CERVICAL CURVE RESTORATION AND FORWARD HEAD POSTURE REDUCTION FOR THE TREATMENT OF MECHANICAL THORACIC PAIN USING THE PETTIBON CORRECTIVE AND REHABILITATIVE PROCEDURES

MARK MORNINGSTAR^A

^ASubmit requests for reprints to: Mark Morningstar, 2393 Wildwood Circle, Grand Blanc, MI 48439. Paper submitted May 7, 2002.

ABSTRACT

Objective: To demonstrate the benefits of reducing forward head posture and restoring the cervical lordosis as a novel approach to treating a patient with mechanical thoracic pain.

Clinical Features: The patient had thoracolumbar junction pain bilaterally that failed to respond to previous sessions of spinal manipulative therapy. Treatment included both manipulative and rehabilitative procedures designed to correct the forward head posture and cervical kyphosis. Treatment progress was quantified on pre and post lateral cervical radiographs.

Intervention and Outcome: The treatment plan was 30 sessions over an 8-week period that included spinal manipulative therapy, used in concert with a new headweight device applied immediately after the manipulation was performed at each session. The patient was also instructed on the performance of certain rehabilitative procedures to be performed in the home setting. The patient experienced significant symptomatic relief after the 3rd week of care. The cervical lordosis was restored by 144% and the forward head posture was decreased by 56% at the end of the trial period.

Conclusion: Restoration of the cervical curve and reduction of forward head posture appears to have beneficial effects beyond the cervical spine. The addition of active rehabilitative procedures seems to enhance the effectiveness of spinal manipulative therapy in the correction of forward head posture and cervical kyphosis. (J Chiropr Med 2002;1:113–115)

KEY INDEXING TERMS: Cervical Lordosis; Kyphosis; Headweight; Rehabilitation

INTRODUCTION

Chiropractic research (1) has illustrated the importance of the natural contours of the spinal column. The curves of the spine allow for specific biomechanical functions. These curves promote a balance between both flexibility and strength. They serve as lever-arm attachments for the spinal musculature, and transmit forces through the body to decrease the chance of injury to a focal area. The thoracic curve is the primary curve, with the cervical and lumbar curves being secondary. However, some authors (2) consider the cervical curve to be a primary curve due to evidence of its development *in utero*. (3) Loss of the cervical curve has been considered a significant factor in certain conditions such as mechanical neck pain (4,5) and headaches. (6,7)

Forward head posture (FHP) is a clinical finding that has been shown to be associated with several disease processes, such as spinal degeneration², headaches, (6,7) TMJ Syndrome, (8) loss of proper bowel function, (8) and reduced vital capacity. (8) It is a condition where the skull is carried anterior to the body's center of gravity, thereby putting increased stress on the posterior musculature of the entire spine, especially in the cervical spine.

The purpose of this report was to determine whether or not the presence of both the loss of cervical curve and FHP was an associative factor in the development of chronic recurrent mechanical thoracic pain in an otherwise apparently healthy, 21-year-old male.

CASE REPORT

A 21-year-old male was referred to the Palmer College of Chiropractic outpatient clinic with a chief complaint of lower thoracic pain. A thorough case history and physical examination eliminated any physiological or visceral involvement associated with the thoracic pain. Upon posture analysis, it was noted that the patient had uneven shoulders and hips. There was also apparent evidence of FHP when viewing the patient from the

side. However, the correlations between surface measurements of FHP and radiological findings of FHP have been shown to be inaccurate. (9,10)

A radiographic study was ordered based upon the postural exam findings, and a 2-view series was taken. The series included anteroposterior and lateral cervical views. Both views were taken with the patient seated and according to the protocol outlined by Pettibon. (11) Radiographic line analysis was performed on the lateral cervical x-ray. This included a cervical curve measurement by drawing a line off of the posterior vertebral body margins of the 2nd and 7th cervical vertebrae (C2, C7). According to Kapandji, the normal cervical curve should measure 45 degrees from C2-C7. (12) The FHP was measured by constructing a vertical gravity line representing the center mass of the skull as outlined by Kapandji. (12) This line should normally intersect the anterior portion of the 4th cervical intervertebral disc. (12) The distance between the gravity line and the anterior margin of the 4th cervical intervertebral disc is measured in inches. For every one inch the gravity line is anterior, 10 lbs of apparent head weight is added. (13) The normal apparent head weight is about 10 lbs. The line analysis revealed a 164% (3-degree kyphosis and 20-degree lordosis) loss of the cervical curve (a 0 degree curve would equal a 100% loss) and 2.25 inches of forward head posture, which equates to 32.5lbs of apparent head weight. The Palmer College Radiology Report stated that the cervical spine was "marginally kyphotic" with "intersegmental hypomobility" at the 3rd, 4th, and 5th cervical vertebral levels, and "moderate anterior weight bearing." (14) A Borg scale was used to approximate the intensity of the patient's thoracic pain on a 1 to 10 rating system. Initially, the patient rated the pain as a 6 out of 10.

