CASE STUDY

Resolution of Chronic Headaches Following Reduction of Vertebral Subluxation in an 8-Year-Old Utilizing Chiropractic Biophysics Technique

Paul A Oakley DC, MSC[1], Stephanie J Chaney DC[2], Tom A Chaney DC[2], Adam Maddox, DC[2]

Abstract

Objective: To describe the outcome of Chiropractic Biophysics (CBP) technique along with dietary changes performed on an 8-year old with chronic headaches as well as chronic sore throat, fatigue, dizziness, queasiness, and radiographic diagnosed cervical subluxation.

Clinical Features: An 8-year old male presented with chronic headaches for two years. He also suffered from sore throat, fatigue, queasiness, aches, pains, and dizziness. He had been seen by a neurologist, psychologist and nutritionist with limited health improvements. Radiographs of the cervical spine revealed a cervical spine second harmonic S-shaped neck with upper spine kyphosis and lower spine hyperlordosis.

Interventions and Outcomes: The boy was treated with CBP mirror-image isokinetic exercises, postural adjustments, and cervical spine extension traction. Spinal manipulation, cervical mobilization and hydrotherapy were provided. One month into care, a food diary analysis prompted dietary modifications along with nutritional supplementation. The child was originally seen on a three times per week schedule as per CBP protocol then progressed to a maintenance schedule of two times per month, a total of 86. A lateral cervical radiograph taken 6-months after initiating care revealed that his cervical lordosis was improved to near normal for his age.

Conclusion: This case presents the successful outcome in an 8-year old with a variety of health issues as well as headaches. This case and others suggests CBP cervical extension traction as well as manipulation is a safe and effective intervention for the pediatric headache.

Key Words: *CBP, cervical lordosis, cervical hypolordosis, cervical kyphosis, extension traction, headaches, vertebral subluxation, pediatrics*

Introduction

Pediatric headache remains a frequent health problem for children and their families.[1] In fact, headache is a common complaint in childhood with up to 75% of children reporting a notable headache by the age of 15 years.[2]

Cervical subluxation (hypolordosis/kyphosis) has been implicated as a contributing factor to headaches.[3-6] For example, Nagasawa et al.[6] evaluated the presence of straightened cervical spines in headache patients as compared to controls and concluded that a straightened cervical spine may play an important role in the pathogenesis of tension-type headache.

1. Private Practice of Chiropractic, Ontario, Canada
2. Private Practice of Chiropractic, Annapolis, MD, USA

Also, Vernon et al.[5] determined that a 'greatly reduced or absent cervical curve' was a high occurrence characteristic in those who suffered from tension headaches and migraines.

Consequently, the correction of cervical spine lordosis has been documented to alleviate headache symptoms in pediatric cases.[7-10] This case presents the successful outcome in a pediatric who suffered from headaches as well as other health problems having cervical subluxation (hyperlordosis/kyphosis) who received treatments aimed at the restoration of the cervical lordosis using Chiropractic Biophysics technique.[10,11]

Case Report

Clinical Features

An 8-year old male (67 kg) presented with headaches, muscle aches, fatigue, allergies, and digestive problems. It was reported that he suffered daily from headache, sore throat, and fatigue, suffered most days from queasiness, and some days from aches, pains, and dizziness. His headaches would range from a 6-10/10 (0=no complaint, 10=worst pain/sensation ever) on an 11-point numerical rating scale (NRS), his sore throat a 4-8/10, fatigue a 7-8/10, dizziness a 6/10, and queasiness a 3-4/10 when bothered by these symptoms.

The headaches were described as sharp and throbbing, worse with noise, better when lying down, and located in the frontal skull area and reported to occasionally last an entire day where he is sometimes awakened because of them at night.

Health history revealed that during delivery he was unable to breath after cutting of the cord. The attending staff gave him 'something' and he seemed normal thereafter. The mother took medications to ease delivery pains approximately 45 minutes prior to birthing. The child received all the regular recommended vaccinations, had been on antibiotics approximately 6 or more times mostly due to sinus infections. He was breast fed for 6-months, formula fed for 2-months following, and solid foods were first introduced at 4-months. His development was described as normal and he was able to walk alone at 11.5-months.

Over the last year the child had felt too sick to partake in activities he used to such as rock climbing. Due to his declining health the parents had taken him to a pediatric neurologist-headache specialist, an allergist, a nutritionist, and a psychologist. Despite the guidance from these medical practitioners throughout the Annapolis and Baltimore area, the boy's health continued to fail. Any recommended medications, dietary restrictions, and relaxation techniques only gave slight and temporary relief if any at all.

