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# CASE STUDY

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## Improvement in Chronic Hypertension Following a Single Upper Cervical Adjustment: A Case Report

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### ABSTRACT

**Objective:** To report a case presenting with chronic hypertension undergoing upper cervical chiropractic care.

**Clinical Features:** A 55-year-old male seeking chiropractic care with a 20-25 year history of hypertension. Various medication combinations have been used without success in maintaining normal blood pressure. Radiographs revealed an atlas misalignment anterior and superior with right laterality. History revealed a traumatic side blow cervical spine injury 25-30 years prior to chiropractic visit.

**Intervention and Outcome:** The patient received upper cervical specific chiropractic care over a seven month period. Thermography performed bilateral in the cervical spine via infra-red technology and leg length inequality were used to analyze progress on a daily visit basis. Radiographic analysis was utilized to determine the characteristics of the upper cervical misalignment present. An upper cervical adjustment was performed according to the KCUCS knee chest protocol. Through the course of 7 months care, the patient received one upper cervical adjustment and the blood pressure progressively lowered.

**Conclusion:** The findings presented in this case study suggest that an upper cervical chiropractic adjustment may benefit patients who have unresolved chronic hypertension.

**Key Words:** *Atlas, Subluxation, Upper Cervical Spine, Hypertension, Upper Cervical Knee Chest Adjustment*

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### Introduction

Today, one in three people are diagnosed as hypertensive and are at risk for other cardiovascular related diseases such as heart attack, renal failure, stroke, and increased mortality. More alarming is the fact that an estimated 55% of patients with hypertension who are already on anti-hypertensive medication remain hypertensive.<sup>1</sup> The U.S. is estimated to have spent \$63.5 billion on the direct and indirect cost of hypertension.<sup>2</sup>

Hypertension is defined as a systolic blood pressure higher than 140 mm Hg or a diastolic blood pressure higher than 90 mm Hg (millimeters of mercury). The diagnosis of hypertension is based on the average of two or more blood pressure readings taken at each of two or more office visits after the initial screening. The recommended management includes single or combined treatments consisting of diuretics, angiotensin converting enzyme inhibitors, angiotensin II receptor blockers,  $\alpha$ -blockers,  $\alpha/\beta$ -blockers,  $\beta$ -blockers, and calcium antagonists.<sup>2</sup> It has also been established for more than 70% of hypertension patients it takes two or more antihypertensive agents to achieve their blood pressure goals.<sup>3</sup>

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Between 1994 and 2004 there was an 18% relative increase in the prevalence rate of hypertension.<sup>4</sup>

Hypertension has been linked to a central nervous system etiology. The rostral ventrolateral medulla known as the cardiovascular control center of the brain has garnered attention. It is a source of supraspinal sympathetic outflow to the heart, kidneys, and vessels.<sup>5</sup> Research in several animal models has supported the mechanism of a pulsatile mechanical pressure on the rostral ventrolateral medulla produced by looping arteries or veins relating to systemic hypertension. By relieving this mechanical pressure through microvascular decompression (MVD) of the left rostral ventrolateral medulla at the level of the root entry zone for cranial nerves IX and X, a reduction has been seen with systemic hypertension in cases.<sup>6</sup>

One specific case involved a 47 year old male with a 4 year history of hypertension who was admitted into a hospital in 1998 for left hemifacial spasms. An MRI prior to surgery demonstrated neurological compression of the rostral ventrolateral medulla by the left vertebral artery. MVD was performed to relieve this compression surrounding the facial nerve as well as the rostral ventrolateral medulla. Three months later the patient's blood pressure decreased from 152/110 mm Hg to 90/70 mm Hg, resulting in a decrease in his previous antihypertensive regimen. Five months after the MVD blood pressure had balanced out to 108/74 mm Hg.<sup>7</sup>

MVD is an invasive procedure that is not without risk. The cost of surgery prohibits many suffering with hypertension and its effects from receiving treatment. Conservative management for hypertension should be explored as a viable option for proper management in individuals as well as throughout the population.

