

Case Study

Resolution of Obstructive Sleep Apnea Following Chiropractic Care to Reduce Vertebral Subluxation

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Abstract

Objective: The purpose of the study is to provide a detailed report on the improvement and reduction of symptoms of a patient diagnosed with obstructive sleep apnea (OSA) by way of Chiropractic Biophysics (CBP) chiropractic care.

Clinical features: A 51-year-old male presented with an eight-year history of sleeping problems associated with sleep apnea.

Intervention and outcomes: The chiropractic care administered was CBP protocol, a technique based on restoring the normal three-dimensional curvatures to the spine. Myo-Vision Thermography (thermal scan) was used to measure the patient's progress throughout the course of treatment.

Conclusion: This case demonstrates the reduction and improvement of obstructive sleep apnea and associated sleeping problems following consistent subluxation-based chiropractic care in a 51-year-old male. This case provides additional evidence to the literature of the positive effects subluxation-based care can have on the improvement of obstructive sleep apnea. It is necessary to note that additional chiropractic studies on the topic are required to further support the evidence.

Keywords: *Chiropractic, Chiropractic Biophysics Technique, Obstructive Sleep Apnea, Myo-Vision Thermography, Subluxation, adjustment, manipulation*

Introduction

Obstructive sleep apnea (OSA) is the recurrent partial and complete obstruction of the oropharynx and hypopharynx during sleep.¹⁻⁴ The apnea-hypopnea index (AHI) is used to measure severity of OSA. When the AHI score is ≥ 5 , the patient is diagnosed with OSA. OSA syndrome is the diagnosis when the AHI score is ≥ 5 and the patient also has daytime sleepiness.² Daytime sleepiness, as defined by the American Association of Sleep Medicine is mild, moderate, and severe relative to its impact on daily social life.^{2,5} Other sequela include morning headaches, impaired memory and concentration as well as cardiovascular and metabolic disorders.⁵⁻⁷

OSA is described as loud snoring, choking, awakening due to gasping with repetitive interruptions of complete upper airway obstruction that is resolved with temporary arousal.^{3,6,8} It is commonly defined as 10 or more episodes of obstruction,

each lasting at least 10 seconds in duration, detected each hour of sleep.^{3,9} The trachea and bronchi maintain patency by cartilaginous support. Upper airway patency is critically dependent on the dilator muscles of the pharynx.⁴ The pharynx is the most common area of obstruction. In the pharynx the sternohyoid, genioglossus, and tensor veli palatini muscle work together to either dilate or stiffen the extrathoracic airway.¹⁰ When a person is sleeping, the upper airway muscles, specifically the dilator muscles, undergo a loss of neuromuscular tone, especially during REM.^{4,8} Patients whose anatomy is disproportionate are more likely to experience a complete collapse of the airway while sleeping.⁴

The OSA and snoring prevalence are both twice as common in men than they are in women.² According to McNicholas et al, OSA affects about 10% of men and about 3% of women in well developed countries and is increasing in commonality as

fast as obesity is doing the same. It is postulated that hormonal effects on upper airway muscles and collapsibility, gender differences in body fat distribution, and differences in pharyngeal anatomy and function are reasons to explain the predominance amongst males.²

Risk factors for developing OSA include age, obesity, smoking, and alcohol, male sex, craniofacial anomalies, and familial risks.^{2,4,5} Until age 50-60, the frequency of snoring increases. After this age, however, the frequency will decrease in both men and women. Despite the decrease in snoring beyond age 60, OSA still remains and continues to increase in prevalence. Obesity is an important risk factor for sleep apnea and snoring. It is also common amongst those diagnosed with OSA. Obesity is believed to predispose to OSA because of mass loading in the upper airway.² The inflammation in the nasopharyngeal airway in smokers and the sleep instability from nicotine withdrawal during the sleeping hours is what is proposed to put smokers at risk for developing OSA. Non-smokers who are exposed to second hand cigarette smoke on a daily basis are also predisposed to becoming habitual snorers. A side effect of alcohol is the reduction of motor output to the upper airways resulting in hypotonia of the oropharyngeal muscles. Laboratory studies have found alcohol to increase both the frequency and duration of apneas. Alcohol dependence and its affect on the reduction of motor output to the oropharyngeal muscles proved to be more significant in lean women.² It has been known for multiple family members to have OSA, however the transmission is unclear. However, the genetic component is suspected because of nonobese male and female members having OSA.⁴

