Whiplash-Associated Chronic Headache Treated With Home Cervical Traction

The subject of this case report was a 56-year-old woman who sustained a whiplash-associated disorder as a result of a motor vehicle accident. Within a few hours after the accident, she developed a headache, which became chronic, creating disability and hindering the quality of her life. In the following year, a variety of diagnostic tests, medications, and physical therapy were unsuccessful in determining the cause of her complaints or in relieving them. After this year, she expressed anger, frustration, and a reluctance to undergo additional physical therapy. By listening to her explain how she coped with her problem and observing that she lacked the ability to reduce her cervical lordosis, the therapist developed and implemented a home program of supine cervical traction and exercise. After 30 days of treatment, she was able to reduce and control her headache. This treatment and the approach used to develop the treatment may benefit other patients who have whiplash-associated chronic headache. [Olson VL. Whiplash-associated chronic headache treated with home cervical traction. Phys Ther. 1997;77:417-424.]

Key Words: Cervical spine, Cervical traction, Exercise, Headache, Home care, Pain, Whiplash injuries.

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The purpose of this case report is to describe a patient with a chronic whiplash-associated disorder and its treatment. Spitzer et al define a *whiplash-associated disorder* as resulting from the following:

Whiplash is the acceleration-deceleration mechanism of energy transfer to the neck. It may result from rear-end or side-impact motor vehicle collisions, but can also occur during diving or other mishaps. The impact may result in bony or soft tissue injuries (whiplash injury), which in turn may lead to a variety of chronic manifestations.\(^1\)

Some of the clinical manifestations of whiplash-associated disorder are neck pain, headache, visual disturbances, dizziness, limitation of neck motion, shoulder and arm pain, and temporomandibular joint pain.\(^2\) The most common complaints are of neck pain and headache.\(^2\)

The most common cause of whiplash-associated disorder is a motor vehicle accident.\(^1,2\) An approximate incidence in Western societies is 1 case for every 1,000 people in the population.\(^1,2\) About 75% of patients with this disorder will recover in 2 months or less.\(^2\) Whiplash-associated disorder is usually considered a benign condition, with most patients recovering regardless of the type of treatment provided.\(^2\)

**Chronic whiplash-associated disorder** occurs when symptoms last 6 months or longer postinjury.\(^1,2\) Twenty-five percent of patients with a whiplash-associated disorder develop chronic symptoms.\(^2\) The magnitude of the problem is great, with 0.25 cases of chronic pain for every 1,000 people in the population per year.\(^2\) Considering the fact that the average age range of persons with chronic whiplash-associated disorder is 20 to 30 years and that the average life span is 70 years, the cumulative effect over 40 to 50 years would be that at least 1% of the entire population will experience chronic pain due to a whiplash-associated disorder.\(^1,2\)

Various impairments related to whiplash-associated disorder have been reported to cause disability. Zygapophyseal joint injury\(^6\) and muscle injury\(^4\) have been thought of as the primary causes of patient complaints when more severe injuries have been ruled out.\(^1\) Unfortunately, no accepted standardized treatment is available for whiplash-associated disorder, regardless of the supposed causes of the patients’ complaints.\(^1\) The Quebec Task Force on Whiplash-Associated Disorders\(^1\) recommends early return to usual activities, with an emphasis on preventing chronicity.

**Case History**

The patient, aged 56 years, sustained a whiplash-associated disorder in a motor vehicle accident. Several hours after the accident, she developed a headache and vertigo with changes of head position. She indicated that the headache had waxed and waned but had been present continuously since the accident. She also sustained a bruise on her left leg and subsequently developed venous clots, which were managed with Coumadin® therapy.

Following the accident, she was evaluated in an emergency department for her cervical spine injury and was given Tylenol® with codeine, no. 3\(^3\), to be used as needed for pain. She was unable to recall the dosage. About 20 days later, she was evaluated with computerized tomography, and her scan was normal. Based on a neurologist's examination, he stated that her vertigo was a result of a vestibular concussion. The neurologist defined a vestibular concussion as a positive response to Bárány position testing.\(^5\) The test is performed by having the patient lie down. The clinician then abruptly extends and side bends the patient’s head 45 degrees. The clinician observes for nystagmus and complaints of ve...

