2013

Is Mechanical Traction a Safe and Effective Treatment for Patients with Chronic Neck Pain?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania

December 14, 2012

Abstract

Objective: The objective of this selective EBM review is to determine whether or not mechanical traction is a safe and effective treatment for patients with chronic neck pain.

Study Design: Review of three English-language randomized clinical trials (RCTs) published in 2008, 2009, and 2011.

Data Sources: Two double-blind randomized clinical trials and one single-blind randomized clinical trial were found using PubMed.

Outcomes Measured: Decrease in neck pain was measured through subjective pain rating scales performed prior to and after treatment of both those receiving mechanical traction and those not receiving mechanical traction.

Results: While patients reported a decrease in pain, the results were not significant for mechanical traction to effectively treat chronic neck pain.

Conclusions: The results of the randomized clinical trials demonstrate that mechanical traction is a safe treatment but does not provide significant differences in treating chronic neck pain.

Key Words: neck pain, cervical pain, traction, mechanical traction

INTRODUCTION

Chronic neck pain is a debilitating condition that may greatly affect quality of life. Neck pain can affect mobility and range of motion and may also lead to migraines, radiating arm pain, sensory deficits, and tingling and numbness in extremities. Chronic neck pain can be addressed through a variety of interventions but there is little evidence on the best nonoperative therapy for this condition.[1] Mechanical traction may provide a less invasive and more cost-effective treatment to reduce pain in patients. This paper assesses three randomized clinical trials (RCTs) evaluating the effectiveness and safety of mechanical traction as a treatment intervention for chronic neck pain.

Neck pain is very common and accounts for 15% of all soft tissue problems.[2] Fourteen percent of the general population experience neck pain symptoms for longer than six months.[3] The exact cost of chronic neck pain for patients and the health care system is unknown; however, chronic pain results in repeated visits to physical therapy and primary care providers, as well as the cost of sick leave and inpatient hospitalizations due to surgery, which influences health care costs and impacts the economy.[2] While an exact number of healthcare visits each year for patients with this condition has not been identified, 26% to 71% of the adult population experience a single episode of neck pain or stiffness in their lifetime and chronic patients consume an increased number of the health care visits.[2] Over 50% of patients with neck pain are referred for repeated visits of physical therapy.[4]

There are many possible etiologies for chronic neck pain, including herniated discs, traumatic whiplash injuries, sprains or strains, cancers, neurologic causes such as nerve compression, and infectious diseases such as meningitis, tuberculosis, osteomyelitis, fibromyalgia, and polymyalgic rheumatic. Chronic neck pain can also include symptoms of

upper-extremity pain, paresthesia, numbness or weakness, and headaches.[5] Typical treatment methods for this condition include disc replacement surgeries, manipulation/manual therapy, cortisone injections, pain medication, exercise and stretching activities, and heat treatment. The exact form of treatment is dependent on the etiology and nature of the neck pain, and all methods may not be recommended to every patient.

While some of the standard treatments, such as exercise and heat treatment, are non-invasive, ongoing therapies and interventions such as surgeries, injections and medication can be costly both financially and physically, requiring extensive recovery and often not guaranteeing an improved range of motion or decreased symptoms of pain. Mechanical traction has been shown to decrease pain by causing a number of physiological effects, such as decreased pressure on intervertebral discs, nerve roots, neural tissue, and blood vessels. The ligaments are stretched which thus leads to a release of muscle tension, stimulation of mechanoreceptors, and increased blood circulation.[2, 3] With the patient lying on their back, a head halter is placed under the back of the head and attached to a machine set for a specific weight for the pulling action to occur, in effect stretching the neck. [6] Some patients may also receive a mechanical weight and pulley system to apply the therapy at home. This method of treatment is also less invasive, expensive, and permanent than surgical interventions.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not mechanical traction is a safe and effective treatment for patients with chronic neck pain.

METHODS

Specific selection criteria of three randomized clinical trials (RCTs) were used for this review. The population chosen was patients (both men and women) ages 18-70 years who were

experiencing chronic neck pain. The intervention used in each RCT was mechanical traction. Comparisons were made between the treatment group receiving mechanical traction to the control group receiving a combination of other interventions such as exercise, manual therapy, and infrared irradiation. All of the studies included several outcomes but for the purpose of this review the outcome measured was a decrease in neck pain in order to focus on patient oriented evidence that matters (POEMs).

Key words used in the searches for these RCTs include neck pain, cervical pain, traction, and mechanical traction. All articles were published in peer-reviewed journals and in the English language. The author researched the studies through PubMed and selected the articles based on their relevance to the clinical question and if they included POEMs. Inclusion criteria included studies that were randomized clinical trials published after 1996 with POEMs. Exclusion criteria included studies published before 1996, studies with patients younger than 18 years old, and studies that did not include mechanical traction as an intervention. The statistics used in these studies were mean scores of pain rating scales and p-values. Table 1 shows the demographics and characteristics of the included studies.