The occipito-atlanto-axial complex is the most complex joint system in the entire human body. The spinal vertebrae below the atlas and axis have interlocking joints in order to maintain position and function. The occipito-atlanto-axial complex relies on convex and concave articulating surfaces, the odontoid process, ligaments, and muscles.<sup>8</sup> A misalignment or displacement at the cranio-vertebral junction can cause distortion of neural pathways possibly affecting sensory, motor, and autonomic function.<sup>9</sup> Upper cervical chiropractic care has been shown to be both safe and effective.<sup>10</sup>

This case report presents a possible relationship between a nonsurgical conservative method of normalizing blood pressure by properly aligning the head position through upper cervical chiropractic care.

## Case Report

### History

A 55-year-old male with a 20-25 year history of high blood pressure presented into our chiropractic practice. He had no other complaints. The patient reported seeing his doctor regularly for hypertension. Over the years he had tried many different regimens of medication without any success in normalizing his blood pressure. Upon his first visit into the office, he was taking hyzaar and metoprolol along with

vitamin E, multi-vitamins, omega 3's, and beta-carotene. Hyzaar is an angiotensin II receptor antagonist combined with a diuretic component<sup>11</sup> and metoprolol is a beta antagonist. The patient stated he was not seeing a reduction in blood pressure readings while on two medications and a restricted diet including reduced sodium intake. He also reported a significant side blow injury affecting his cervical spine 25-30 years ago.

### Examination

An initial physical and chiropractic exam were performed. Blood pressure was 180/110, pulse; 91 beats per minute, temperature; 97.2 degrees, weight; 178 pounds, and height; 73 inches. A 12 mm apparent right short leg was measured on prone examination.

Cervical spine x-rays were performed consisting of APOM (anterior posterior open mouth) full cervical stereo views and a neutral lateral cervical view. Stereo views allow the examiner to view the image in three dimensions.<sup>12</sup> The radiographic examination depicted a slight right head tilt. The first cervical vertebra was seen with right laterality relative to the respective condyles. The axis had a spinous process deviating from the midline left along with a larger body laminar notch on the left. The neutral lateral view as well revealed slight anterior wedging and a break in George's line at the C3/C4 motor segment. The atlas lateral angle was 19 degrees. The upper cervical listing was determined to be C1 ASR (anterior and superior with right laterality relative to the corresponding condyles) and a C2 PLI (posterior and inferior axis with right rotation).

Bilateral paraspinal thermography was performed via a Tytron C-3000 instrument for the purpose of assessing neurophysiologic function of the cervical spine.<sup>13-15</sup> Five thermography graphs were performed prior to the initiation of care for the purpose of establishing the patient's subluxation pattern. The thermograph readings revealed constants consistent with aberrant neurophysiological function.<sup>16</sup>

The reliability of thermography has been favorably reported.<sup>17-19</sup> Skin temperatures are constantly changing in response to an ever changing internal and external environment. Asymmetrical, static, and persistent temperature differentials found in the cervical spine represent aberrant neurophysiology. The thermography readings are recorded on a graph. Multiple graphs are analyzed to identify constant points within each graph. Monitoring patients via thermography on a day to day visit basis assists in determining progress as well as helping the doctor decide when a patient needs to receive an upper cervical adjustment or when the previous adjustment is holding its corrected position.<sup>16, 20</sup>

Prone leg length inequality was measured via Chiroslide in millimeters and was performed on each daily office visit.<sup>21</sup> Research has shown significant repeatability with prone leg length measurements.<sup>22</sup> In this case, leg length inequality was used as a secondary measuring tool in determining neurophysiological health relate to the cranio-vertebral junction.

## *Intervention*

An upper cervical adjustment was performed utilizing the Knee Chest Upper Cervical Specific (KCUCS) protocol. The X-ray analysis determines doctor stance, torque and vectors used for the upper cervical adjustment. Paraspinal thermography interpreted according to the KCUCS protocol for pattern analysis was utilized to determine when an upper cervical adjustment was to be performed.<sup>16</sup> The prone leg checks were used as a secondary factor in determining when an upper cervical adjustment would be necessary.