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tigo. The test is repeated to the opposite side, and if the symptoms promptly reoccur, the peripheral vestibular mechanism is implicated. If the position testing had not been positive, a central cause of the patient's vertigo (eg, brain-stem ischemia, cerebellar injury) would have been suspected. The patient was assured that her vertigo would disappear within several weeks. She reported that 1 month after the accident, she had six physical therapy sessions consisting of hot packs, ultrasound, and massage, as requested by her family physician. She did not recall details about ultrasound (ie, power and duration). She reported that the treatment was ineffective and seemed to exacerbate her headache. She reported that her vertigo and headache would often increase during or shortly after the treatment. She did not have any lasting change in her headache.

The patient’s family physician referred her for 10 more physical therapy sessions beginning the second month after the accident. This physical therapy was provided at the same clinic and consisted of the same treatments with the addition of exercise, which consisted of shoulder shrugs, neck rolls, and neck extension. She was instructed to do these exercises several times a day. The results were the same as for the previous course of treatments.

Three months after the accident, the patient was referred to a different physical therapy clinic, one specializing in neck and back care. She continued to complain of headache beginning at the base of her occiput and progressing to her vertex. Her vertigo had disappeared by this time. Her therapy consisted of deep muscle massage (trigger-point therapy) and vigorous cervical flexion and extension and cervical rotation exercises using machines. The first exercise machine positioned the patient seated with stabilization of her trunk and head so that cervical spine flexion and extension was the only motion possible. Pads were placed against her forehead and occiput. The levers attached to the pads were attached to a pan of weights. The patient was instructed to flex and extend, lifting as much weight as possible until muscle fatigue occurred. Fatigue was determined to have occurred when her ability to lift was only 50% or less of her initial maximum isometric force. The second machine was similar to the first machine, but allowed only cervical rotation. The exercise instructions were the same for both machines.

She had 10 physical therapy treatments during the month, which were followed by 7 more sessions during the next month and 3 more sessions during the following month. She described the treatment as painful, causing her headache to increase during the exercise. The patient would go home and use Tylenol® to reduce what she said was her constant headache to a “tolerable level.” By this time, she had found Regular Strength Tylenol® (325 mg), six to eight tablets per day, to be the best medication for her to keep her headache at a tolerable level.

She had several visits with her family physician following this course of physical therapy. Amitriptyline was prescribed to be used as a sedative and to be taken as a small dose (10 mg) at bedtime. The rationale is that persons with chronic pain often have sleep disorders. Amitriptyline has been shown to promote improved sleep and reduce chronic pain. She used the amitriptyline for 6 weeks, with no change in her symptoms. The patient found Tylenol® to be the best medication to give her some relief from her headache.

She received a fourth course of physical therapy consisting of electromyographic biofeedback and relaxation exercises—two visits 9 months after the accident and two visits 10 months after the accident. Two muscles (frontals and upper trapezius) were used to determine the patient’s ability to relax. Her muscles did not show increased electromyographic activity at rest, and she learned very quickly to return her muscle activity to resting levels following repeated contractions. The therapist also provided the patient with an audio relaxation tape to be used at her discretion and instructed her in its use. The biofeedback did not relieve the patient’s headache, and the therapist suggested that she use overdoor home cervical traction. The therapist instructed her on one occasion to sit facing a door on which she had secured the traction bracket, put on the cervical halter so that she had minimal pull on the mandible, and attach a weight that was large enough to give relief of her headache. She was to use the traction as needed. She said that the traction relieved her headache, but that the headache came back when the traction was removed. The traction was difficult for her to use. She lived alone, and positioning the weight, adjusting the angle of the traction rope, and obtaining a consistent comfortable position of the head halter were difficult. She said that the constant traction could be tolerated for only 5 to 8 minutes because of increased headache or temporomandibular joint discomfort, or both. During the 5 to 8 minutes of traction, she could obtain headache relief provided that the halter was adjusted properly. Her headache would be relieved for 15 to 20 minutes following termination of the traction. The patient used the home traction only when her headache became so severe that she “would do anything for a few minutes of relief.”

Eleven months after the accident, the patient’s family physician referred her for a follow-up neurological evaluation by the same neurologist who she had seen previously. The findings of the evaluation were similar to
those at the time of the accident. The neurologist diagnosed her condition as a chronic pain syndrome of the head and neck. The recommendation was another trial of physical therapy.