Someone who is diagnosed with OSA has an increased risk of having a heart attack and stroke. They are also more likely to have serious automobile accidents and incur an injury in the workplace due to excessive daytime sleepiness.^{2,7} According to an article by Riley et al, OSAS is the most serious sleep condition in terms of morbidity and mortality.⁴

Treatment for OSA can depend on the severity of the patient's symptoms. The following are considered when determining the severity: apnea index (AI [number of apneic episodes per hour]), extent of hypersomnia, neurological sequela, nocturnal arterial oxygen desaturation and sleep disruption, pulmonary hypertension or abnormal daytime blood gas values, and the presence of cardiac dysrhythmias. Treatment begins with identifying and eliminating provocative factors. Alcohol, sedatives, and antihistamines are recommended to be avoided at night.³ When the sleep apnea is mild, eliminating aggravating factors is usually effective in greatly reducing symptomatology.⁹ Several research studies have indicated that weight loss improved sleep disorder breathing. Therefore, it would follow that weight should be considered with obese patients diagnosed with OSA.^{4,11} However, the long term efficacy of the weight loss is trivial, as patients tend to regain weight and there is no guarantee that symptoms will decrease with weight loss.^{2,4}

Currently, the continued home usage of nocturnal nasal continuous positive airway pressure (CPAP) therapy has been known to dramatically reduce symptoms in severe cases of OSA.⁷ CPAP therapy is also the primary and most effective form of treatment for OSA.^{4,9} The CPAP machine is typically

used for moderate to severe cases of OSA.⁷ With the CPAP, a continuous flow of air is delivered from a blower unit to a tightly-fitting nasal mask held in place by head straps. Nasal CPAP acts as a 'pneumatic splint,' preventing collapse of the upper airway in all phases of respiration.³ A problem that arises with the CPAP machine is patient compliance. In order for this machine to have a renowned affect on the patient's sleeping, the patient needs to be using the CPAP machine 5 nights per week and 5 hours per night.^{4,12}

Surgical approaches to treat OSA have also been developed. The surgical approach consists of enlarging and/or stiffening the upper airway.⁷ The original surgical procedure for treating OSA was tracheostomy.^{4,11} This method of treatment was the treatment of choice in the 1970's and was a way to bypass the upper airway obstruction. It is no longer a common method of treatment used.⁴

The most common procedure done is uvulopalatopharyngoplasty (UPPP), however, the effectiveness of pharyngeal surgery as treatment for OSA is unclear because it is more effective at reducing symptoms, not curing OSA.^{1,3,5,7,9-11} This procedure includes removing excess tissue in the palate and tonsil area. Although it is helpful at reducing snoring, only about 50% of patients reported improvement and only about 30% regained control of the syndrome.⁴

There are no pharmaceuticals used to treat OSA at this time.⁷

With that said, there are currently no medical treatments with lasting effects or cure to this disorder.^{3,7} In cases such as this one, where there is no medical cure, the desire to seek other alternative healthcare choices is evident. While there are several case studies of chiropractic care having favorable outcomes with patients with OSA, the literature on the matter is very limited. The following case report documents the resolution of sleep apnea in a 51-year-old-male undergoing chiropractic care.

Case Report

Patient history

A 51-year-old male presented to a chiropractic clinic for chiropractic care with a chief complaint of sleeping problems associated with sleep apnea that had been going on for 8 years. His history revealed that he has been a desk worker for the last 30 years. He had also been tripped by a dog 6 years prior and landed on his back, and was involved in a car accident 5 years ago, leaving him sore and without injuries, respectively. The patient noted having recurring bouts of throat infections, a natural childbirth, and strained ligaments in his knee. Later during treatment, it was discovered that the patient also had a history of motion sickness.

Examination

The initial postural exam revealed multiple postural deformities. The deformities included increased thoracic kyphosis, anterior skull translation, bilateral dyskinesia at the atlanto-occipital articulations and at the sacral-iliac articulations. The levels of T1-T2 and T12-L1 exhibited loss

of motion.

A thermal scan was also performed in order to measure heat differences in the paraspinal skin. The thermography technology uses infrared heat to evaluate temperatures. Bilateral temperature differentials are considered to be of neurological significance (Figures 1 & 2).

