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# CASE STUDY

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## Resolution of Cervicalgia Following Blair Upper Cervical Technique: A Case Study & Review of the Literature

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### ABSTRACT

**Objective:** The purpose of this case study is to evaluate and discuss the use of Blair Upper Cervical technique in a 55-year-old female diagnosed with cervicalgia.

**Clinical Features:** The patient is a 55-year-old female who presented with a chief complaint of neck pain, exacerbated by prolonged sitting and standing. The patient also presented with reduced cervical range-of-motion (ROM), spasms and tenderness of the left cervical paraspinal muscles, and postural abnormalities.

**Intervention and Outcomes:** A patient health history and chiropractic examination was performed. Blair Upper Cervical technique was utilized to identify the area of involvement. This case study shows improvements in the patient's condition after one month of care. During that time period, the patient received chiropractic adjustments in accordance with Blair Upper Cervical technique protocol. By the end of care, the patient's Verbal Pain Scale score went from a 5/10 pain level to 0/10 pain level. Other outcome assessments used in this case study include Tytron thermography scanning.

**Conclusions:** The findings presented in this case study suggest that chiropractic adjustments using Blair Upper Cervical technique may provide some benefit in the management of neck pain.

**Keywords:** *Chiropractic, vertebral subluxation, adjustment, Blair, upper cervical, neck pain, cervicalgia*

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### Introduction

Pain accounts for the majority of presentations seen in clinical practice.<sup>1</sup> Although pain may be a symptom of more insidious disease, the focus of this study will be on neck pain arising from musculoskeletal or mechanical origin.<sup>2,3</sup> Such pain is costly with respect to health care expenses, disability, absenteeism, presenteeism, and decreased quality of life.<sup>1,3,4</sup>

#### *Epidemiology*

According to The Global Burden of Disease 2010 Study, neck

pain ranked fourth in terms of years lived with disability (YLDs) and 21<sup>st</sup> in terms of overall burden (i.e.; disability-adjusted life years – DALYs).<sup>5-7</sup> Neck pain is becoming increasingly common throughout the world.<sup>6,8</sup> However, because there is much heterogeneity between neck pain studies, pooling the data and calculating comparison data is difficult. The estimated 1-year incidence of neck pain ranges between 10.4% and 21.3%, with a higher incidence in office and computer workers. While some studies report between 33% and 65% of people recover from an episode of neck pain within one

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year, most cases run an episodic course over one's lifetime. As a result, relapses are common. Furthermore, the mean prevalence of neck pain in the general population is 23.1%, mean point-prevalence is 14.4% and, the mean 1-year prevalence is 25.8%. Prevalence is generally higher in women, high-income countries, and urban areas. There is an increased risk of developing neck pain until the 35-49 year age group, after which the risk begins to decline.<sup>7</sup>

### *Etiology*

Neck pain may be due to a variety of reasons. Most neck pain is of musculoskeletal or mechanical origin.<sup>1-4</sup> 15-40% of neck pain involves musculoskeletal or mechanical dysfunctions including muscles strain/sprain, spasm, facet joint capsule involvement, or some combination of these factors.<sup>3,9</sup> Less than 15% of neck pain conditions is due to spinal lesions such as disc herniation, osteoarthritis, compression fractures, spondylolisthesis or spinal stenosis.<sup>3</sup> And, only a few neck pain episodes are caused by infection (0.01%), inflammation (0.3%), or cancer (1%).<sup>1,3,9</sup> Any structure in the cervical region that is innervated may be a source of neck pain. This makes determining the specific tissue involved in neck pain difficult. However, nociception is the method by which the body conveys pain and the method by which the brain interprets pain.<sup>1,2</sup> In order to help the reader gain an appreciation for how neck pain manifests, an explanation of nociception must follow.