A management plan was designed with the goal of correcting the cervical curve and reducing or eliminating the FHP. The frequency of care was 5 visits per week for 3 weeks, then 3 times per week for the next 5 weeks, for a total of 8 weeks or 30 visits. The treatment plan consisted of both adjusting and rehabilitative procedures. The adjusting procedures included a -Z axis drop adjustment, a percussive adjusting instrument used to mobilize all the cervical spinal joints individually, a Y axis traction adjustment applied bilaterally to the cervical spine, and an anterior thoracic adjustment used to mobilize the cervicothoracic spinal junction, (15) The rehabilitative procedures included manual cervical traction with an assistive traction apparatus, supine positional spinal traction using high-density foam blocks, and headweighting using a headweight device designed by Pettibon. (16) All of the adjustments were

performed at each visit, except the -Z axis adjustment, which was discontinued after the first 3 weeks or 15 visits. The headweighting procedure was the only rehabilitation used during each visit, immediately after completion of all the adjustive procedures. The headweight was worn on the front of the patient's forehead for 15 minutes immediately following the adjustments. Initially, 4 lbs was inserted into the headweight. Once the patient could wear the headweight for 15 minutes at home without any soreness, 2 more lbs were added to the headweight. By the end of the 8-week period, the patient was using 8 lbs in the headweight. The headweight was used twice per day for 15-minute periods. The use of the headweight immediately after the adjusting procedures counted for one of the two periods for that day. The patient was instructed on the proper use of the cervical traction apparatus and the high-density foam blocks. The patient was instructed to perform the cervical traction 3 times per day for about 1 minute each time, and to perform the supine positional spinal traction for 20 minutes immediately prior to going to bed.

At the conclusion of the 8-week trial period, a comparative radiographic study was performed to evaluate the progress made during the trial period. Using the same radiographic line analysis, the post lateral cervical radiograph revealed a 20% loss of the cervical curve (36 degrees), and 1.25 inches of forward head posture, or 22.5 lbs of apparent head weight. By the beginning of the 4th week, the patient reported a verbal analog reading of 0 out of 10. There were two visits after the 4th week where the Borg scale had been a 4 and a 2, respectively. Interestingly, these two visits corresponded to the addition of extra weight to the headweight device. The post treatment radiology report from the Palmer Clinic stated that the patient's cervical spine was "hypolordotic" with "mild anterior weight bearing." (17)

DISCUSSION

It has been well documented in the literature that posture is under a significant amount of involuntary neurological control. (18-22) The vestibular apparatus (19); especially the utricle and saccule; (18,19) cervical proprioception from the deep tissues of the neck; (20) and the ocular righting mechanism (18,19) are the major components in the maintenance and control of posture. Because of this information, a newer biomechanical model has been developed that incorporates the application of this neurophysiology. (23)

There are currently different methods of attempting to correct posture and posture-related imbalances. The headweight device designed by Pettibon is a new device

used to correct postural faults through neuromuscular re-education. Rather than more traditional methods of simply trying to strengthen weak muscles, the head-weighting procedure theoretically retrains the weak musculature through the involuntary neurological righting mechanisms. Since muscle strength gains in the first 6–8 weeks are primarily due to the re-education of neuromotor pathways, (24,25) the use of the head-weighting procedure may facilitate this process beyond the ability of simple isometric or isotonic exercises of the weak muscles alone.

This study may provide some insight as to the effects of cervical kyphosis and forward head posture on the rest of the musculoskeletal system. However, these results are not applicable to all types of mechanical thoracic pain. In this present case study, there was no single identifiable cause for the mechanical thoracic pain. Implementation of this procedure also requires a certain amount of patient awareness and education. The author feels that the most important reason that these results were obtained was the high rate of patient compliance. Because nearly two-thirds of the rehabilitation procedures were performed at home, failure to do these procedures may have significantly reduced our results. The only adjustment delivered to the thoracic spine was the anterior thoracic adjustment given to the cervico-thoracic junction. The goal of this procedure was to mobilize this area so that the headweighting procedure would have a maximal effect during each visit. It is possible that this adjustment relieved the thoracic pain. However, the area of pain reported by the patient was determined to be the lower thoracic spine and thoracolumbar junction. Since chiropractic adjustments alone have been shown to be largely unsuccessful at correcting spinal curves, (26) the rehabilitative procedures were an integral part of this study. Perhaps any future studies could compare the results of these specific rehabilitative procedures used both with and without chiropractic adjunctive procedures.