Thermography has been used since the 1920's as a way for chiropractors to detect the presence of subluxation and to assess the outcome of chiropractic adjustments. The theory behind thermography is that there should be a strict symmetrical comparison between right-left paraspinal skin temperatures in healthy individuals, unless an abnormality in the autonomic nervous system is present.^{13,14} When there is a deviation in the normal values, a neurological pathology is expected to present. These values can then be quantified and used to improve treatment and management of the patient.¹⁵

Chiropractic Intervention & Outcomes

Chiropractic Biophysics (CBP) Technique is a chiropractic technique that was built on a foundation based in Linear Algebra theory mathematics and mechanical engineering.¹⁶ This technique operates on the basis that "(a) there is a normal static spinal configuration, (b) result in abnormal function within the homeostatic balance of the human organism and (c) altered resting static posture results in altered dynamics."¹⁷ Abnormal structure in the spine may lead to abnormal functioning of human body systems that result in dis-ease. The CBP technique focuses on restoring normal alignment to the musculoskeletal structure and reducing subluxation by way of adjusting and rehabilitation.¹⁷

In an effort to ensure that their technique was effective in the treatment of their patients, a research plan was established. This research plan, which was established in the 1990's, consists of four tiers, with each tier expanding upon the previous one. The tiers are:

1. Establish a scientific definition of the ideal and/or average human spinal alignment.
2. Define and investigate the existence of spinal subluxations.
3. Evaluate and investigate the existence of spinal subluxation types described in tier 2.
4. Develop interventions to reduce subluxation types in tier 2 using the assessment procedures in tier 3 and investigate patient outcomes using these interventions."¹⁶

With this four tiered research model, CBP researchers have been able to find reliability with their technique.

The CBP technique still preserves its roots in upper cervical technique while it now addresses subluxations present in the thoracolumbar spine.¹⁸ CBP practitioners may use a variety of adjusting techniques in order to deliver the adjustment. The delivery of the adjustment may come in the form of prone, anterior, and side-posture setups; as well as, devices that serve as fulcrums to assist in the delivery of the adjustment. These devices include Sacro-Occipital Technique-style wedges, drop-tables, and hand-held or floor-mounted mechanical

percussive devices.¹⁸ Regardless of what is utilized to deliver the adjustment, the patient is placed in a "mirror-image" position prior to the adjustment. This mirror-image pre-positioning is also used during the rehabilitation exercises. The significance of the mirror-image is to place the patient in a position that pre-stresses the musculoskeletal system in a way that encourages reversal of postural deviations when the adjustment is delivered and when the exercises are done.^{17,18}

While most techniques work in the two dimensional, CBP focuses on the three dimensional shape of human posture. The ultimate goal is aimed toward a global correction of this three dimensional posture. Utilizing the "mirror-image" when adjusting and performing exercises is key in reaching this goal.¹⁷

The Harrison spinal model is a model proposed by Donald D. Harrison, M.S., D.C., Ph.D founder of CBP technique. "The model is a proposed computerized geometric model of the range of ideal normal positions of the axial skeleton that serves as a clinical goal and as a standard against which a patient's relative spinal/postural health can be compared."¹⁹

The mirror-image postural adjustments are used in order to reduce the subluxation and misalignment of the spine in a three dimensional manner. Troyanovich gives an example of how this technique is utilized as follows "a patient presenting with a right lateral flexion malposition of the median sagittal plan of the skull relative to the median sagittal plane of the thorax would be placed in a position of left skull lateral flexion" before the adjustment was delivered appropriately. After the adjustment, the patient's posture would be evaluated again to ensure that reduction of the postural distortion had taken place.¹⁹

The rehabilitation in the mirror-imaged posture is important to correct the longstanding musculoskeletal postural adaptations present in the spine. The combination of the adjustments and the exercises is important in helping the patient achieve postural correction.¹⁹ Performing the exercises in a mirror-image position promotes physiologic re-education and adaptation to occur. The adaptation occurs in the soft tissue of the spine through the repetitive stresses put on the tissues. The tissues will adapt bringing balance to the postural muscles which in turn aids in restoring equilibrium loading positions.¹⁹ Similar to the position the patient is placed prior to the delivery of the adjustment, the patient is to also place themselves in a position that is opposite of their presenting curvature when performing the exercises. The typical protocol for the exercises begins with submaximal isometric mirror-image exercise to maximal isometric mirror-image exercise. Once the patient has successfully completed the isometric mirror-image exercises over a four-week period, they are instructed on how to perform short range-of-motion isotonic mirror-image exercise. This is followed up by full range-of-motion isotonic mirror-image exercise to complete the mirror-image exercise procedures.¹⁹

In this case study, the patient was analyzed for subluxation three times per week for twelve weeks and was re-evaluated before moving to a care plan of one visit per week for twenty-four weeks. The initial analysis for subluxation was based upon CBP technique analysis. Specific adjustments to the

occiput, T12-L1 and sacrum were delivered to the patient. The adjustments were administered using Diversified technique and a drop table.