Pain receptors—which are free nerve endings—are widespread in the superficial layers of skin, periosteum, arteries, and joint surfaces.<sup>1,2</sup> These receptors may be stimulated by mechanical, thermal or chemical means. Mechanical and thermal stimuli create a fast pain response, which is described as sharp, pricking, acute or electric. Mechanical and thermal stimuli—along with chemical stimuli—may also elicit a slow pain response, which is described as burning, aching, throbbing, or chronic.<sup>2</sup>

During nociception, mechanical, chemical, and/or thermal stimuli excite free nerve endings, which carry the signal to the dorsal root ganglion (DRG). This is where the signal enters the spinal cord. From here, the pain signal either enters the neospinothalamic tract or the paleospinothalamic tract. The neospinothalamic tract utilizes fast type A fibers to transmit mechanical and thermal pain to laminae I of the dorsal columns where they excite second-order neurons of the neospinothalamic tract. The A delta fibers cross the anterior commissure and ascend into the anterolateral columns. Many of these fibers terminate in the ventrobasal complex of the thalamus and the dorsal column (medial lemniscal tract). A few of these fibers also terminate in the posterior nucleus of the thalamus. From these areas, signals are transmitted to the somatosensory cortex.<sup>1,2</sup> The paleospinothalamic tract utilizes slow type C fibers to transmit signals to laminae II and III of the dorsal columns (substantia gelatinosa) where they pass through lamina IV and give rise to long axons that join the fibers crossing the anterior commissure and ascend into the anterolateral columns.<sup>2</sup>

### *Medical Management*

Most mild to moderate acute neck pain will self-resolve within two weeks.<sup>5,9</sup> Following a proper history and physical

examination to rule out more serious pathology, early medical management of neck pain includes the prescription of nonsteroidal anti-inflammatory drugs (NSAIDs) and the application of heat and cold.<sup>3,5</sup> NSAIDs are used for pain suppression, whereas heat and cold is used to relieve muscle spasms.<sup>1-3</sup> If pain persists past two weeks, medical physicians typically prescribe muscle relaxers and may prescribe a tricyclic antidepressant for pain relief.<sup>3,9</sup> For those in severe pain that do not respond to the typical protocol, opioid analgesics may be prescribed. Furthermore, a mobilization and stabilization may be employed as a means of providing rehabilitation to the painful area.<sup>3</sup> Other therapies for neck pain typically include exercise, physical therapy, transcutaneous electrical nerve stimulation (TENS), and traction.<sup>1,3,5,9-11</sup> After radiographic and/or magnetic resonance imaging, other interventions for neck pain that has not responded to medication or therapy includes steroid injections of corticosteroids or lidocaine. In the rare case of intractable neck pain from severe spinal stenosis or cervical radiculopathy, surgery may be performed as a last resort.<sup>1,5,9</sup>

Many practice guidelines are beginning to include nonpharmaceutical interventions as the first-line treatment for neck pain in order to reduce the burden associated with chronic pain conditions, opiate addiction, and complications from spinal surgery.<sup>12-14</sup> Specifically of interest to this paper is the use of chiropractic adjustments using Blair Upper Cervical technique as a primary intervention for neck pain.

### **Review of Literature**

The peer-reviewed literature used in this case study was located using Index to Chiropractic Literature (ICL), Manual, Alternative, and Natural Therapy Index System (MANTIS), and PubMed. The keywords, “chiropractic”, “blair”, and “upper cervical” returned, 10 results on ICL, 15 results on MANTIS, and two results on PubMed.

Further inclusion/exclusion criterion was established to narrow the results to the most appropriate studies for this review of literature. Due to a low number of articles specifically related to use of Blair Upper Cervical technique, a wide variety of study designs were included. Subjects may have been any age and must have been diagnosed with headache, neck, shoulder pain, and/or any other neurological or musculoskeletal condition. Sex/gender and the race/ethnicity of subjects were not used as inclusion/exclusion criteria. No limitations were placed on publication date(s) or location. In order to be included in this review of literature, chiropractic adjustments must have been delivered by a licensed doctor of chiropractic utilizing Blair Upper Cervical technique. After applying the aforementioned inclusion/exclusion criteria, a total of ten studies were obtained and summarized regarding chiropractic and Blair Upper Cervical technique. They are presented in chronological order.

