CASE STUDY

Resolution of Atrial Fibrillation & Hypertension in a Patient Undergoing Upper-Cervical Chiropractic Care

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ABSTRACT

Objective: To describe the correction of an upper cervical subluxation in a patient with atrial fibrillation and hypertension.

Clinical Features: A 68-year-old female presented with fatigue, weakness, dyspnea, tachycardia and hypertension. Her cardiologist previously diagnosed her with atrial fibrillation.

Intervention & Outcomes: High velocity, low amplitude adjustments were delivered in the knee-chest position to the atlanto-occipital area on 4 separate visits. Upon receiving a second adjustment, the patient's heart rate variability readings showed signs of improvement suggesting autonomic balance. Her blood pressure returned to normal and was able to discontinue her medication.

Conclusion: This case reviews the use of upper cervical in the resolution of signs and symptoms in a patient with atrial fibrillation.

Keywords: *Chiropractic, Upper Cervical, Knee-Chest, Atrial Fibrillation, Subluxation, HRV, Arrhythmia*

Introduction

In atrial fibrillation (AF), the atria do not contract due to overstimulation of the SA node, the natural pacemaker of the heart. It is believed that the firing of an ectopic focus within venous structures adjacent to the atria, usually the pulmonary veins, is responsible for initiation and perhaps maintenance of AF.[1] The atrioventricular conduction system is also over stimulated causing an irregular ventricular rate.

It is also possible that, in a significant number of patients, rotors, that give rise to vortices of electrical waves, are the drivers that maintain the arrhythmia.[2] These rotors according to Jalife et al., are stationary or may shift, but tend to be located in the cardiac muscle. AF can become self-sustaining with no need of a trigger due to remodeling of the atria structurally and electrically.It is estimated that 2.3 million Americans and 4.5 million Europeans are affected by atrial fibrillation; it predominantly impacts persons > 65 years of age.[3,4] By the year 2050 it is estimated that more than 5.5 million people in the United States will have atrial fibrillation.[3]

AF can be classified as paroxysmal (lasting less than 7 days and self-resolving), persistent (lasting longer than a week) or permanent (lasting over a year). While often asymptomatic, according to The Merck Manual of Diagnosis and Therapies, signs and symptoms of AF can include palpitations, chest discomfort, and symptoms of heart failure (weakness, light-headedness, and dyspnea).[1] Well-known risk factors for atrial fibrillation include coronary artery disease (CAD), diabetes, heart failure, hypertension, hyperthyroidism, and myocardial

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infarction.[1,3,6]

Medical intervention focuses on ventricular rate control, rhythm control with thromboembolism prevention, and ablation procedures. However, these treatments remain controversial. For elderly patients, the risk-benefit and cost-benefit ratio of some treatment options may be more unpredictable.[7] Drug interventions for rhythm control involves the antiarrhythmic class of drugs. These drugs have an associated pro-arrhythmic risk and AF reoccurrence. Eagle et al.[3] state 9- 23% have pro-arrhythmic side effects while 55-67% had a reoccurrence of atrial fibrillation. Rate control involves beta-blockers, dixogin, and calcium antagonists.

Boriani[7] explains the risk involved with these drugs is the possibility of inducing effects such as excessive sinus bradycardia and atrio-ventricular blocks. Ablation procedures, the elimination of the AV node, are done when the patient is unresponsive to drug therapy. The long-term efficacy and cost-effectiveness are yet to be determined.[8]

According to Thrall,[9] patients with AF have significantly poorer quality of life compared to healthy controls, the general population, and other patients. The purpose of this paper is to discuss a patient with atrial fibrillation undergoing upper cervical chiropractic care.

Case Study

History

The patient is a 68-year old female who had a complaint of paraxsomal atrial fibrillation. She had been previously hospitalized for two days, which led to the diagnosis of atrial fibrillation. The cardiologist prescribed Flecainide and Aspirin. Also noted in the history was a complaint of hypertension in which she was treated with an angiotensin receptor blocker (ARB), Benicar, as well as Metaprolol, a beta blocker. She had a history of multiple transient ischemic attacks.

The symptoms associated with AF were fatigue, weakness, shortness of breath and rapid heart rate up to 130bpm. The patient reported for the first three months she would have symptoms 1-2 times a week, which increased to everyday over the following two months. By the 6th month the symptoms occurred at least 4 times a day. The symptoms were worse in the morning and did not change with activity. There was no family history of atrial fibrillation.

