Conservative Treatment Using Chiropractic Care and Orofacial Myofunctional Therapy for Obstructive Sleep Apnea: A Case Report

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Abstract

Objective: The purpose of this case study was to describe the use of chiropractic care in the treatment of obstructive sleep apnea (OSA).

Clinical Features: A 42-year-old man with obesity presented for chiropractic care. He had OSA and was seeking a way to reduce snoring. The patient had a previous diagnosis of OSA and had been using a continuous positive airway pressure machine for over 5 years. The patient was a mouth breather, exhibiting poor oral and spinal posture.

Intervention and Outcome: The patient was treated for 90 days, which included chiropractic manipulation, orofacial myofunctional therapy exercises, nutritional modification, postural/ergonomic correction, and regular exercise. After a course of care, there was a drop in his apnea-hypopnea index from 55.4 events per hour to 3.4 events per hour. The patient lost 40 pounds, with an 8% reduction in body fat and an 8-point drop in his body mass index.

Conclusion: This patient's sleep apnea and other health outcomes improved under a course of a combination of chiropractic adjustments, orofacial myofunctional therapy, nutritional modification, postural/ergonomic correction, and exercise. (J Chiropr Med 2023;22:234-238)

Key Indexing Terms: *Sleep Apnea, Obstructive; Chiropractic; Weight Loss*

Introduction

Obstructive sleep apnea (OSA) has been described as interruptions of breathing due to lax, low-tone airway muscles, and/or excessively bulky, malformed, or inflamed pharyngeal tissues (ie, soft palate, uvula, tongue).[1] Obstructive sleep apnea is a serious health concern that is linked with other conditions, including hypertension, diabetes, and obesity, and an increased rate of motor vehicle accidents.[2]

The prevalence of OSA is approximately 1 in 4 people in the United States.[3] Obstructive sleep apnea is within a spectrum of breathing-sleep–related concerns—snoring and upper airway resistance syndrome are at the beginning of the spectrum, while severe OSA is at the far end.[4] Signs and symptoms of OSA may include the following: excessive daytime sleepiness, snoring, nocturnal polyuria, morning headache, and fatigue.[5] The normal onset of sleep itself is associated with a reduction of upper airway patency and an increase in respiratory resistance; however, this is not clinically significant in healthy individuals.[6-10] The most likely time for an apneic event to occur is during the deeper stages of sleep or rapid eye movement sleep when the upper airway muscle tone is neurologically decreased.[6-10] Inflammation will compound these effects.[11-14]

Continuous positive airway pressure (CPAP) machines are the preferred therapy in the United States to help OSA patients.[15] Continuous positive airway pressure machines can be highly effective in reducing the symptomology of OSA and are effective in making an immediate positive impact on the patient. However, CPAP may have side effects, including central sleep apnea.[16] Surgery is another option; however, the long-term benefits remain questionable unless undergoing a major procedure such as maxillomandibular advancement.[1] Oral appliances or mandibular advancement devices allow for natural breathing to occur, and the best results for mandibular advancement devices are seen in mild to moderate OSA cases.[17] Implantable devices are another option, which stimulates the muscles of the tongue to maintain a high tone.[18] However, the muscles of the tongue can also be stimulated simply by using them if a patient chooses to do so.

Conservative OSA treatments can be used with or instead of more invasive traditional therapies for OSA.[19] Such therapies attempt to address the root problems in OSA patients (eg, obesity, lack of oropharyngeal muscle tone), and patients learn how to manage the health concern on their own rather than relying on a device and or a provider.

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Conservative therapies include diet, exercise, orofacial myofunctional therapy, and chiropractic manipulation. Lifestyle changes such as diet and exercise have much-supporting evidence for resolving OSA.[11-13] Orofacial myofunctional therapy is rehabilitation of the oral-pharyngeal muscular tissue that has been used to treat OSA and snoring.[20-25] Orofacial myofunctional therapy aims to reduce the size of oral pharyngeal tissues by reducing inflammation and increasing tone.[26] In addition, orofacial myofunctional therapy aims to retrain faulty oral habits that may have led to the improper formation and use of oral pharyngeal structures. Such habits include mouth breathing, improper tongue posture, and improper swallowing patterns.[26]

Chiropractic spinal manipulative therapy (SMT) has been hypothesized to influence parasympathetic nervous system activity.[27-30] Patients with OSA may present with a forward head posture, excessive cranio-cervical extension, open mouth breathing, and hyperkyphotic thoracic spine,[31,32] which may have a negative effect on the patency of the airway. Thus, SMT and postural exercises aim to improve posture and increase upper airway tone.[31-33]

At the time of this writing, we found no published papers on the combination of chiropractic manipulative therapy and orofacial myofunctional therapy to address symptoms of snoring and OSA. Therefore, the purpose of this case study is to describe the use of chiropractic care in the treatment of a patient with OSA.

Case Report

A 42-year-old man presented with OSA for chiropractic care. He was seeking a way to reduce snoring. The patient had a previous diagnosis of OSA and had been using a CPAP machine for over 5 years. The patient was compliant with his CPAP machine; however, the patient wanted to discontinue the use of his CPAP machine, as he was frustrated with side effects, including dry nose and throat, swollen, puffy eyes, and waking due to machine and mask difficulties. The patient also often traveled for work and stated he "was fed up with the hassle and embarrassment of traveling with a CPAP machine."