The Terminal Point drop table was invented by Dr. J. Clay Thompson in the 1950's. Dr Thompson created the drop mechanism in order to preserve the functionality of the doctor's body, enable the safe delivery of low-force adjustments, and allow "fine-tuning of the forces applied through the adjustment of the tension on the drop pieces." The purpose behind the Terminal Point is to "correct vertebral subluxation at the terminal point – the end point – of its travel distance once having been set into motion."²⁰

The patient began to see an improvement in his chief complaint after three visits. After thirty-three visits, the patient was noted to have an improvement and resolution of symptoms associated with his sleep apnea. Posture wise, the patient was reported to have improved anterior skull translation and cervical range of motion. The vertebral subluxation found at T12-L1 had become stable and mobility of occiput-atlas has improved.

The patient also noted that early on in care, when the doctor was putting him in mirror-image to adjust the anterior skull translation and increased thoracic kyphosis using postural block under the thoracic spine and brought him back to midline, that he experienced moderate to severe nausea. This nausea was similar to the nausea that the patient had experienced with "motion sickness" on numerous events, especially while reading in the car. It was noted that the patient exhibited a poor outcome with eye tracking during testing. As a result, the patient was given exercises to help correct this and ultimately the nausea improved.

Discussion

Obstructive sleep apnea continues to be a condition that is becoming increasingly common. As this disorder becomes more prevalent in well-developed countries, it is imperative that the healthcare community finds a way to successfully help the individuals who are burdened with the condition. Medical treatment has been shown to dramatically reduce symptoms and reduce the AI score. However, no medical treatment has been shown to completely rid the OSA.³

The purpose of this case study was to determine the effect of CBP chiropractic care had on a patient experiencing sleep apnea. Per D.D. Palmer and B.J. Palmer, "a (sub)luxation of a joint, to a chiropractor, means pressure on nerves, abnormal functions creating a lesion in some portion of the body, either in its action, or makeup."²¹ The art, science, and philosophy of chiropractic together embody the paradigm that the human body has within itself the ability to self heal and self regulate.²² This innate intelligence within the human body is coordinated by the brain and spinal cord.^{22,23} When there is a disturbance in the nervous system, the interference creates an imbalance within the system and the body is then unable to efficiently self heal and self regulate. When this happens in the nervous system, a cascade of interference and dysfunction continues to all other systems in the body.^{22,23} This disturbance in the nervous system has been named a subluxation.

The human body is an operating system that contains systems within it that depend on each other heavily for proper function. Because the brain and the spinal cord are one, it is necessary to point out that as disturbances occur within the spine and spinal cord, the function of the brain would then be negatively affected. It would follow that the removal of such interferences, or subluxations, that proper function would be restored to the spinal cord, thus allowing for proper function of the brain, which would further provide the body the capability to self heal and self regulate as it was meant to do. In this case study, CBP technique was utilized to remove the interferences present within the spine.

While there are numerous models of vertebral subluxation, the best model to describe this case is the neurodystrophic model. According to Kent, "the 'neurodystrophic model' suggests that neural dysfunction is stressful to body tissues and that 'lowered tissue resistance' can modulate specific and nonspecific immune responses and may alter the trophic function of the involved nerves." The altered response in the immune system decreases lymphocytic function, as the nerves that innervate the lymph nodes are negatively affected by the presence of the subluxation. The decrease in lymphocytic function and increase in sympathetic activity predisposes the individual to illness by way of negatively affected tissue and organ response to infectious agents, hormones, and blood components.²¹

Furthermore, it can be reasoned that, the patient experienced an improvement in his OSA as the subluxations were adjusted and became more stable. When the interference was removed in the patient's body, the nervous system was able to function optimally.

Conclusion

The patient in this case study showed improvement in his sleep apnea after only three chiropractic visits. The patient also experienced a dramatic reduction in nausea associated with motion sickness.

As evidence based healthcare becomes increasingly popular and important in today's society, it is necessary to note that further studies on this condition is of great importance. Moreover, further studies on chiropractic care and its affect on OSA is required to obtain additional information on the efficacy of this treatment. Patients are continuing to look beyond medical treatment into alternative methods of care as their medical management generally does not eliminate their conditions fully.