Chiropractic Care & Instrumentation

Upon examination, the patient had a blood pressure of 193/98 mm Hg. Heart rate measured at 98bpm and respiratory rate at 14 breaths per minute. Postural examination revealed right cervical head tilt, left high shoulder, right high hip, and an anterior head carriage. Cervical range of motion tests showed decreased right and left rotation and right lateral flexion.

The upper cervical technique used in this case was the Knee-Chest protocol. The Knee- Chest protocol is based upon the research of B.J. Palmer. In upper cervical techniques, the analysis to determine the presence of an upper cervical subluxation includes paraspinal infrared thermography, leg length assessment, and x-rays of the upper cervical spine.

A thermal scan was performed on the posterior cervical region of the patient with a Tytron C-3000.[7] The Tytron contains infrared probes that glide paraspinally from the 7th cervical vertebra to the occipital brim.[8] Skin temperature is controlled by the sympathetic nervous system through the arteriole system and is activated by centers located in the spinal cord, brain stem, and hypothalamus.[9] Thermal imbalances of 0.5ºC or higher indicate abnormal autonomic regulation or neuropathophysiology.

The "pattern" analysis, developed by B.J. Palmer is used to determine if there is neurological deficit. Owens et al.[10] explained that in pattern analysis, a series of thermal readings are compared, looking for certain constant features of the temperature profile. When enough constant features are found, the patient is considered ''in pattern'' and is most likely subluxated. Pattern analysis with the detection and measuring of constants is more reliable than visual inspection due to the ease of reproducibility.[10] The patient's thermograph showed a pattern angle with a deviation greater than .5C with all constants present indicating a neurological inference. (Figure 1)

Hart[11] stated because paraspinal temperature analysis is only one measure of the neurological component, it must be used with other assessments. Thus, for further assessment for a possible upper cervical subluxation, a prone leg check was performed. Leg check revealed a right leg shorter than the left by 14mm.

Additional assessment of the patient's neurological state included heart rate variability (HRV) measurements using the BioSuite 3.0. Heart rate is controlled by the autonomic nervous system (The sympathetic and parasympathetic nervous system). Zhang et al[12] concluded that HRV appeared to be a good outcome assessment tool for monitoring patients' autonomic nervous system activity. Changes in autonomic flow to the heart may be measured using HRV.[13] In this case, the patient's initial HRV showed dual high autonomic tone which indicated abnormal autonomic tone between the sympathetic and parasympathic nervous system. (Figure 2)

Upper cervical radiographic series were performed due to neurological assessments indicating neurological deficit. It was determined this patient was a candidate for upper cervical care. To maintain postural integrity, the patient was placed in a positioning chair using head clamps. The four views taken were: anterior- posterior, anterior-posterior open mouth, vertex, and lateral cervical. (Figure 3-5)

Analysis of these views were done using the atlas, foramen magnum, and occipital condyles, which are associated with the neural axis.[8] These radiographs demonstrated the three dimensions of an Atlas (C1) misalignment: sagittal, coronal, and transverse. Left laterality and anterior- superiority were found which yielded the C1 listing of ASL.

The initial adjustment of C1 with the listing ASL was given on a Kale knee chest table. The patient was positioned with the sternal notch in front of the table and the right side of the head

as well as the shoulders was placed on the table. Contacting the left posterior arch just under the occipital brim, a counterclockwise tissue pull and roll in was made with the left arched hand.[14] Using the same hand, the pisiform was used to contact the posterior arch and the right hand was placed on top to form a toggle mechanism necessary for a thrust. A high velocity, low amplitude thrust was administered After the adjustment the patient was instructed to rest in a supine position for 30 minutes. A post paraspinal thermal scan and HRV were performed.

Outcomes

Five days after the initial adjustment, a second adjustment was administered at which point the patient's condition started to improve. She reported that her heart rhythm was improving and that her energy level had increased. Post HRV revealed autonomic tone to be within normal limits. (Figure 6) A post thermal scan revealed to be clear of pattern. (Figure 7)

A week later during a routine visit, the patient reported she consulted with her cardiologist and decided to discontinue her medication. The patient did not require an adjustment for six weeks after discontinuing her medication.

About two months later, the patient only needed to be adjusted twice. Her HRV and thermal scan showed no signs of autonomic imbalance. The patient's hypertension resolved as well. It was recorded to be 124/74 mm Hg compared to the initial reading of 193/98. The patient is still under care and has not had any reoccurrence of arrhythmia.