The upper cervical spinal listing of C1 ASR was assessed through the x-ray analysis. To accomplish this adjustment the patient was placed in the knee chest posture utilizing a solid head piece knee chest table. The patient was placed with his knees on the floor and midsternal notch at the front of the knee chest headpiece. In the knee chest position the patient's head was rotated maximally towards the right with his ear and neck maintaining solid contact with the headpiece. The doctor performed a tissue pull and roll in onto the patient's C1 posterior arch right side.

A set down and body drop was performed as detailed in the KCUCS protocol. Once the correction had been made the patient was instructed to rest in a supine position for 45 minutes. The rest period is employed to facilitate the soft tissue surrounding the upper cervical region to adapt to the new head position. Therefore, it is thought rest immediately following the upper cervical adjustment increases the ability for the atlas to maintain and hold the correction. A post graph reading was obtained along with a pelvic balance leg length inequality exam to assess the initial outcome.<sup>23</sup>

## *Outcomes*

Over the course of seven months of care the patient visited the office 21 times for the purpose of assessing the status of the upper cervical subluxation. The patient received one upper cervical adjustment at the beginning of care. There were no other adjustments, manipulations, physical therapy, dietary advice or other forms of treatment procedures offered this patient throughout the duration of care. The patient did not change his lifestyle in regards to exercise or any other significant alterations. Before his first adjustment, the patient's blood pressure was measured as 180/110 mm Hg. After the chiropractic correction and 45 minutes rest the patient's blood pressure was reduced to 164/94 mm Hg. Over the seven month period the patient's blood pressure consistently reduced with the initial reading at 180/110 mm Hg and the last measurement of 136/82 mm Hg. See table 1 for detailed account of in-office blood pressure readings.

The patient performed blood pressure readings on a daily basis prior to care in our office. He continued this regime throughout care. Prior to the initiation of care in our clinic his blood pressure readings were consistent with our findings recorded at the beginning of care. He related the blood pressure readings ranged as low as 170/100 to 210/120. The patient used an automated bicep cuff blood pressure device. He elected to reduce his medications when at-home readings began consistently staying under 140/90. He was recommended to consult with the prescribing doctor for

instruction on how to reduce. He chose to manage the reduction on his own. Beginning on June 29, 2009 the patient began bringing in his at-home readings and are reflected in table 2.

After two months of care, the patient independently elected to stop metoprolol and reduce hyzaar by one half. Four months after the initial correction, the patient elected to cease all medications taken for his high blood pressure. Table 1 indicates the timing medications were reduced or stopped.

The patient adhered to his previous restricted diet and supplementation routine throughout his care in our office. He maintained the same relative weight, beginning care at 178 pounds and measured at 176 on his last office visit. Throughout the 7 months of care his weight fluctuated between 176 pounds up to 181 pounds.

## **Discussion**

The interesting component of this case study is the gradual reduction of long term hypertension over a 7 month period following one upper cervical correction. The decrease in blood pressure remained with a cessation of all hypertension medications.

Backris, et al brought forth a landmark study showcasing NUCCA upper cervical chiropractic care and reduction in hypertension.<sup>24</sup> No reports to date, known to the authors, have recorded a reduction in hypertension utilizing the KCUCS or any other knee chest upper cervical procedure.

Other studies have shown a relationship between the anatomical position of the atlas vertebra and a reduction in blood pressure.<sup>24, 25</sup> Recent neurological research has shown a relationship between pulsatile arterial compression of the rostral ventrolateral medulla and the presence of high blood pressure.<sup>1,3,5-7</sup> Magnetic resonance evaluations done by Akimura et al found that out of thirty two patients with diagnosed essential hypertension, 90% of them showed neurovascular compression of the left ventrolateral medulla.<sup>26</sup>

It is beyond the scope of this case study to determine the physiological mechanism for the decrease in blood pressure associated with an upper cervical alignment correction. The study demonstrates a case with a 20-25 year history of hypertension not successfully managed with medication responding in a favorable way following a single upper cervical chiropractic adjustment.