Brown presented a case series involving twenty subjects whose radiographs were analyzed according to Blair Upper Cervical technique and the Grostic procedure to obtain a listing for the misalignment of C1. The subjects were randomized to receive either Blair Upper Cervical technique or the Grostic procedure for four weeks. An SF-36 was administered to ascertain changes in general health and quality of life. No significant differences in change from baseline scores were observed

between the two techniques. Although this series makes an argument for the reliability between two upper cervical chiropractic techniques, agreement of C1 laterality between the two techniques was only slightly more than what would be expected due to chance alone. It can only be concluded that determination of C1 misalignment is highly dependent on the technique used.<sup>15</sup>

Burcon presented a case series of ten subjects diagnosed with Meniere's disease. Radiographs and Blair Upper Cervical technique analysis of the subjects' upper cervical vertebrae were performed and adjustments were made to reduce the presence of vertebral subluxation. A resolution of the subjects' symptoms was apparent; indicating the possibility that reducing vertebral subluxation might play a role in treating Meniere's disease. However, the connection between vertebral subluxation and Meniere's disease is still unknown. No universal treatment plan was uniformly followed for each subject. Furthermore, a case series is limited in its ability to provide conclusions. In this study, it is possible that spontaneous remission and/or placebo effect may explain the results.<sup>16</sup>

Hubbard et al. presented a case report involving a 25-year-old woman who reported having an 11-year history of myoclonic seizures. The subject was diagnosed with juvenile myoclonic epilepsy (JME) at 14 years of age shortly after trauma to her cervical spine. The subject received chiropractic adjustments for 12 weeks using Blair Upper Cervical technique protocol and her condition demonstrated improvement. One weakness includes the difficulty involved with making a diagnosis of JME. JME mimics other disorders and it is possible the subject may have witnessed an improvement in a condition that was not JME. Furthermore, because of the cyclic nature of JME, it is difficult to ascertain whether the improvements seen were the result of chiropractic adjustments or whether the subject entered a cyclic phase.<sup>17</sup>

Burcon presented another case series to build on his earlier work with chiropractic and Meniere's disease. In this case series, 139 subjects diagnosed with Meniere's disease were studied. Radiographs and Blair Upper Cervical technique analysis of the subjects' upper cervical vertebrae were performed and adjustments were made to reduce the presence of vertebral subluxation. A resolution of 136 out of 139 of the subjects' symptoms was apparent; indicating the possibility that reducing vertebral subluxation might play a role in treating Meniere's disease. However, the connection between vertebral subluxation and Meniere's disease is still unknown. No universal treatment plan was uniformly followed for each subject. Furthermore, a case series is limited in its ability to provide conclusions. In this study, it is possible that spontaneous remission and/or placebo effect may explain the results.<sup>18</sup>

Hooper and Manis presented a case study involving a 9-year-old female complaining of uncontrollable blinking of the left eye and fainting spells. The subject had previously been diagnosed with occipital lobe epilepsy by a neurologist. Blair Upper Cervical technique and Activator Methods were used to address the subject's vertebral subluxation. The subject's symptoms completely resolved three weeks following care. In addition to the possibility of spontaneous remission and placebo

effect, techniques other than Blair Upper Cervical protocol were administered to the patient. As a result, we cannot be sure whether Blair Upper Cervical technique is responsible for the improvement in the subject's condition.<sup>19</sup>