CONCLUSION

The existence of both forward head posture (FHP) and a loss of the cervical curve may have musculoskeletal impacts beyond the cervical spine, in certain cases. In the present study, correction or reduction of these cervical spinal deviations seemed to eliminate the presence of mechanical lower thoracic pain. Future research should attempt to better understand the relationship of the cervical spine and head position to the rest of the musculoskeletal system and any other potential effects forward head posture and the loss of the cervical curve.

ACKNOWLEDGEMENT

The author would like to thank Karol Donaubauber, DC for her guidance and support in creating this paper, as well as providing the subject for the study.

REFERENCES

1. Harrison DE, Troyanovich SJ, Harrison DD. A normal sagittal spinal configuration: a desirable clinical outcome. *J Manipulative Physiol Ther* 1996; 19: 398–405.
2. Harrison DE, Harrison DD, Troyanovich SJ. A normal spinal position: its time to accept the evidence. *J Manipulative Physiol Ther* 2000;23:623–44.
3. Bagnall KM, Harris PF, Jones PRM. A radiographic study of the human fetal spine. *J Anat* 1977;124:791–802.
4. Hallgren RC, McPartland JM, Brodeur RR. Chronic neck pain, standing balance, and suboccipital muscle atrophy: a pilot study. *J Manipulative Physiol Ther* 1997;20:24–9.
5. Griegel-Morris P, Larson K, Mueller-Klaus K, Oatis CA. Incidence of common postural abnormalities in the cervical, shoulder, and thoracic Regions and their association with pain in two age groups of healthy subjects. *Phys Ther* 1992;72:425–31.
6. Bogduk N. The anatomical basis for cervicogenic headache. *J Manipulative Physiol Ther* 1992;15:67–70.
7. Steiman I, Hagino C, Vernon H. Cervicogenic dysfunction in muscle contraction headache and migraine: a descriptive study. *J Manipulative Physiol Ther* 1992;15:418–29.
8. Cailliet R, Gross L. The rejuvenation strategy. Doubleday & Company, Inc. 1987. pg. 52–60.
9. Refshauge KM, Goodsell M, Lee M. The relationship between surface contour and vertebral body measures of upper spine curvature. *Spine* 1994;19:2180–85.
10. Johnson GM. The correlation between surface measurement of head and neck posture and the anatomic position of the upper cervical vertebrae. *Spine* 1998;23:921–27.
11. Pettibon BR. Introduction to spinal biomechanics. Pettibon Biomechanics Institute 1989. Pg. 89–96.
12. Kapandji IA. The physiology of the joints. volume 3: the trunk and vertebral column, 5th ed. Churchill Livingstone 1974. pg 235–36.
13. Cailliet R. Neck and arm pain, 2nd ed. FA Davis Company 1981 pg 12–14.
14. Littrell, T. Palmer College of Chiropractic radiology report 8/3/01
15. Woggon D. The science of pettibon spinal biomechanics system adjusting 2001. Pettibon Biomechanics Institute 2000. pg 45–101.
16. Pettibon BR. Posture correction and spinal rehabilitation: seminar session #1. Pettibon Biomechanics Institute 2001. pg 46–76.
17. Littrell, T. Palmer College of Chiropractic radiology report 10/16/01.
18. Kandel E, Schwartz JH, Jessell TM. Principles of neural science, 4th ed. McGraw-Hill: 2000 pg 717–23, 802–27.
19. Pompeiano O, Allum JHJ. Vestibulospinal control of posture and locomotion; progress in brain research, volume 76. Elsevier Science Publishers 1988. pg 5–16, 45–96, 137–80, 253–62, 291–96.
20. Seaman DR, Winterstein JF. Dysafferentation: a novel term to describe the neuropathophysiological effects of joint complex dysfunction. A look at likely mechanisms of symptom generation. *J Manipulative Physiol Ther* 1998;21:267–80.
21. Mergner T, Hlavacka F. Multisensory control of posture. Proceedings of an International Symposium on Sensory Interaction in Posture and Movement Control. Plenary Press: 1995. pgs 1–14, 69–94, 131–38, 237–42, 269–88.
22. Conn PM. Neuroscience in medicine. JB Lippincott Company 1995. pgs 214–34, 369–400, 505–7.
23. Nicholas SC, Doxey-Gasway DD, Paloski WH. A link-segment model of upright human posture for analysis of head-trunk coordination. *J Vestib Res* 1998;8:187–200.
24. Enoka, RM. Muscle strength and its development: new perspectives. *Sports Med* 1988;6:146–68.
25. Sale, DG. Neural adaptation to resistance training. *Med Sci Sports Exerc* 1988;20: S135–S145.
26. Harrison DD, Jackson BL, Troyanovich SJ, Robertson G, DeGeorge D, Barker WF. The efficacy of cervical extension-compression traction combined with diversified manipulation and drop table adjustments in the rehabilitation of cervical lordosis: a pilot study. *J Manipulative Physiol Ther* 1994;17:454–64.