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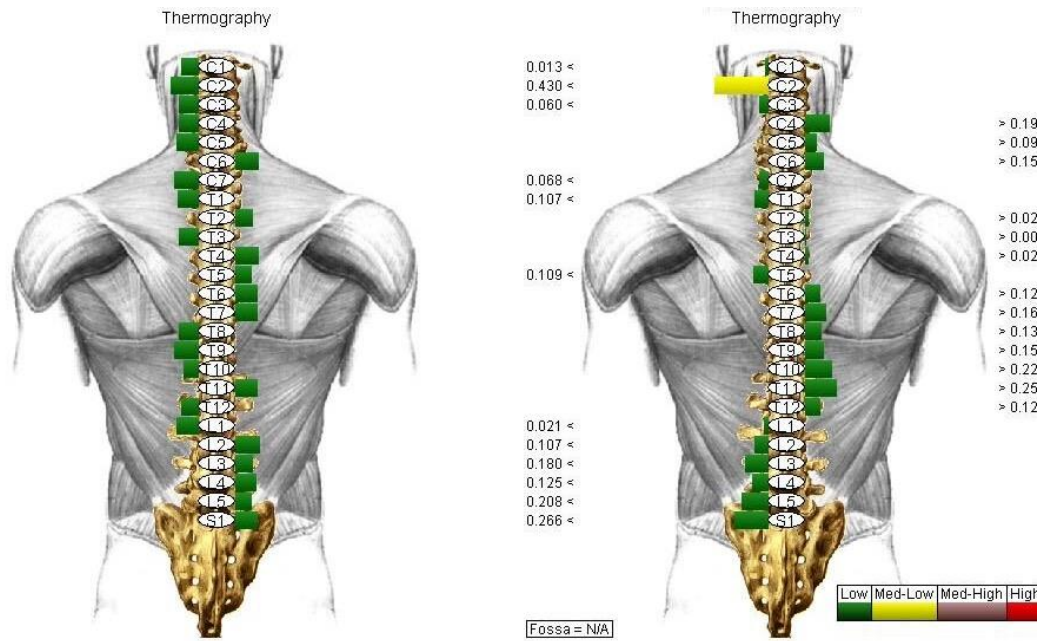


Figure 1. Thermal scan performed at initial consultation. The image on the left is considered to be normal, while the image on the right is the patient's scan.

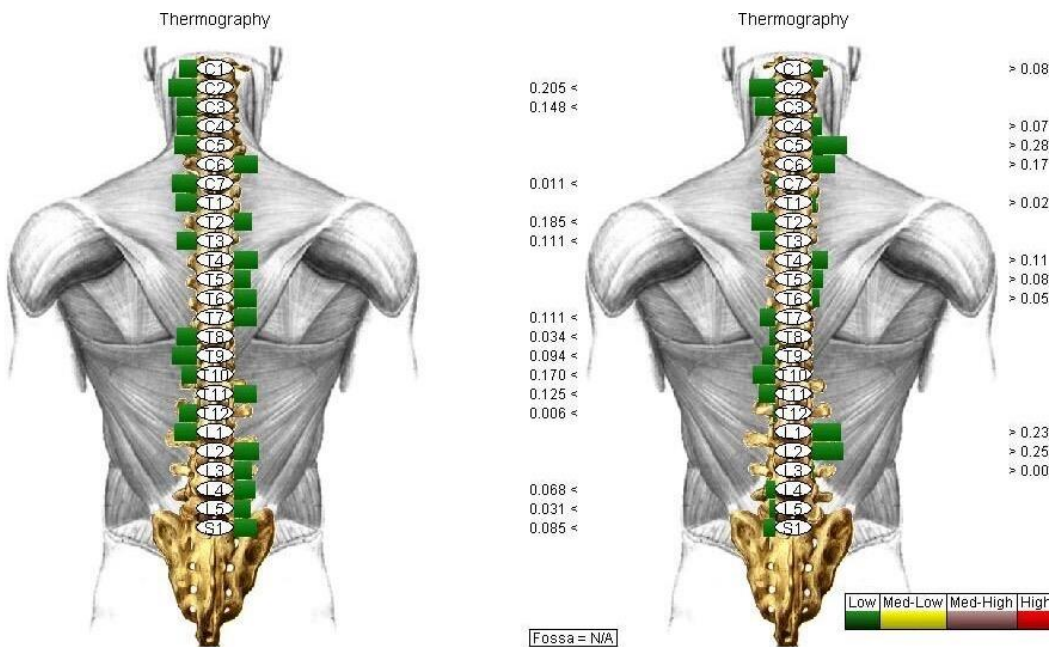


Figure 2. Thermal scan performed after 60 days of care. The image on the left is considered to be normal, while the image on the right is the patient's scan.