Wells and Williams presented a case study involving a 52-year-old male complaining of postural stiffness in multiple joints, mid-back pain, neck pain, bilateral shoulder pain, bilateral leg and hip pain. Comorbidities included high blood pressure, diabetes mellitus, and ulcerative colitis. Blair Upper Cervical and Knee Chest techniques were utilized over a four-month period with improvements noted in subject's pain level, range of motion, and blood pressure. Because two different techniques were used in this study, it is unknown whether Blair Upper Cervical technique is responsible for the subject's improvements.<sup>20</sup>

Hubbard and Kane presented a case study involving a 39-year-old woman complaining of essential tremors and migraine headaches. The subject stated that her episodes occurred 2-3 times per week. Her conditions were previously diagnosed by her general medical doctor. The subject received chiropractic adjustments 2-3 times per week using Blair Upper Cervical technique for 4 months. The patient was not receiving any concurrent medical or pharmacological treatment. By the end of care, the subject's tremors reduced to 1-2 intermittent episodes per week and her migraines reduced to one per month. The mechanism for how chiropractic adjustments alter headache is unclear. There is also no relationship between essential tremors and migraines. Other disorders may mimic essential tremors such as subclinical torticollis. Regardless, the outcomes reported by Hubbard and Kane cannot be generalized to other patients. Furthermore, the role of placebo and spontaneous remission cannot be ruled out.<sup>21</sup>

Millman et al. presented a case study involving a 10-year-old boy diagnosed with complex regional pain syndrome. Blair Upper Cervical technique was used to address the subject's vertebral subluxations. After ten months of care, the subject saw a decrease in complex regional pain syndrome symptoms, noting them as less frequent, of less duration and decreased severity. The fundamental pathophysiological pathway for complex regional pain syndrome is not completely understood, which may lead to over-diagnosis of the condition. As a result, the patient may have been experiencing symptoms from another disorder. Also, the patient was seeking other modes of treatment during the time he received chiropractic intervention.<sup>22</sup>

Hubbard et al presented a study involving a 58-year-old male diagnosed with cervical disc herniation and cervical radiculopathy. The subject saw improvement within six weeks of care consisting of Blair Upper Cervical technique, passive segmental range of motion, high-velocity, low-amplitude rotational adjustments, and postural taping. Several different techniques were used to achieve a positive outcome. As a result, it is unknown if Blair Upper Cervical technique is responsible for the subject's improvement.<sup>23</sup>

Herman presented a case involving an 8-year-old female complaining of intermittent, moderate middle and low back pain. The subject received six chiropractic adjustments over the course of five months. Blair Upper Cervical technique was utilized and the patient realized a significant improvement in

her middle and low back pain. Musculoskeletal back pain in a juvenile is usually self-limited. Additionally, due to the age of the subject, the role of placebo must be taken into account.<sup>24</sup>

From the literature reviewed, it becomes apparent that some of these studies utilized interventions other than chiropractic adjusting and adjustment techniques other than Blair Upper Cervical technique. In addition to the use of other interventions, the subject's symptoms varied greatly and included symptoms other than mechanical pain. In fact, none of the case studies focused on subjects with neck pain alone. Because of these factors, an association between chiropractic adjustments using Blair Upper Cervical technique and the resolution of neck pain cannot be made. Due to this lack of evidence, the author presents the following case study.

## Case Study

### History

A 55-year-old female presented with a chief complaint of neck pain. She reported that her neck pain felt like a dull, stiff, ache that was exacerbated by prolonged sitting and standing. Her current pain level was rated at 5/10 on the Verbal Pain Scale. The patient also related that she had visited an Atlas Orthogonal chiropractor two years prior; however, she did not continue with chiropractic care because she had since moved to a different state.

### Examination

Physical examination revealed a patient who demonstrated difficulty with performing right lateral cervical flexion. Local pain was reported at 30°. All other ranges of motion (ROMs) were within normal limits. Prone leg check demonstrated a functional leg length inequality (FLLI) of 0.25 inches. Posture analysis also revealed a high right shoulder. Orthopedic examination demonstrated a positive cervical distraction test, which indicates muscle spasm, ligamentous sprain/strain, or facet capsulitis. Palpation revealed spasm and tenderness of the right cervical paraspinal muscles with restricted motion segments found from C1 to C4.

