Upper Cervical Specific Pattern Analysis Utilizing Paraspinal Thermography, Leg Length Inequality and Heart Rate Variability in Two Patients with Tachycardia

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ABSTRACT

Objective: The purpose of this study is to report on the outcomes of two patients with tachycardia undergoing Blair technique using cervical specific chiropractic pattern work based on paraspinal dermothermography, modified Prill leg length inequality tests and heart rate variability.

Clinical Features: Two patients, a sixty two year old male diagnosed with Paroxysmal Supraventricular Tachycardia (PSVT) and a twenty two year old female diagnosed with Postural Orthostatic Tachycardia Syndrome (POTS) were evaluated. Both patients’ chief complaint was low back pain. POTS patient also had a history of migraine. Both had a history of significant head trauma.

Results: Five months after initial adjustment, PVST patient presented with absence of pattern, change in HRV and resolution of lumbago. POTS patient presented nine weeks after first adjustment migraine free. Her POTS was unchanged. Her HRV analysis was unchanged.

Conclusion: Sometimes higher heart rate variability is not better heart rate variability. In these two cases there appears to be a relationship between the improvements in bilateral skin temperature pattern analysis and Prill modified tests with over all health following an upper cervical chiropractic technique. It is feasible that upper cervical chiropractic care can have a positive effect on the autonomic nerve system. Further study is recommended to determine the role of HRV testing in subluxation management.

Key Words: Upper cervical specific chiropractic, vertebral subluxation, pattern analysis, paraspinal thermography, heart rate variability, modified Prill leg checks, Blair x-ray analysis, paroxysmal supraventricular tachycardia (PSVT), postural orthostatic tachycardia syndrome (POTS), Vagus (Cranial Nerve X), autonomic nervous system, adjustment

Introduction

In 1930 B.J. Palmer introduced an upper cervical technique known as hole-in-one (HIO), and in 1946 the technique was re-named upper cervical specific. The idea that the upper cervical region is the major area for subluxation did not initially belong to B. J. Palmer but he is known for promoting the concept. Palmer’s early ideas about HIO biomechanics and its x-ray analysis can be found in the 1934 text Subluxation Specific, Adjustment Specific. The typical upper cervical specific chiropractor analyzes his or her patients with a pattern analysis of paraspinal heat temperatures and leg length.
The radiographic set for upper cervical specific technique is comprised of a minimum of three x-ray views. The adjusting method consists of the toggle-recoil, with the patient in either the side-posture, prone or knee-chest position. Of the 60,000 practicing chiropractors today, less than 2,000 use a specific protocol for adjusting the upper cervical spine on a regular basis.

Paroxysmal supraventricular tachycardia (PSVT) is a type of “short-circuit” arrhythmia. It may result either from atrioventricular nodal re-entrant tachycardia (AVNRT) or from an accessory pathway, which may occur as part of the Wolff-Parkinson-White (WPW) syndrome. PSVT may occur at any age and commonly occurs in patients who have no other types of heart disease. Patients with PSVT typically describe a rapid, or racing, regular heartbeat (between 130 and 230 beats per minute) that starts and stops abruptly. Postural tachycardia syndrome (POTS), is a disorder marked by abnormal blood circulation and blood flow to the brain and heart when standing up from the lying position, causing severe lightheadedness, fainting and a rapid heart rate.

Parasympathetic innervation of the heart is mediated by the Vagus nerve. Specifically, the Vagus nerve acts to lower the heart rate. The right Vagus innervates the sinoatrial node. Parasympathetic hyperstimulation predisposes those affected to bradyarrhythmias. The left Vagus when hyperstimulated predisposes the heart to atrioventricular blocks. At this location nerves secrete substances which have effects on receptors in target tissues. The substance released by the Vagus nerve is acetylcholine. The Vagus nerve has three nuclei in the CNS associated with cardiovascular control, the dorsal motor nucleus, the nucleus ambiguus and the solitary nucleus. The parasympathetic output to the heart comes mainly from neurons in the nucleus ambiguus and to a lesser extent from the dorsal motor nucleus. The solitary nucleus receives sensory input about the state of the cardiovascular system, being an integrational hub for the baroreflex. The exact mechanism of how an upper cervical adjustment can affect heart rate via the Vagus nerve is beyond the scope of this paper.

Methods

In pattern analysis, successive thermal plots are compared, looking for certain constant features of the temperature profile. When enough constant features are found, the patient is considered “in pattern” and most likely in a subluxated state. Intraexaminer and interexaminer reliability of paraspinal thermal scans using the TyTron C-3000™ have been found to be very high, with ICC values between 0.91 and 0.98.

A detailed leg check was performed on the patients to determine cervical involvement, as developed by J. Clay Thompson, DC and Clarence Prill, DC. Starting with prone leg check for relative short leg. Thompson checks to determine presence of possible cervical syndrome and modified Prill to individually test all seven cervical vertebrae. The author previously researched and tested an expanded version of the modified Prill tests used by the Blair Chiropractic Society’s C1 through C4 to extend down through C7. Intraexaminer repeatability tested very good, while interexaminer repeatability tested excellent. The subluxation pattern was determined by combining the information gathered from the surface thermography pattern analysis and leg length inequality checks. The presence or absence of this pattern determined when and where to adjust.