Table 1: Demographics and Characteristics of included studies

Study	Type	# pts	Age (yr)	Inclusion Criteria	Exclusion Criteria	W/D	Intervention
Borman[1] 2008	RCT	42	18-65	Chronic cervical pain more than 6 weeks; neck pain without radiation to arm for more than 6 weeks	Patients with whiplash, traumatic injuries, or serious somatic diseases; received physiotherapeutic or manipulative treatment in past 3 months; evidence of an affected nerve	N/A	Therapeutic exercises, with or without mechanical traction.

					root; cervical spine surgery; diagnosis of radiculopathy; stenosis; metabolic systemic disorders; cancer		
Chiu[3] 2011	RCT	79	18-70	Chronic neck pain for 3 months or more; capable of reading Chinese for the questionnaire	History of injury to neck or upper back from T1 to T6; inflammatory conditions; previous neck surgery; history of malignancy; congenital abnormality of the spine; other musculoskeletal problems at the same time; receiving concurrent treatment; received training because of neck pain in past three months	39	Cervical traction
Young[4] 2009	RCT	81	18-70	Diagnosed with cervical radiculopathy; unilateral upper-extremity pain, paresthesia, or numbness; three or 4 tests of clinical prediction rule positive: spurling test; distraction test; upper-limb tension test 1; ipsilateral cervical rotation <60°	History of previous cervical or thoracic spine surgery; bilateral upper-extremity symptoms; signs or symptoms of upper motor neuron disease; medical “red flags”, cervical spine injections in the past 2 weeks.	12	Manual therapy, exercise, and sham traction (less or no traction)

OUTCOMES MEASURED

Outcomes measured was a decrease in neck pain based on pain rating scales performed prior to and after treatment of both those receiving mechanical traction and those not receiving mechanical traction. Each study utilized different rating scales and patient reports were collected by assessors who were blinded to the patients' group assignment. In the study by Borman et al, pain was recorded using a visual analog scale (VAS in millimeters). In the study by Chiu et al, neck pain was assessed by using the Verbal Numerical Pain Scale (VNPS), which measured the severity of pain along an 11-point scale. Patients rated their pain intensity along a scale of 0-10, with 0 being no pain and 10 being worst pain. In the study by Young et al, pain was measured by the Numeric Pain Rating Scale (NPRS), with scores from 0-10 where 0 equals no pain and 10 equals worst pain.

RESULTS

The three randomized clinical trials in this systematic review examined the effect of mechanical traction on chronic neck pain. The data from all three randomized controlled studies included in this review contained continuous data that could not be converted to dichotomous data. Therefore, the analysis of risk reduction (RRR), absolute risk reduction (ARR), and number needed to treat (NNT) could not be calculated. The researchers in all studies included multiple outcomes but for the purpose of this review the outcome measured was a decrease in neck pain through subjective pain rating scales.

In the study by Borman et al, forty-two patients completed the study over two weeks. Patients were recruited from an outpatient service of the Physical Medicine and Rehabilitation Department at a hospital in Turkey and were experiencing chronic neck pain, as defined by neck

pain for more than 6 weeks. Exclusion criteria for this trial included patients with whiplash traumatic injuries, serious somatic diseases, those receiving physiotherapeutic or manipulative treatment during the last 3 months, those showing evidence of an affected nerve root, patients who received cervical spine surgery, and patients with a diagnosis of radiculopathy. Patients were randomly assigned to one of two groups. Group 1 (n=21) received traditional physical therapy including a hot pack, ultrasound, and exercise program. Group 2 (n=21) received intermittent cervical traction, ten treatments in total over the two week period, in addition to the physical therapy modalities that Group 1 received. Both groups reported significant improvement in pain intensity but results found that intermittent traction therapy did not provide a significant difference in pain as compared to patient education or other more traditional physical therapy methods ($P<0.001$).

Table 2: Mean ± SD VAS scores before and after therapies

Treatment Group	VAS Before	VAS After
Group 1	7.05 ± 1.8	3.68 ± 2.1
Group 2	7 ± 2.21	3.9 ± 2.23

In the study by Chiu et al, seventy-nine patients from a hospital-based outpatient practice were recruited if they were between the ages of 18 and 70 years and were experiencing neck pain for more than three months. Patients were excluded if they were currently experiencing, or had ever experienced, a history of injury to neck or upper back, inflammatory conditions, previous surgery, a history of malignancy, or congenital abnormality of the spice. Exclusion criteria also included patients who were receiving concurrent treatment or who had received training because

of the neck pain in the last three months. Patients were randomized into either the traction group (n=40) or the control group (n=39) and they were assessed by the Verbal Numerical Pain Scale (VNPS) at baseline, at six weeks after the intervention was complete, and at a 12-week follow-up assessment. Patients in the traction group received intermittent cervical traction for 20 minutes, twice a week for six weeks. The control group received a placebo heat treatment of infrared irradiation for 20 minutes, twice a week for six weeks. Due to natural attrition, 23 patients dropped out of the control group and 16 patients dropped out of the intervention group, with 45 of the 79 patients selected still present at the 6-week assessment and 40 patients total remaining at the 12-week assessment. Results demonstrated that there was no significant difference between the control group and the traction group in VNPS scores and the researchers determined that six weeks of neck traction did not provide a significant difference in neck pain.