Instrumentation was performed using Tytron C-5000. Tytron C-5000 is thermographic instrumentation used to assess the autonomic nervous system (ANS) by differentiating temperature differences between both sides of the paraspinal muscles.<sup>25</sup> The ANS uses vasoconstriction and vasodilation of the capillaries to help regulate body temperature; therefore irregularities within the ANS are manifested as asymmetrical temperature differences. Interexaminer and intraexaminer reliability of Tytron C-5000 is high, with intraclass correlation coefficient values between 0.91 and 0.984.<sup>25</sup> In this study, the initial Tytron C-5000 readings demonstrated moderate temperature differences of  $>0.50^{\circ}\text{C}$  on the right from C5 to C6.

The patient was referred for radiographic imaging using a Blair Upper Cervical technique series. Findings from the radiographs indicate stage 2 cervical spine degeneration inclusive of a reversed cervical curve and severe decreased disc deformation, disc space loss and degeneration from C4 –C6. Osteophytic growth formation was noted along the anterior and posterior margins of the vertebral bodies from C4-C6. Canal stenosis was

evident from C4-C6. The C3 vertebra was positioned anteriorly in respect to lower segmental levels. These findings substantiate the patient's neck pain symptomatology. From the data collected during the history/physical and radiographic examinations, a diagnosis of cervicgia was made.

### Intervention

The patient's care was developed in recognition of clinical findings from the history/physical and radiographic examinations. Chiropractic adjustments utilizing Blair Upper Cervical technique were administered with the objective to correct vertebral subluxations such that the body can repair and maintain health from within. Blair Upper Cervical technique is a specific system of analyzing and adjusting the upper cervical vertebrae. Special attention is given to C1 and C2 since they are the most freely moveable segments.<sup>26</sup>

In this study, chiropractic adjustments were delivered over the course of a month, utilizing a decreasing frequency schedule, with adjustment frequency set at each reassessment. Reassessments were scheduled every two weeks. The patient began with a care frequency of two visits per week for the first two weeks. At the first reassessment the patient's symptoms, had not reduced by at least 50 percent. As a result, her frequency schedule remained at two visits per week for another two weeks. At the end of the second two-week period, the patient saw a 100 percent improvement in her cervicgia and discontinued chiropractic care at that time. No other ancillary procedures were utilized other than the chiropractic adjustment.

### Technique

Chiropractic adjustments were delivered using Blair Upper Cervical technique. Blair Upper Cervical technique utilizes neurological tests, thermographic instrumentation, and leg checks to determine when vertebral subluxation is present or absent.<sup>27</sup> The Blair Upper Cervical technique has shown substantial reliability inter (0.74 kappa) and intra-examiner (0.92 kappa) reliability.<sup>28</sup> The adjustment is administered only when vertebral subluxation is present. Radiographic imaging helps to determine how the vertebrae is misaligned and in what way the chiropractic adjustment will be delivered. The objective of Blair Upper Cervical technique is the analysis and correction of vertebral subluxation and does not regard the biochemical and orthopedic standards of alignment because they do not bear any relation to the relief of nerve interference.<sup>27</sup>

Two consecutive thermographic readings are taken on separate days. A patient's pattern of vertebral subluxation is defined by unilateral heat deflections ("breaks"), which are present on each of the pre-adjustive readings. A prone leg check is used to determine any functional leg length inequality. A two-stage system of radiographic analysis permits assessment of vertebral alignment at the articular margins as those articulations are formed in each individual patient and which is therefore insensitive to violations of the assumption of bilateral symmetry. A scout series, composed of Base Posterior, A-P Open Mouth, and 5° rotated Lateral Cervical views, is used to determine the optimum angles from which to observe the atlanto-occipital and apophyseal articulations. An articular series, which includes Blair Oblique Protractoviews of each atlanto-occipital articulation and a Blair lateral Cervical