One year after the accident, the patient arrived for her fourth physical therapy evaluation at a fourth physical therapy clinic. Her health insurance had preauthorized seven visits. She was apprehensive about "another course of physical therapy" and another physical therapist. When asked what she expected, she stated, "I don't know, but I must try something to get rid of this headache." She expressed anger about the constant headache and the previously ineffective treatments. Her headache was disabling, interfering with her concentration and interaction with people and limiting her physical activity. She commented, "I never had headaches before the accident. Now I can't do any yard work, only some of my housework, and I couldn't have Christmas at my house last year as my headache was so bad."

She was reluctant to undergo any type of passive movement or palpation examination. She stated, "I don't want to leave here with a worse headache." The examination consisted of listening to her story, asking questions, encouraging her to describe how she treated and lived with her condition, and observing her active cervical spine and shoulder motions. I often find that motion is asynchronous in patients with chronic conditions and that they have difficulty independently moving body segments. The patient was not able to flex her cervical spine independent from the associated scapular motion. Cervical rotation and flexion were measured linearly by having her stand with her scapulae and occiput touching a wall. This position eliminated shoulder and other extraneous movements in the patient's efforts to rotate and flex her cervical spine (Fig. 1). A 1-m ruler was placed perpendicular to the patient's head. She was asked to rotate first left and then right, and the distance from the tip of her nose to the wall was measured and recorded. Cervical spine rotation measured 17 cm to the right and 13 cm to the left, which indicated decreased rotation to the right. The greater the distance from the wall to the tip of her nose, the greater the limitation of cervical spine rotation. Cervical spine flexion was measured by placing a 10-cm ruler perpendicular to the sternal notch and asking the patient to flex as far as possible, keeping her mouth closed and her scapulae.
touching the wall. Cervical spine flexion was limited and measured 8 cm from chin to sternal notch. She was unable to reduce her cervical lordosis.

**Physical Therapy Plan**

The patient had not previously had a specific written home program. Therefore, working with her family physician, neurologist, and insurance carrier, the following program was implemented.

The first step was to ensure that her seven preauthorized physical therapy visits could be used within a 2-month time frame, as this amount of time was adequate to develop, implement, and monitor a home program. Her insurance carrier agreed. The next step was to obtain agreement from her family physician and her neurologist, and both agreed. An effort to keep all parties apprised of the treatment plan was important.

Because the patient stated that she “did not want to get worse,” the plan needed to be simple and limited in scope. She had a movement disorder of asymmetrical cervical rotation and an inability to reduce her cervical lordosis. She was instructed to rotate her head from side to side and to flex and extend her head while standing with a partially inflated beach ball placed between her forehead and a wall (Fig. 2). The partially inflated beach ball required less muscle effort than that required by a fully inflated beach ball to hold the ball against the wall. She did 6 to 12 repetitions of each exercise twice daily. Initially, the emphasis of the exercises was to teach spinal motion control. The beach ball gave the patient feedback regarding her head position throughout the flexion and rotation movements, as the ball required her to maintain her head over her cervical spine. If this posture was not maintained, the ball would fall to the floor. The ball required her to move her head on her cervical spine without accompanying motions of cervical extension (chin protrusion) or scapular elevation or protraction, particularly during cervical rotation. She was told to stop the exercise for that session if she believed that she was unable to control the motion. As her motion control improved, based on linear cervical motion measurements, observational analysis of her motion, and her improved ability to do 12 or more successive movement exercises, the ball was more fully inflated. Inflating the ball more fully required the patient to develop greater...
motion control, as increased force was needed to hold the ball between forehead and wall.

Traction had been the only treatment to give the patient relief from her headache. A possible reason for this relief was stretching of posterior cervical spine soft tissue and reduction of her cervical lordosis. Reduction of the cervical lordosis is a reported result of cervical traction.

To overcome the problems of overdoor cervical traction, lack of control of force, inappropriate force through the chin strap, and difficulty with the head halter adjustment, a Saunders Cervical HomeTrac™ traction unit was selected (Fig. 3). The Saunders Cervical HomeTrac™ allows the patient to control the amount of traction force with a pneumatic pump. The force is released with a push of a button, permitting the patient to give constant or intermittent traction. The device is designed so that there is no force through the mandible, eliminating the problem of temporomandibular joint pain. In addition, the Saunders Cervical HomeTrac™ is applied with the patient positioned supine (Fig. 4), which is reported to be more effective than sitting traction for cervical disorders.