Chiropractic Examination

During examination palpation revealed tenderness in upper cervical (C1-Co) and lower cervical (C3-T1) areas, para-vertebral muscle spasms were present through the entire cervical spine (C0-C7), and motion palpation revealed dyskinesia in the upper cervical spine (Co-C1), mid cervical spine (C3-6), and upper thoracic spine (T2-T5).

Radiographs of the cervical spine (Fig 1) revealed a cervical spine second harmonic configuration;[12-13] that is, an S-shaped neck with upper spine kyphosis (C2-3= +6.1°) and lower spine hyperlordosis (C3-7= -36.2°) creating an absolute rotation angle (ARA) from C2-7 of -30.1°. The atlas plane line was 21.8°. Lumbar radiographs revealed pelvic unleveling indicative of an anatomical short left leg. The primary diagnosis was cervicogenic headache resulting from global subluxation of the cervical spine. One month into care, a food diary analysis was performed with the help of his mother. Food diary analysis revealed a diet that consisted primarily of processed grains, dairy and meats, such as hot dogs and lunch meats, and lacking in fresh fruits and vegetables with no addition of nutritional supplements.

Intervention and Outcome

The child was given a total of 86 treatments over the course of a year and two thirds. Initially he was on 3-times per week schedule progressing to a maintenance schedule of 2-times per month. Two nutritional consultation visits were scheduled to discuss findings of the food diary and the recommendations for dietary modifications, which included elimination of dairy and gluten-containing grain products and the introduction of fresh fruits and vegetables. Additional supplementation included a pediatric serving (1/2 oz) of a liquid organic multivitamin and 1 Tbsp daily of cod liver oil and a daily pediatric serving of powdered magnesium and calcium.

Cervical spine extension traction was applied via 2-way counter stressing mechanical traction[14] performed for initially 5 minutes and progressing to 15 minutes with weight of 5lbs on the front and 2.5 lbs on the back. Spinal manipulation was occasionally performed and cervical mobilization was provided. Isokinetic mirror-image exercises were also given for the cervical spine and thoracolumbar spine. To normalize cell metabolism, speed up tissue repair, and enhance muscular vasodilation, hydrotherapy was done for 10 minutes duration.

Radiology

A lateral cervical radiograph taken revealed that cervical spine lordosis had improved in shape, the C2-3 kyphosis was reduced to +2.2° (from +6.1°) and the C3-7 hyperlordosis reduced to -27.7° (from -36.2°); overall, the absolute rotation angle C2-7 was reduced to -25.6°(from -30.1°) much closer to approximating a normal 8-year old lordosis (-22.1°[10,15]). The child was 'graduated' to a maintenance care program of twice a month as his symptoms had subsided concomitant with the improvement in distribution of lordosis throughout his cervical spine.

An assessment revealed that, although the child had been in an automobile collision since his last assessment, he had no complaints. Upon examination there was deep spastic paraspinal musculature bilaterally in the lower cervical spine with articular fixations in the cervical, lower thoracic and lumbar areas. All spinal ranges of motion were normal; all orthopedic tests were also negative. It was recommended that moving forward he be treated on an 'as-needed' basis for continued care.

Discussion

Pediatric headache is a common complaint[2] and accordingly, the chiropractor must practice due diligence to ensure a comprehensive exam and diagnosis. This is because, although rare, there is an increased likelihood of a serious pathology with pediatric headache presentations such as benign and malignant tumours, cerebrovascular disease, primary disorders of raised intracranial pressure and depression. However, this risk is reduced if a diagnosis of a primary headache disorder can be made.[16]

Cervical Lordosis

Lack of cervical lordosis, such as kyphosis or hypolordosis, is commonly associated with presence of headache symptomatology[3-6] and should be targeted for correction as it is a prime suspect in headache pathogenesis. Although the cervical spine in adults has been well studied and modeled,[17-20] the pediatric spine has not been. Bagnall et al. demonstrated the cervical lordosis is present in 83% of fetuses and illustrates a fetus having a clearly established lordosis at 91/2 weeks in utero.[21] Data from Kasai et al.[22] indicates the lordosis is most prominent in ages 2-4, where it decreases steadily from ages 4 - 9, then the lordosis steadily increases up to age 18 approaching normal adult lordosis.

The adult cervical lordosis has been determined to be normal in the range of 31° through to 42°, the upper end being the CBP 'ideal' or essentially the gold standard. Re-analyzing the data from Kasai,[22] Harrison et al.[10] presents a table of normal Cobb and ARA values for pediatrics aged 2-18 years. In a letter to the editor, Oakley[15] has pointed out the fault of applying the CBP adult lordosis of 42° in the evaluation of children as it may result in gross 'over-corrections' if consideration for pediatric lordosis is neglected.