How to adjust was determined by x-ray analysis. Modified Blair analysis was used in the upper cervicals. Anteriority or posteriority is the major misalignment in most cases. Due to the rocker shape of the superior articulation, if atlas moves anterior, it must also move superior. When atlas moves posterior, it must also move inferior. There are only four C1 listings under this system, anterior and superior on the right or left (ASR, ASL), and posterior and inferior on the right or left (PIR, PIL). Pierce Results analysis of the lower cervicals suggests that most C4, C5 & C6 subluxations are from whiplash. Posterior lower subluxations were adjusted with a knife edge contact and a down and forward drop.

The heart rate variability (HRV) examination was selected as an additional diagnostic tool to evaluate physiological significance of pattern changes following the application of an upper cervical chiropractic technique. There have been multiple studies demonstrating autonomic nervous system health and balance improvements through chiropractic care. In this study the relationship between HRV examinations, chiropractic pattern analysis, upper cervical x-ray analysis and two subjects with tachycardia were observed. Autonomic neuropathy has been shown to lead to conditions such as heart disease, syncope, vertigo and tachycardia.

The heart rate variability (HRV) examination is becoming more commonplace in the chiropractic clinic. It is a natural fit for the chiropractor wanting to evaluate the function of the autonomic nervous system (ANS). It readily measures the overall activity of the ANS, a direct measure of ANS health and adaptability. HRV also measures balance between the sympathetic and parasympathetic branches of the ANS. In this study, measurement and analysis of HRV data was performed by the BioSuite HRVTM biosignal analysis unit designed by HRV Enterprises LLC.

Results

The patient with PSVT presented with moderate right head tilt, POTS mild right head tilt. PSVT presented with a one inch relative short right leg, POTS a half inch short right leg. No cervical syndromes observed. Prill tests C1+++ and C5+ for PSVT, C2+ and C6 for POTS. Thermography: PSVT - C1 left Delta T 0.66 degrees C (Ills.1.2); POTS- C1 right Delta T 1.57 degrees C. (Ills.3,4) Initial heart rate variability: ANS activity 116 PSVT, 132 POTS; ANS ratio 30 PSVT, 32 POTS and both had high parasympathetic tone with normal sympathetic tone. (Ills.5,6) Cervical x-ray listings for PSVT: C1 ASR, C5 PLI; (Ills.8,9) POTS: C1 double PLI, major, PIR minor, and C6 PLI. (Ills.10,11) Degenerative arthritis and disc degeneration at C5 found on PSVT’s lateral film.

Twelfth visit, five months after initial adjustment, PVST patient presented with absence of pattern and lumbago. On one visit the patient presented in pattern with heart rate at 203 with high heart rate variability and high parasympathetic tone. (Ill.7) After specific atlas adjustment and 15 minute rest, heart rate was 80. On another visit he presented in pattern with heart rate at 204 with high heart rate variability and high parasympathetic tone.
rate at 83 with low heart rate variability. After adjustment and rest it was 201 with high heart rate variability and increased parasympathetic tone, but the subluxation pattern had cleared. POTS patient’s lumbago was exacerbated by a fall on the ice while carrying a bookcase. She presented on her sixth visit, nine weeks after first adjustment, migraine free. It was the first time she went a month without a migraine in seven years. Her POTS was unchanged. Her HRV was also unchanged.

Discussion

Thermography has withstood the test of time. It has been used chiropractically for ninety years. It also has medical applications.14 Although the author considers the cervical syndrome test to be the most telling upper cervical test for subluxation available, these patients both tested negative on every visit. The cervical syndrome complex also has a strong medical background.15 Leg check inequality testing is well documented in the literature.16

Anatomical abnormalities of the cervical spine at the level of the atlas vertebra are associated with relative ischemia of the brainstem circulation and increased blood pressure. A placebo-controlled study demonstrated a specific atlas adjustment can significantly lower high blood pressure. The procedure had the effect of not one, but two blood-pressure medications given in combination and it was adverse-event free. Eight weeks after undergoing the procedure, 25 patients with early-stage high blood pressure had significantly lower blood pressure than 25 similar patients who underwent a sham chiropractic adjustment.17

In these two cases there appears to be a relationship between the improvements in bilateral skin temperature pattern analysis and Prill modified tests with over-all health following an upper cervical chiropractic technique. It is feasible that upper cervical chiropractic care can have a positive effect on the autonomic nerve system. It is not possible to determine a correlation between HRV analysis and over-all chiropractic vertebral subluxation analysis in this report of two cases.

Conclusions

Sometimes higher heart rate variability is not better heart rate variability.18 Unlike thermography and leg length inequality testing, it was not possible to determine the relationship between HRV analysis and over-all chiropractic vertebral subluxation analysis in this report of two cases. Further study is recommended.

References

4. Taylor EW, Jordan D and Coote JH. Central Control of the Cardiovascular and Respiratory Systems and Their Interactions in Vertebrates. (http://physrev. physiology. org/ cgi/ content/ abstract/ 79/ 3/ 855)
5. Owens E, DC, Hart J, Donofrio J, Paraspinal Skin Temperature Patterns: An Interexaminer and Intraexaminer Reliability Study, J Manipulative Physiol Ther 2004 (Mar);27 (3):155-159
18. Stein P, Domitrochich, Hui N. Sometimes Higher Heart Rate Variability Is Not Better Heart Rate Variability: Results of Graphical and Nonlinear Analyses, Washington University School of Medicine, St. Louis, Missouri
Illustration 1 (PVST)

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