Discussion

Chiropractic Literature

The amount of peer-reviewed articles discussing chiropractic care in the case of arrhythmias is lacking. There are no clinical trials that suggest chiropractic care for the management of arrhythmia.[15] However, the literature found suggests there are benefits. The focus of the case studies were reducing arrhythmias through the reduction of vertebral subluxation and thereby balancing autonomic tone. In each case subluxations in the upper cervical spine were addressed. Although data from the HRV and ECG readings were not statistically significant, autonomic tone seemed to stabilize over time.

Igarashi and Budgell[15] discussed the case of a 22-year-old male with a history of fatigue, dyspnea, and tachycardia during mild exercise. He was diagnosed with arrhythmia during a high school physical exam. He was adjusted at C1-C2, and the upper thoracic area and monitored with an ECG and HRV instrument. After a total of eight treatments, the patient reported an alleviation of symptoms and was able to run short distances without overexertion.

Another study by Igarashi and Budgell[16] discussed the case of a 23-year-old man who initially volunteered for a cohort study on the effects of spinal manipulation on HRV. He was excluded from the study due to an ECG that showed bradycardia and trigeminal rhythm. After a single upper cervical adjustment at C2, ECG showed a change in heart rhythm and trigeminal rhythm was resolved.

Proposed Mechanisms

The cause of arrhythmias can be traced back to an imbalance of the parasympathetic and sympathetic nervous system. Arrhythmias are known to be caused by lesions in the brain or spinal cord.[16] Because the upper cervical region, C1 and C2, misaligns in a three-dimensional torque,[17] it is said that this can cause pressure on the medulla. When pressure is applied to the medulla, it can affect vital functions of the cardiovascular, gastrointestinal, or respiratory system. The following are proposed mechanisms.

Grostic's[18] dentate ligament- cord distortion theory states that the misalignment of atlas, because of it's attachment to the spinal cord via the dentate ligaments, can cause stress and distortion of the cord. This mechanical stress and distortion of the cord can cause abnormal neurological function. This can also cause altered vascular flow to the cord and produce anoxia in areas of the cord.[19] Areas of the cord that can be anoxic in this particular case study could be the nucleus ambiguous which is the nucleus of the vagus nerve, controller of the parasympathetic system.

The next proposed mechanisms are the somato-sympathetic and somato-vagal reflexes. Jarmel[20] explained that spinal joint dysfunction may cause interruption in cardiac regulation by activating somato-sympathetic and somato-vagal reflexes. According to Reis et al, the lower brainstem located at the C1 assists with cardiovascular somato-sympathetic reflexes affecting a large number of sympathetic preganglionic neurons.[21]

With regards to vertebral dysfunction triggering a somato-vagal reflex, the first two spinal nerves communicate with the vagus nerve via the C1- C2 nerve loop.[22] Because the first two spinal nerves exit posterior, they are more susceptible to compression. Compression of these spinal nerves due to an upper cervical subluxation may cause dysfunction of the vagal nerve. Consequently this can lead to a variety of arrhythmias.[21]

Conclusion

In the case of a 68-year-old female with atrial fibrillation, there was a resolution of symptoms after receiving four adjustments over the course of three months. Evidence in this case supports the use of upper cervical care in the management. In addition to the elimination of AF symptoms, the patient's blood pressure returned to normal. However, this is a case of one patient and one cannot assume results will be the same for other cases.

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Figure 1: Initial thermograph with an established pattern angle greater than .5 C showing evidence of neurological deficit

