HEP. During the fifth session she stated being able to work with no increase in pain; she even reported that she thought about cancelling her final visit because of how much better she was feeling. ROM and strength of the cervical spine and upper extremities were also reassessed. All motions

were within normal limits and pain free. Tables 1 and 2 list normal cervical and shoulder ROM, respectively, as reported in McGee.[12] The patient was able to demonstrate proper posture without cues, but admitted that she did not always follow this positioning.

Because the patient had met her goals for therapy and even over-achieved them, it was determined the patient would be discharged from physical therapy with instruction to continually work towards proper posture through the education given as well as continue her HEP. The patient was satisfied with her results and felt confident about being discharged. She was instructed to call or return to the physical therapy department if she had any questions.

CHAPTER V

DISCUSSION

The use of mechanical traction appears to have decreased the patient's neck, shoulder and TMJ symptoms. However, other interventions including exercise, stretching, postural education and STM were utilized making it difficult to demonstrate significant cervical traction effectiveness.

Patients with cervical DDD present with the intervertebral disc losing water content, decreasing its ability to act as a shock absorber.[18] This may cause the nucleus pulposus to collapse and the intervertebral disc spaces to lessen.[18] One reason mechanical traction may have improved the patient's symptoms is because it separates the space between the vertebrae, which decompresses the discs, promoting healing and pain relief.[10] Another reason mechanical traction may have decreased the patient's symptoms is because it can stretch soft tissue and relax muscles.[11] The patient had a FHP which could explain the tight muscles in her upper back. Mechanical traction may have helped relax these muscles and decrease the patient's pain; however, STM, exercise, stretching, and postural education may have also assisted in symptom relief.

Mechanical traction may have assisted in improving the patient's symptoms as evidenced by her previous episodes and current episode of care outcome measurements. Because traction was used in combination with other interventions it cannot be implied

that it was mechanical traction alone that improved her symptoms, although it appears to have contributed to her success.

Reflective Practice

The patient had excellent outcomes and achieved her goals in a timely manner, therefore minimal aspects would change in regards to the delivery of physical therapy services. However, educating the patient on posture before beginning other interventions at her initial visit may have been a significant benefit since posture was a very important piece in the patient's care. Also, a functional assessment could have been utilized to provide a better subjective and functional piece in the patient's episode of care. One assessment that would have been appropriate for the patient is the Neck Disability Index (NDI). The NDI determines the extent neck pain affects one's ability to manage everyday activities.[19] It has good test retest reliability ($r=0.89$)[12] and validity ($\alpha=0.80$).[12]

Because of the limited research on the effectiveness of mechanical traction, it may not be utilized initially on patients with complaints of neck pain unless they have had previous success. However, until research proves there is no effectiveness of mechanical traction it should not be completely ruled out.

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