I attempted to develop a self-management program for the patient to use to control and reduce the intensity of her headache. This program would allow her to do yard work, such as raking, and to entertain family and friends in her home. The time frame she and I agreed on to achieve these results was 2 months.

Prior to beginning the program, the patient recorded a week of baseline data consisting of headache intensity based on a scale of 0 (no headache) to 10 (incapacitating headache) and amount of Tylenol® used each day (Fig. 5). She was instructed to record her headache intensity two times per day. She was provided with a recording form indicating the date, time of day, head-
ache intensity, and number of Tylenol® tablets used. Her cervical rotation and flexion linear measurements also served as baseline data.

She was instructed in the use of the traction unit. The HomeTrac™ is supplied with written and videotape instructions (Fig. 3B), which she also reviewed. Her program was written (Appendix 1). She applied intermittent traction of 9.1 kg (20 lb) of force for the first 12 days. She continued with intermittent traction but increased the force to 11.3 to 13.6 kg (25–30 lb) for the remainder of the treatment time. She was required to keep a daily record of her treatments and was provided with a supply of recording forms (Appendix 2). Each recording form had places for 7 days of data. Each day, she recorded the date, time of day, headache index, traction force, time the traction was applied, medication (Tylenol®) used, and number of exercise repetitions.

Outcome
Following 30 days of home traction and beach-ball exercises, the patient’s headache intensity had decreased from 10 to 2 on the headache index, and her Tylenol® usage had decreased from 8 to 2 tablets a day (Fig. 5). Her cervical spine rotation changed from 17 cm on the right side and 13 cm on the left side to 15 cm on both sides, and her flexion changed from 8 cm to 3 cm from chin to sternal notch. Symmetry of cervical rotation and elimination of chin protrusion and scapular elevation during cervical motions were accomplished.

The traction was discontinued because the patient believed that she could control her headache with her cervical spine exercises. She was able to do active cervical spine motion exercise without using the beach ball as a guide. At 1 week after discontinuing traction, she reported continued relief from her headache, stating, “I am able to have control over my life” (Fig. 5). Six of the seven preauthorized physical therapy visits were used to develop, implement, and monitor her home program. She achieved the goals of headache control and the ability to entertain family and friends in her home.

Discussion
This case is not unique from the standpoint of chronic pain resulting from a whiplash-associated disorder. Twenty-five percent of these disorders result in chronic conditions. What is unique is the specificity of the patient’s complaints of headache and cervical spine movement disorder. She had an inability to reduce her cervical lordosis, limiting her ability to flex and rotate her cervical spine. She held her cervical spine in extension, presumably resulting in shortened posterior tissues and lengthened anterior tissues. This relationship has been described by Braaf and Rosner in a general population of patients with idiopathic headache. To restore their patients’ cervical spine flexion and rotation, they used supine cervical traction and exercise, resulting in headache alleviation in approximately 60% of the cases. This case demonstrates that offering patients control over their therapy, along with professional guidance, can prove to be successful for patients with chronic whiplash-associated disorders. The tissue from which the patient’s headache originated could be debated (zygapophyseal joints or muscle); however, her treatment was designed to restore symmetrical cervical motion and to allow her to control her headache. The use of supine home cervical traction and controlled exercise appears to have allowed her to restore her ability to reduce her cervical lordosis, resulting in control of her headache and improvement in her quality of life.
References

Appendix 1.
Home Program of Cervical Traction for Headache Treatment
Apply cervical traction two times each day as follows:
1. Lie supine in the traction device and rest quietly for 3 minutes.
2. Apply traction so that you have a comfortable, firm pull (usually a minimum of 9.07 kg [20 lb] to a maximum of 18.1 kg [40 lb]).
3. You may elect to have continuous traction for 15 minutes or intermittent traction by releasing the pull every 5 minutes, resting for 1 minute, and recaking the traction for 5 minutes, for a total of 15 minutes. Be sure to record the type of traction you used.
4. Following the 15 minutes of traction, release the traction and rest for 2 minutes.
Following each traction treatment, perform your cervical exercises using the beach ball.
Record your daily treatment on the recording form.

Appendix 2.
Cervical Traction/Headache Scale Recording Form

<table>
<thead>
<tr>
<th>Date</th>
<th>Time of Day</th>
<th>Headache Index</th>
<th>Traction No.</th>
<th>Traction Time</th>
<th>Medications Used</th>
<th>Exercise</th>
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