Although there are clinical trials documenting routine correction to the cervical spine in adults receiving extension cervical traction[12,23-24] (in conjunction with chiropractic manipulation and exercise) there are only a few sporadic case reports documenting restoration of lordosis by CBP technique in relief of headaches in the pediatric population.[7-10]

In fact, we located only eight documented cases where CBP technique was successfully employed in the pediatric headache population. These eight cases came from four different sources.[7-10] The cases ranged in ages from 4-16yrs, including males and females. The treatment periods to restore the pediatric cervical lordosis in these cases ranged from 4-weeks to 12-weeks, and the number of treatments ranged from 22 to 30 treatments for the 'correction phase.' Most cases did not include any maintenance treatments, as is the case with the current report.

It should be noted, however, that in two of the cases reported by Harrison et al.[10] after correction and resolution of headache, trauma to the cervical spine resulted in both subluxation and concomitant headache symptomatology. In one of these cases, (Harrison case #1) a subsequent second round of 4-weeks treatments including extension traction was required to both correct the lordosis and alleviate the headaches. This points to a direct causal relationship.

The current case as well as the others discussed point to a connection between cervical lordosis and pediatric health. Further, likened to the association between cervical hypolordosis/kyphosis and headache in adults, it seems prudent to suggest that a plausible pathogenesis to headache in pediatrics is cervical subluxation in all its variations, i.e. hypolordosis; kyphosis; buckled configurations. Although a caveat is that more research needs to be done, it seems that evidence points to the cervical spine and it's alignment as a critical factor in the diagnosis, treatment and prevention of cervicogenic headache in the pediatric population.

Dietary Effects

While structure is undoubtedly of importance when discussing causation of chronic headaches, it is impossible to ignore the effect of diet. The efficacy of magnesium as a safe method of alleviation of headaches and migraines has been documented in the literature. [26,27, 28, 29] Magnesium is utilized in hundreds of chemical pathways in the body and is known to relax tension of any muscle in the body, including that of the heart and blood vessel walls. This may partly explain its positive impact on headaches. The best source of magnesium is from green leafy vegetables.

Harel et al., [30] reported on the significant reduction of headache frequency in adolescents after consuming fish oil over a 2-month period. Simopoulos [31] also reports on the impact that omega 3 fatty acids have on lowering inflammation and reducing migraine headaches, along with positively impacting many other inflammatory and autoimmune diseases. Huss [32] et al. reported in a cohort study the significantly positive outcomes of omega-3 and magnesium consumption over a 12-week period on the behavior of a pediatric and adolescent population displaying sleep and behavioral disturbances, including ADHD and impulsivity.

This study emphasizes the importance of essential fatty acids on brain development, hormone balance and general cell membrane function. Cod liver oil contains both EPA and DHA, as well as vitamin D. Vitamin D has also been shown to be efficacious in the amelioration of mental outlook, energy, and headaches.[33]

Monosodium glutamate (MSG) has been shown to be a causal factor in pericranial muscle tenderness and headaches.[34] MSG is found in an increasing number of foods and glutamate may be found in many other ingredients in processed foods and thus listed as ingredients other than MSG. Common foods containing MSG include processed meats, fast foods and many commercially flavored and processed snack foods, soups, sauces and dressings.

Conclusion

This case presented the successful outcome in an 8-year old with a variety of health issues as well as headaches. This case and others suggests CBP cervical extension traction as well as manipulation may be an effective intervention for the pediatric headache, along with diet modification specifically targeting improvement of brain and nerve health and function and reduction of inflammation.

Since prior nutritional and dietary counseling alone did not positively impact the headaches of this subject, it is likely that either the CBP treatments alone, or the combination of both CBP treatments and the dietary changes implemented created the complete resolution of the complaints of the subject. Further research is needed to determine what subset of pediatric patients presenting with headaches may be best suited for structural-based chiropractic care.