## **Conclusion**

This case report outlines a 55 year old male undergoing upper cervical chiropractic care with 20-25 years of hypertension not successfully managed with medication. After seven months of care and one upper cervical chiropractic adjustment his chief complaint of high blood pressure was reduced from 180/110 mm Hg to 136/82 mm Hg. This reduction occurred even though all hypertensive medications were eliminated and no change in the patients diet or weight. Conclusions drawn from one case study should be carefully interpreted. More research is needed in the area of upper cervical chiropractic care as a plausible conservative.

## References

1. Julian P, Hidefumi W. Is neurogenic hypertension related to vascular inflammation of the brainstem? *Neuroscience and Behavioral Reviews* 2009; 33:89-94.
2. Chiong JR. Controlling hypertension from a public health perspective. *Int J Cardiol* 2008; 127:151-156.
3. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo Jr JL et al. Randomization of patients seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension* 2003; 42:1206-1252.
4. Cutler JA, Sorlie PD, Wolz M, Thom T, Fields Le, Roccella Ej. Trends in hypertension prevalence, awareness, treatment, and control rates in United States adults between 1988-1994 and 1999-2004. *Hypertension* 2008; 52:818-827.
5. Schobel HP, Frank H, Naraghi R, Geiger H, Titz E, Heusser K. Hypertension in dpatients with neurovascular compression is associated with increased central sympathetic outflow. *J Am Soc Nephrol* 2002; 13:35-41.
6. Levy EI, Scarrow AM, Jannetta PJ. Microvascular decompression in the treatment of hypertension: Review and update. *Surg Neurol* 2001; 55:2-11.
7. Morimoto S, Sasaki S, Takeda K, Furuya S, Naruse S, Matsumoto K et al. Decreases in blood pressure and sympathetic nerve activity by microvascular decompression of the rostral ventrolateral medulla in essential hypertension. *Stroke* 1999; 30:1707-1710.
8. Panjabi M, Dvorak J, Duranceau J, Yamamoto I, Gerber M, Rauschnig W et al. Three-dimensional movements of the upper cervical spine. *Spine* 1988; 13(7):726-730.
9. Goodman R. Hypertension and the atlas subluxation complex. *Chiropractic: The J Chiro Res & Clin Invest* 1992; 8(2):30-32.
10. Eriksen K, Rochester RP, Hurwitz EL. Symptomatic reactions, clinical outcomes and patient satisfaction associated with upper cervical chiropractic care: a prospective, multicenter, cohort study. *BMC Musculoskelet Disord.* 2011; 12: 219.
11. Noble RJ. *Cardiovascular Pharmacology.* ACC Curr. J. Rev. 1998; 7(4):18-25.
12. Reimer, PA. *The chiropractic stereoscope in modern technic and procedures.* The Palmer School of Chiropractic. May 1936.
13. Uematsu S, Edwin D, Jankel W, Kozikowski J, Trattner M. Quantification of thermal asymmetry. *J Neurosurg* 1988;69:552-555.
14. Ebrall P, Iggo A, Hobson P, Farrant G. Preliminary Report: The Thermal Characteristics of Spinal Levels Identified as Having Differential Temperature by Contact Thermocouple Measurement (Nervo Scope). *Chiropr J Aust* 1994; 24:139-146.
15. Feldman F, Nickoloff E. Normal Thermographic Standards for the Cervical Spine and Upper Extremities. *Skeletal Radiol* 1984; 12:235-249.
16. Kessinger R, Anderson M, Adlington J. Improvement in pattern analysis, heartrate variability & symptoms following upper cervical chiropractic care. *JUCCA* May 9, 2013; page 32-42.
17. Plaughter G, Lopes M, Melch P, Cremata E. The Inter- and Intraexaminer Reliability of a Paraspinal Skin Temperature Differential Instrument. *J Manipulative Physiol Ther* 1991;14(6).
18. Owens E, Hart J, Donofrio J, Haralambous J, Mierzejewski E. Paraspinal Skin Temperature Patterns: An Interexaminer and Intraexaminer Reliability Study. *J Manipulative Physiol Ther* 2004;27:155-159.
19. McCoy M. Paraspinal thermography in the analysis and management of vertebral subluxation: a review of literature. *J Vert Sublux Res.* 2011; 57-66.
20. Duff SA. *Chiropractic clinical research, interpretations of spinal bilateral skin temperature differentials.* San Francisco: Paragon Printing, 1976.
21. Kessinger RC, Boneva DV. A new approach to the upper cervical specific, knee-chest adjusting procedure: Part 1. *Chiropr Res J* 2000; 3(1):14-32.
22. Seemann DC. Bilateral weight differential and functional short leg: An analysis of pre and post data after reduction of an atlas subluxation. *Chiropr Res J* 1993; 2(3):33-38.
23. Kessinger RC, Boneva DV. Vertigo, tinnitus, and hearing loss in the geriatric patient. *J Manipulative Physiol Ther* 2000; 23(5):352-362.
24. Bakris G, Dickholtz M, Meyer PM, Kravitz G, Avery E, Miller M et al. Atlas vertebra realignment and achievement of arterial pressure goal in hypertensive patients: A pilot study. *J Hum Hypertens* 2007; 1-6.
25. Knutson GA. Significant changes in systolic blood pressure post vectored upper cervical adjustment vs resting control groups: A possible effect of the cervicosympathetic and/or pressor reflex. *J Manipulative Physiol Ther* 2001; 24(2):101-109.
26. Kimura T, Furutani Y, Jimi Y, Saito K, Kashiwagi S, Kato S et al. Essential hypertension and neurological compression at the ventrolateral medulla oblongata: MR evaluation. *Am J Neuroradiol* 1995; 16:401-405.