Table 3: Mean/SD values of pain scores on VNPS for control and traction groups

	Control: Baseline	Control: 6 weeks	Control: 12 weeks	Traction: Baseline	Traction: 6 weeks	Traction: 12 weeks
Pain (VNPS)	5.2/2.0	3.0/2.0	2.8/2.0	5.8/1.9	3.1/2.2	3.5/2.6

In the Young et al study, eighty-one patients were recruited from orthopedic physical therapy clinics in several states. Inclusion criteria included patients between 18 and 70 years old with reports of unilateral upper-extremity pain, paresthesia, or numbness, as well as 3 of 4 clinical prediction tests (Spurling test, distraction test, Upper-Limb Tension Test 1, and ipsilateral cervical rotation <60 degrees) rule positive. Exclusion criteria were a history of previous cervical or thoracic spine surgery, bilateral upper-extremity symptoms, signs or

symptoms of upper motor neuron disease, medical “red flags” such as tumors, fractures, rheumatoid arthritis, osteoporosis, or prolonged steroid use, cervical spine steroid injections in the past two weeks, and current use of steroidal medication for radiculopathy symptoms. Patients were randomly assigned to the MTEX group or the MTEXTraction group. The MTEXTraction group received manual therapy, exercise, and intermittent cervical traction. The MTEX group received manual therapy, exercise, and sham intermittent cervical traction, wherein the difference was 5lbs or less of force applied, as opposed to 20lbs or 10% of the patient’s body weight for the MTEXTraction group. Patients were treated for an average of 7 visits over 4.2 weeks. Twelve patients (n=6 in each group) were lost to attrition between baseline and the 4-week follow-up. Results found a significant improvement in pain (P<.05) for patients regardless of group assignment but no significant interaction between pain and intermittent cervical traction, with the researchers concluding that traction yielded no additional benefit to a program of manual therapy and exercise.

Table 4: Adjusted Mean (SD) for each group with 95% CI

	MTEXTraction	MTEXT	*P*
NPRS at 2 weeks	4.2 (3.0)	5.2 (3.0)	.25
NPRS at 4 weeks	3.4 (3.1)	3.2 (3.4)	.33

DISCUSSION

This systematic review investigated three RCTs for the safety and effectiveness of mechanical traction as a treatment for chronic neck pain. All three studies demonstrated that

while mechanical traction is safe, no significant effects of traction over other treatments, such as physical therapy, heat treatment, or exercise therapy, were found.

Despite the lack of evidence supporting effectiveness, mechanical traction continues to be offered as a treatment option for those disabled by chronic neck pain, typically during the course of physical therapy. Contraindications include joint instability, when motion is contraindicated, tumors, pregnancy, osteoporosis, fracture, and acute pain or inflammatory responses.[7]

Among the RCTs included in this selective review, there were several limitations. None of the studies were longitudinal in nature and thus only measured a decrease in neck pain after receiving the treatment for six weeks or less. The patients in the Borman et al study only received the therapies for two weeks and the study had a small sample size of 42 patients which may not be a sufficient representation of those with chronic neck pain. The Chiu et al. study also lost most of the patients due to attrition and results at the 12-week assessment are not representative of the entire sample. Additionally, patients were included in the studies based on a minimum amount of time experiencing neck pain but this time may have varied for every participant based on age and other factors. Those in the Chiu et al. study reported neck pain for at least three months, while those in the Borman study reported pain for at least six weeks and there was no inclusion criteria regarding length of pain in the Young study. Results in these studies may have been affected by the lack of uniformity regarding the definition of “chronic neck pain” and may neglect to examine how the specific onset of this pain may affect response to treatment.

CONCLUSIONS

As revealed by this review, mechanical traction is not an effective treatment for chronic neck pain. For many patients, a decrease in neck pain was reported, but not enough to prove statistical significance. The studies in this review included patients ages 18-70 years, and future

research should be performed on a sample of patients with a smaller, more specific age range (i.e. 20-29, 30-39, 40-49 years old, etc.) and a more uniform length of time experiencing chronic neck pain, as patients experiencing pain for 3 months may yield different results than those experiencing pain for 20 years. Each of these studies also had a small window of time for the intervention varying from 10 sessions over 2 weeks, to 24 sessions over 12 weeks, and 8 sessions over 4 weeks. I believe because of the magnitude of the injury, the number of sessions and/or the overall length of treatment should be tried on a longer standing of 1 year. Future research may also focus on mechanical traction as an intervention for patients at the first report of neck pain, prior to using any other nonoperative interventions. Examining this treatment method with a uniform population, such as military service members, may also yield significant results. Finally, future studies could also examine the efficacy of mechanical traction in combination with medications. Continuing research in this field ultimately will benefit those whose quality of life is greatly affected by chronic neck pain and resulting symptoms.

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