References

1. Hershey AD. Recent developments in pediatric headache. Curr Opin Neurol. 2010 Apr 12. [Epub ahead of print]
2. Hershey AD. Current approaches to the diagnosis and management of paediatric migraine. Lancet Neurol. 2010 Feb;9(2):190-204.
3. Ng SY. Upper cervical vertebrae and occipital headache. J Manipulative Physiol Ther 1980; 3:137-141.
4. Schimek JJ. Mohr U. The importance of manual therapy in the treatment of chronic headache. Manual Med 1984; 22:41-5.
5. Vernon H. Steiman I, Hagino C. Cervicogenic dysfunction in muscle contraction headache and migraine: a descriptive study. J Manipuluative Physiol Ther 1992 Sep;15(7):418-29.
6. Nagasawa A. Sakakibara T. Takahashi A. Roentgenographic findings of the cervical spine in tension-type headache. Headache 1993; 33:90-95.
7. Pope M. Applied Chiropractic Biophysics. (chap 12, p.23-24) In: Harrison DD. Chiropractic: The physics of spinal correction CBP technique. CBP Seminars, 1994.
8. Fedorchuk C., Wheeler G. Resolution of headaches in a 13 year-old following restoration of cervical curvature utilizing chiropractic biophysics: A case report. J Pediatr Matern & Fam Health - Chiropr: Fall 2009(2009:4): Online access 7 p.
9. Fedorchuk C., Cohen A. Resolution of chronic otitis media, neck pain, headaches & sinus infection in a child following an increase in cervical curvature & reduction of vertebral subluxation. J Pediatr Matern & Fam Health - Chiropr: Spr 2009(2009:2): Online access 8 p.
10. Harrison DE, Harrison DD, Hass JW. Structural rehabilitation of the cervical spine. Evanston, WY: Harrison CBP® Seminars, Inc., 2002.
11. Oakley PA, Harrison DD, Harrison DE, et al. Evidence-Based Protocol for Structural Rehabilitation of the Spine and Posture: Review of Clinical Biomechanics of Posture (CBP®) Publications. J Canadian Chiro Assoc 2005; (49:4): 270-296.
12. Harrison DE, Harrison DD, Janik TJ, et al. Comparison of axial and flexural stresses in lordosis and three buckled configurations of the cervical spine. Clin Biom 2001; 16:276-284.
13. Harrison DE, Harrison DD, Troyanovich SJ. Three-dimensional spinal coupling mechanics: Part II. Implications for chiropractic theories and practice. J Manipulative Physiol Ther 1998; 21(3):177-186.
14. Harrison DE, Cailliet R, Harrison DD, et al. A New 3-Point Bending Conservative Method of Restoring Cervical Lordosis: Non-randomized clinical control trial. Arch Phys Med Rehab 2002; 83(4): 447-453.
15. Oakley PA. Letter to the Editor: [Fedorchuk C., Wheeler G. Resolution of headaches in a 13 year-old following restoration of cervical curvature utilizing chiropractic biophysics: A case report. J Pediatr Matern & Fam Health - Chiropr: Fall 2009(2009:4): Online access 7 p.] J Pediatr Matern & Fam Health - Chiropr: Summer 2010(2010:3): Online access 2 p.
16. Kernick D, Stapley S, Campbell J, et al. What happens to new-onset headache in children that present to primary care? A case-cohort study using electronic primary care records. Cephalalgia. 2009 Dec;29(12):1311-6.
17. Harrison DD, Janik TJ, Troyanovich SJ, et al. Comparisons of lordotic cervical spine curvatures to a theoretical ideal model of the static sagittal cervical spine. Spine 1996; 21:667-675.
18. Harrison DD, Janik TJ, Troyanovich SJ, et al. Evaluation of the assumptions used to derive an ideal normal cervical spinal model. J Manipulative Physiol Ther 1997; 20:246-256.
19. Harrison DD, Harrison DE, Janik TJ, et al. Modeling of the sagittal cervical spine as a method to discriminate hypo-lordosis: results of elliptical and circular modeling in 72 asymptomatic subjects, 52 acute neck pain subjects, and 70 chronic neck pain subjects. Spine 2004; 29(22):2485-2492.
20. McAviney J, Schultz D, Bock R, et al. Determining the relationship between cervical lordosis and neck complaints. J Manipulative Physiol Ther 2005; 28(3):187-93.
21. Bagnall KM. Harris PF. Jones PR. A radiographic study of the human fetal spine. 1. The development of the secondary cervical curvature. J Anat. 1977 Jul;123(Pt 3):777-82.
22. Kasai T, Ikata T, Katoh S, et al. Growth of the cervical spine with special reference to its lordosis and mobility. Spine 1996; 21(18):2067-2073.
23. Harrison DD, Jackson BL, Troyanovich SJ, et al. 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;17:454-464.
24. Harrison DE, Harrison DD, Betz J, et al. Increasing the cervical lordosis with seated combined extension-compression and transverse load cervical traction with cervical manipulation: Nonrandomized clinical control trial. J Manipulative Physiol Ther 2003;26:139-151.
25. Harrison DD, Harrison DE. The basics of CBP technique. Todays Chiropr. 2004 May/June; 33(3):34,36-38,74-75.
26. Guerrera MP, Volpe SL, Mao JJ. Therapeutic uses of magnesium. Am Fam Physician. 2009 Jul 15;80(2):157-62
27. Sun-Edelstein C, Mauskop A. Foods and supplements in the management of migraine headaches. Clin J Pain. 2009 Jun;25(5):446-52.
28. Sun-Edelstein C, Mauskop A. Role of magnesium in the pathogenesis and treatment of migraine. Expert Rev Neurother. 2009 Mar;9(3):369-79.
29. Tepper SJ. Complementary and alternative treatments for childhood headaches. Curr Pain Headache Rep. 2008 Oct;12(5):379-83.