**Table 1.** Daily blood pressure was performed by the doctor's staff. Blood pressure was assessed on each office visit with the standard blood pressure cuff placed on the left bicep and the stethoscope placed in the left cubital fossa. Daily case record was recorded by the patient. Comments in parenthesis are the doctor's notes clarifying pre/post adjustment blood pressure readings and when patient elected to reduce or stop medications.

| Daily Office Visit Vitals |              | Daily Case Record  |
|---------------------------|--------------|--|
| Date                      | B.P. (mm Hg) |  |
| 2/24/09                   | 180/110      | High blood pressure ( <i>prior to the upper cervical correction</i> )                |
| 2/24/09                   | 164/94       | ( <i>post upper cervical adjustment and 45 minutes rest</i> )                        |
| 2/27/09                   | 168/92       | Great  |
| 3/9/09                    | 150/90       | Late stress  |
| 3/19/09                   | 168/94       | Pretty good  |
| 3/23/09                   | 166/84       | Pretty good  |
| 3/30/09                   | 160/88       | Pretty good  |
| 4/6/09                    | 154/84       | Pretty good  |
| 4/13/09                   | 154/80       | Good   |
| 4/20/09                   | 164/84       | Good   |
| 5/4/09                    | 166/86       | Good ( <i>Patient elected to stop metoprolol and reduce hyzaar medication by ½</i> ) |
| 5/18/09                   | 164/84       | Good   |
| 6/1/09                    | 158/88       | Good   |
| 6/15/09                   | 154/88       | Good   |
| 6/29/09                   | 159/85       | Good ( <i>Patient elected to take hyzaar medication every 3rd day</i> )              |
| 7/13/09                   | 154/80       | Good ( <i>Patient elected to stop all medications</i> )                              |
| 8/3/09                    | 150/88       | Good   |
| 8/24/09                   | 132/86       | Good   |
| 9/14/09                   | 136/82       | Good   |

**Table 2.** Blood pressure readings recorded in the office.