Stereoscopic view made at a specified degree of rotation and tube elevation, is used to determine cervical articular alignment.<sup>27</sup>

From this analysis, chiropractic adjustment is made to any subluxated articulations in the cervical spine. The Blair Toggle-Torque adjustive thrust is a distinctive toggle mechanism incorporating a 180° torque without recoil. To perform this chiropractic adjustment, the patient is positioned in side posture on any chiropractic table with a drop headpiece. Crucial to the adjustment is firm contact of the pisiform with the segmental contact point throughout the adjustive thrust. Atlas is analyzed and listed as misaligning either obliquely anterior-superior or obliquely posterior-inferior along either or both of the long axes of the atlanto-occipital articulations. Axis and subjacent cervical segments are analyzed and listed as misaligning either anterior-superior or posterior-inferior at one or both apophyseal articulations. The slope of the relevant articulation is used in the adjustment, and segmental contact points may include the posterior arch, transverse process, ipsilateral or contralateral lamina, and/or spinous process.<sup>27</sup>

### *Outcomes*

At the first reassessment, the patient noted some improvement in her condition; however, her Verbal Pain Scale was still rated at 3/10. This rating did not meet the threshold of 50 percent improvement within the first 2 weeks. Likewise, the moderate Tytron C-5000 readings from C5 to C6 improved to a mild level (>0.30°C and <0.50°C). These outcome measures demonstrated mild improvement and the treatment frequency continued twice weekly until the second reassessment. The same goal was set of 50 percent improvement in the patient's Verbal Pain Scale by the second reassessment and to improve the Tytron C-5000 readings from mild to normal (<0.30°C) by second reassessment.

Two weeks later, at the second reassessment, the patient noted further improvement in her condition. Her Verbal Pain Scale was rated as 0/10. Normal (<0.30°C) Tytron C-5000 readings were evident within the entire cervical spine. By all outcome measures, the patient demonstrated significant improvement in her symptoms. At this time, the patient was placed on a maintenance care plan and the treatment frequency was set for once weekly until the next reassessment; however, the patient discontinued further care.

### **Discussion**

To better understand the way in which chiropractic adjustments using Blair Upper Cervical technique ameliorate neck pain, the reader must appreciate an understanding of complementary and alternative medicine, the mechanisms by which chiropractic adjustments augment pain signals, the techniques utilized in this study, as well as the limitations of this study.

### *Complementary and Alternative Medicine*

Once considered “woo” and “snake-oil”, there is a growing body of evidence for the efficacy of some complementary and alternative medicine (CAM) interventions.<sup>4,13</sup> As evidence for CAM interventions has increased, so has the integration of CAM into the mainstream health care delivery system.<sup>4</sup> Interest

in CAM interventions may be due to the over-prescription of opioid pain medications<sup>4,12,13</sup> An estimated 20% of patients presenting to physicians' offices for pain received an opioid prescription. Health care providers wrote enough prescriptions for opioid medications for every adult in the United States to have a bottle of pills. And, from 2007 to 2012, the number of opioid prescriptions increased 7.3%. Interestingly, as the sales of opioid medications have increased, so have the number of opioid-related overdose deaths. The increase in opioid related overdose deaths, is due to the serious risks involved with taking opioid medications including overdose, use disorders, social problems, and failures to fulfill major role obligations at work, school, or home.<sup>12</sup>