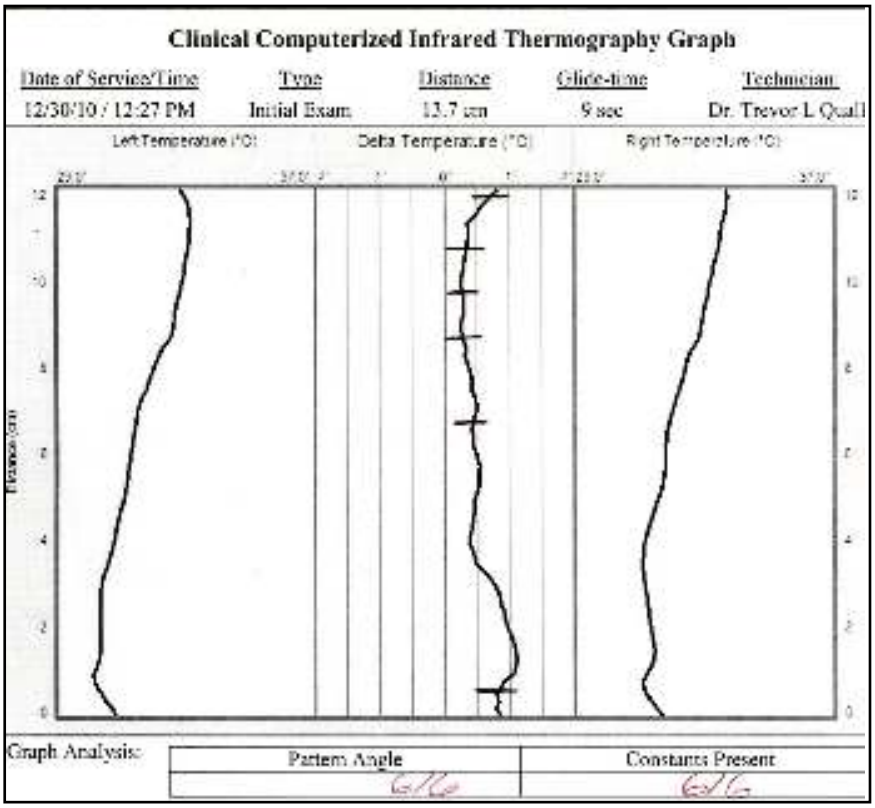

Figure 2: Intial HRV in category 3 showing high dual autonomic tone.