30. Harel Z, Gascon G, Riggs S, et al. Supplementation with omega-3 polyunsaturated fatty acids in the management of recurrent migraines in adolescents. J Adolesc Health. 2002 Aug;31(2):154-61.
31. Simopoulus AP. Omega-3 fatty acids in inflammation and autoimmune diseases. J Am Coll Nutr. 2002 Dec;21(6):495-505.
32. Huss M, Volp A, Stauss-Grabo M. Supplementation of polyunsaturated fatty acids, magnesium and zinc in children seeking medical advice for attention-deficit/hyperactivity problems-an observational cohort study. Lipids Health Dis. 2010 Sep 24;9:105.
33. Prakash S, Shah ND. Chronic tension-type headache with vitamin D deficiency: casual or causal association? Headache. 2009 Sep;49(8): 1214-22. Epub 2009 Jul 8.
34. Baad-Hansen L, Cairns B, Ernberg M, et al. Effect of systemic monosodium glutamate (MSG) on headache and pericranial muscle sensitivity. Cephalgia. 2010 Jan;30(1):68-76.

Figures

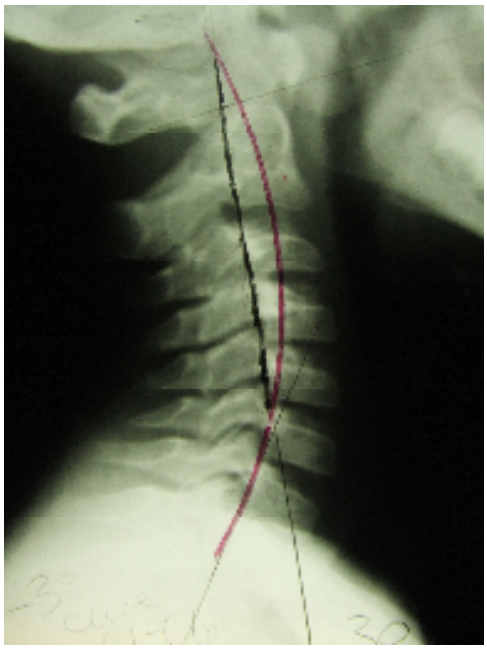

Fig. 1: Pre-lateral cervical radiograph. Note the mild kyphosis (C2-3), overall straight alignment (C2-5), and hyperlordosis (C5-7). Curved line represents adult ideal from Harrison et al.[17]

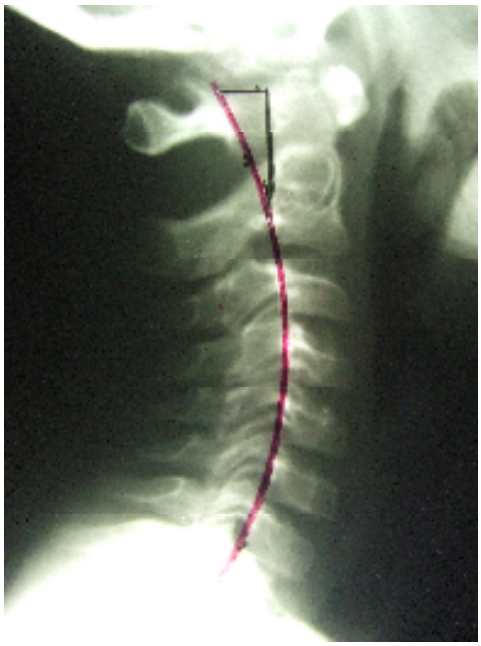

Fig. 2: Post-lateral cervical radiograph. Note the improved shape, the C2-3 kyphosis was reduced to +2.2° (from +6.1°) and the C3-7 hyperlordosis reduced to -27.7° (from -36.2°); overall, the absolute rotation angle C2-7 was reduced to -25.6°(from -30.1°) much closer to approximating a normal 8-year old lordosis (-22.1°[10,15]).