According to the Centers for Disease Control, National Center for Health Statistics, more than 40% of adults with any musculoskeletal pain condition used a complementary and alternative medicine (CAM) procedure to help alleviate their symptoms.<sup>4</sup> CAM procedures with a growing body of evidence include chiropractic, acupuncture, massage, and yoga.<sup>1,3,4</sup> Chiropractic represents 21.7% of CAM procedures used for neck pain.<sup>4,9</sup> A chiropractic adjustment applies an abrupt, controlled thrust to a joint in the neck.<sup>9</sup> For many people, chiropractic adjustments to the neck can provide short-term pain relief with minimal risk.<sup>29</sup> Acupuncture is the application of thin needles into a patient's body at various points.<sup>9</sup> The application of the needles is thought to stimulate the production of endogenous opioids.<sup>1,4</sup> Acupuncture is considered safe when performed by a certified practitioner using sterile needles; however, its efficacy for neck pain has been mixed. Although less evidence exists to support massage in people with neck pain, massage is still considered beneficial for those suffering from neck pain. During a massage, a therapist manipulates the muscles of the neck with his or her hands.<sup>9</sup> This action is thought to increase local blood flow, lymphatic flow, and break up tissue adhesions.<sup>1</sup> Yoga is a mind-body approach that uses a progression of breathing exercises, stretches and poses to help build muscle, improve posture, and reduce stress.<sup>28</sup> However, for the purposes of this discussion, the mechanism by which chiropractic adjustments work to relieve neck pain will be explored in further detail.

### *Mechanism*

The efficacy of chiropractic adjustments as an intervention for neck pain has been recognized in many ways<sup>1,3,4,5,12,13,30,31</sup> According to Kent, spinal degeneration can lead to pain, local irritation, autonomic dysfunction, and other neurological consequences.<sup>32</sup> He goes on to describe a dysafferentation model of vertebral subluxation in which chiropractic adjustments may restore normal afferent input in the central nervous system (CNS), which allows the body to adapt better to its environment.<sup>32</sup> This model may explain why chiropractic adjustments affect the health outcomes of patients with high blood pressure and other non-musculoskeletal issues in the review of literature.

Other studies demonstrate that chiropractic adjustments have been found to block pain signals by temporal summation.<sup>33</sup> Temporal summation occurs within the pain inhibitory complex of the dorsal horns when a chiropractic adjustment is administered. When an adjustive thrust is delivered, serotonin, enkephalin, and endorphin—the neurotransmitters involved in

hypoalgesia—are released causing pre- and post- synaptic inhibition of type C and type A delta pain fibers within the dorsal column. Such synaptic inhibition blocks pain signals before they enter the spinal cord and reach the brain.<sup>1,33</sup>

### Limitations

Some limitations exist when using case studies to draw conclusions about larger populations.<sup>33</sup> Case studies are at the bottom of the evidence hierarchy.<sup>34,35</sup> Nevertheless, because there is an overall lack of evidence within the field of chiropractic, case studies are important because they add to the body of evidence concerning chiropractic and point toward subjects that may be addressed with further research.<sup>34</sup>

In this case, patient compliance waned after the first reassessment. This is problematic because it is unknown whether greater improvements could have been realized. Interventions other than Blair Upper Cervical technique were used in several of the articles mentioned in the review of literature. Inclusion of these interventions confound the results of those studies.<sup>35,36</sup> More evidence is necessary for those in health care to understand which chiropractic interventions are most beneficial to patients. Currently, it is unknown whether the use of Blair Upper Cervical technique results in equally significant patient outcomes when compared to the use of medicine alone, chiropractic adjustment with exercise, or chiropractic adjustment in conjunction with medicine. To help clear some of this confusion, the focus of this case study was exclusively on the use of chiropractic adjustments utilizing Blair Upper Cervical technique as an intervention for neck pain.

### Conclusion

This case study demonstrates a positive result for the patient. From this study, the reader may appreciate the evidence supporting the possibility that chiropractic adjustments utilizing Blair Upper Cervical technique may benefit patients with neck pain. However, it is difficult to establish a true casual relationship between chiropractic adjustments and the relief of neck pain because such generalization cannot be made from a single case study. To better determine the efficacy of chiropractic adjustments for neck pain, further research with larger sample sizes and blinding is needed to establish such a relationship.

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