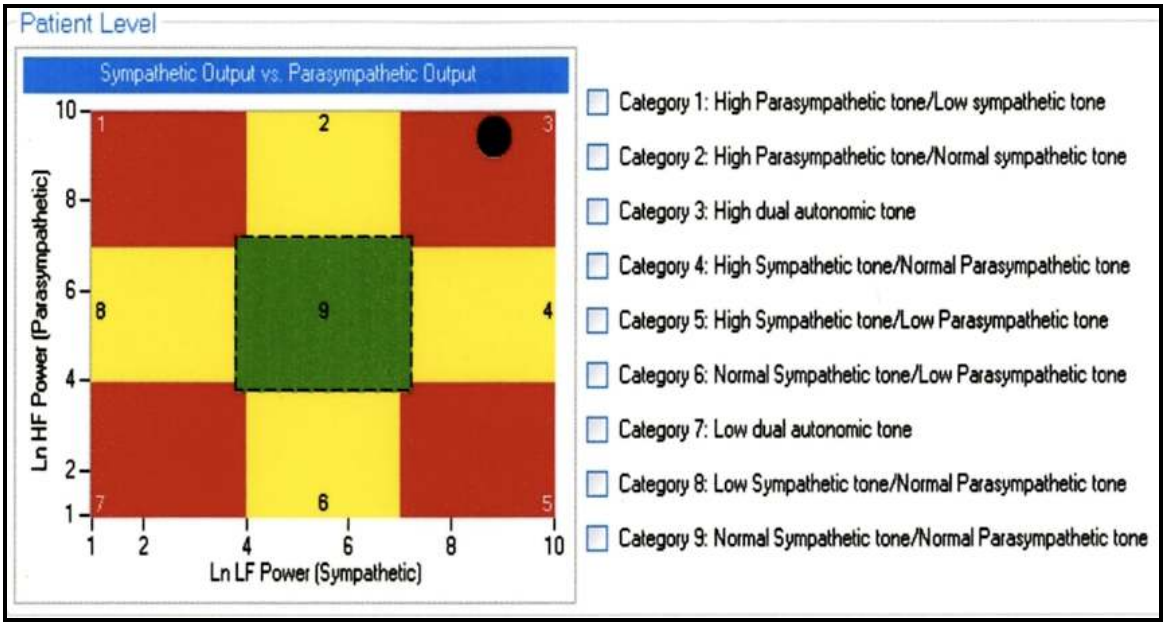

Figure 3: Vertex view to analyze for rotation of C1

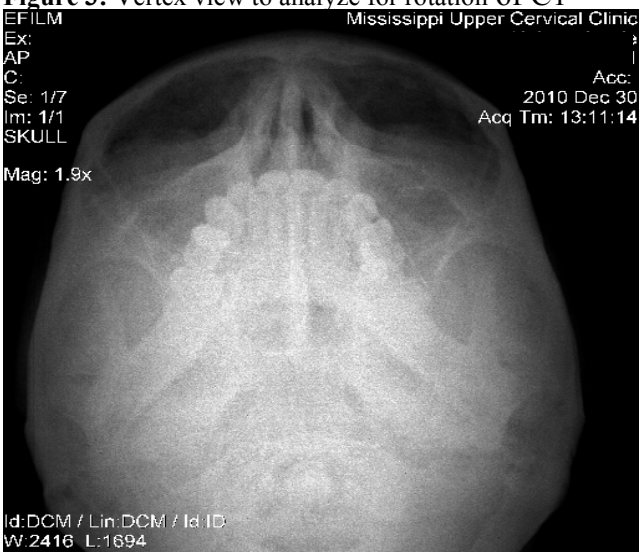

Figure 4: AP Open Mouth view used to assess laterality of C1 in relation to C2

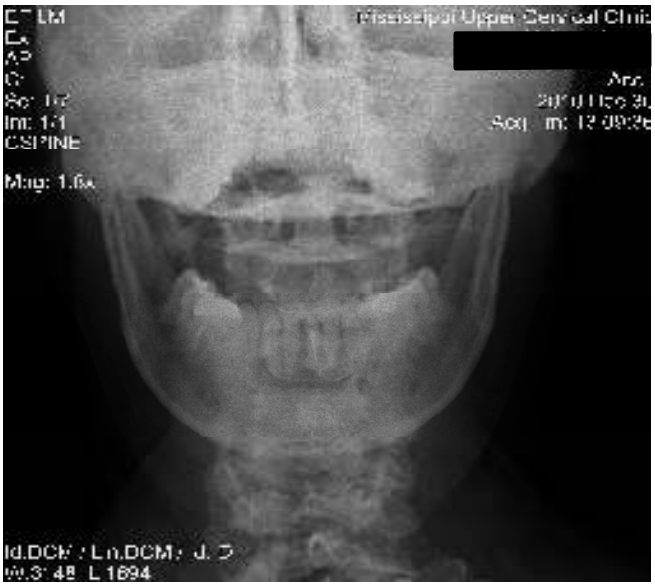

Figure 5: Lateral Cervical used to analyze position of C1. Note C4 has gone posterior in relation to C5. There is IVOC at C4-C5

Figure 6: Thermal scans from post second adjustment showing no pattern.

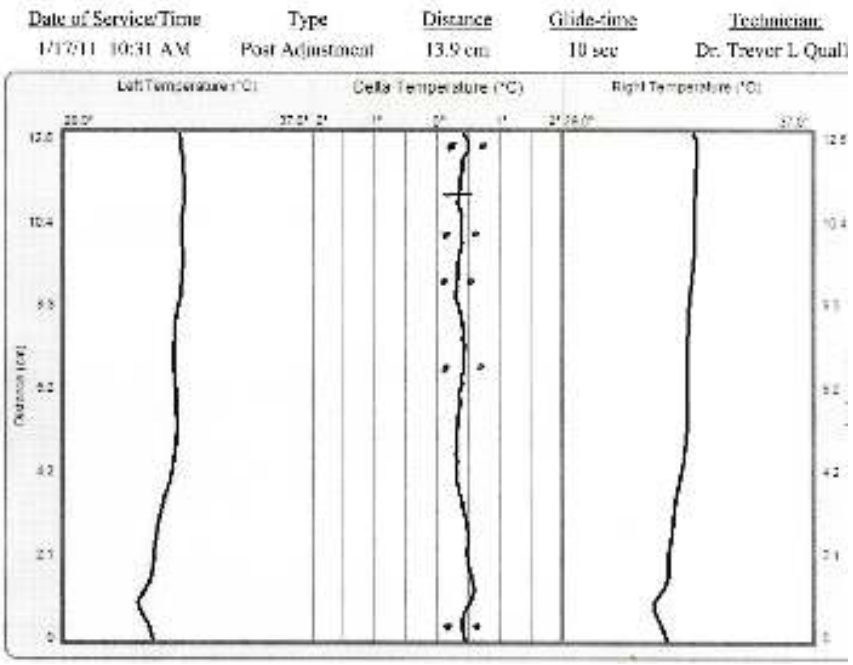

Figure 7: HRV after second adjustment in category 9 showing normal Sympathetic/normal parasympathetic.