On exam, he had swollen, puffy cheeks and a thickened, swollen neck. He exhibited a forward head posture with craniocervical extension and anteriorly rounded shoulders. The patient was able to use all of his facial muscles with no discomfort or difficulty. The left side of the patient's face was hypoactive in comparison to the right, as evidenced by facial muscle functional testing.

The patient was breathing primarily through his mouth and exhibited no lip seal. The patient had no temporomandibular joint discomfort on either side during active motion; however, palpation over the muscles of mastication revealed tenderness of the masseter muscles bilaterally, and fascial adhesions[34-36] (palpable, tender spots of fascial tissue found in muscles) were palpated in both. Mouth opening to 53 mm caused no discomfort and revealed no popping or clicking. The patient exhibited a mandibular deviation to the right of center, and a tongue flare (tongue pushing past the anterior teeth during a swallow) was observed toward the left side during swallowing. Tongue posture was on the floor of the mouth, with the tip of the tongue touching the posterior side of the front lower incisors.

The patient failed the Rosenthal test (strict nasal breathing for 1 minute), exhibiting anxiety and discomfort as he attempted to breathe solely through his nose. There were no obvious superficial obstructions to the patient's nostrils; however, the septum was deviated to the right. Upon intraoral inspection, the patient revealed an inflamed tongue with heavy scalloping indicative of airway pathology[37] and a Mallampati score of 4 of 4,[38] showing inflamed oral tissue and possible airway dysfunction. The patient exhibited a high and narrowed palate. The patient's molar teeth revealed signs of acid wear and bruxism. The pharyngeal arches were hypotonic and lightly responsive to motor activity. The soft palate hung low, and the uvula was long and thick. The patient had enlarged palatine tonsils bilaterally but more so on the right side, with a right score of 3 on the Brodsky scale.[39] Lingual and buccal frenula were non-restrictive, but the superior labial frenulum did appear restricted based on various classification methods.[40]

A recent polysomnography (PSG) test performed at a sleep laboratory under the guidance of a sleep physician showed an apnea-hypopnea index (AHI) of 55.4, meaning the patient's breathing was markedly decreased or stopped an average of 55 times each hour of sleep. This is considered severe OSA.

Heart rate variability was also used as a measure of overall patient health and progress. Heart rate variability is a measure of autonomic nervous system (ANS) function and has been shown to be linked to all-cause mortality.[41] Heart rate variability has been shown to decrease in patients with OSA and can indicate severity level.[42] In this patient's case, the low high-frequency score reflects the lack of vagal tone or parasympathetic control present in the patient's ANS. This has been suggested to be associated with an increased risk for cardiovascular-related events.[43]

Additional questioning about the patient's diet showed he was aware of his poor eating habits and was "making some corrections"; however, the patient admittedly still frequented fast-food restaurants while traveling for work. At home, the patient had removed most sources of simple sugars and dairy but still consumed grains, legumes, soy, processed food, and soda. The patient was not active in any form of exercise.

The patient's bed partner reported that he did snore every night at a moderately loud level. She stated the snoring was worse with alcohol and would change intensity with sleep position. No other major medical concerns were noted in the patient's history. The patient was being seen to improve multiple lifestyle habits, including snoring, oral

breathing, overall posture, sleep routine, sleep hygiene, dietary modification, and physical fitness planning.

Intervention

The program included 90 days of orofacial myofunctional therapy, SMT, dietary changes, and exercise with the following goals, protocols, and outcomes. Orofacial myofunctional therapy's goal was to increase tongue posture and tone, improve soft palate position and tone, reduce oral/pharyngeal inflammation, and improve swallowing patterns. Multiple orofacial myofunctional therapy exercises were assigned to be performed 3 to 5 times per day (see supplementary data). The exercises progressed in difficulty and changed as needed. The goal of SMT was to reduce craniocervical extension and forward head posture, as well as an increase muscular responsiveness and parasympathetic nervous system activity. The patient received SMT to the spine once per week and upper cervical manipulations 2 times per week throughout his program of care. The goal of the patient's nutrition recommendations was to reduce inflammation. The patient was to remove gluten, dairy, sugar, soy, and processed foods. Exercise recommendations aimed to decrease body fat and increase global muscular tone. The patient was instructed to begin a light walking and resistance training program.

Outcomes

The patient was compliant with the recommendations except for exercise, which he did not participate in. After the 90-day program was complete, a physical examination and in-laboratory PSG test were administered (Table 1). Subjectively, the patient's posture showed improvements. His head remained mildly forward but greatly retracted from the initial observation. Shoulders were back, and thoracic kyphosis was within normal limits. The patient's face and neck had better tone than previously noted, as subjectively assessed based on the amount of movement and responsiveness to facial muscle testing, showing only mild differences in activity from side to side. The patient remained pain-free with all functions of the jaw and had no discomfort with palpation of the masseter muscles. Tongue posture was resting in the palate with the tip of the tongue on the palatal rugae. Upon swallowing, the patient's tongue pushed up into the hard palate (normal). Upon intraoral inspection, the patient revealed a tongue with mild scalloping (much improved from the initial exam) and a Mallampati score of 2 (previously 4). The pharyngeal arches held a much higher tone and were very responsive to motor activity. The soft palate sat high, and the uvula had thinned, shortened, and was highly responsive to motor activity. The patient's tonsils had diminished in size bilaterally, the right side now scoring a 1 of 4 (previously 3).

Table 1. *Objective Findings Before and After the 90-Day Program*

Variable	Initial Visit Findings	After 90-Day Program
Weight, lb	242	202
Body fat, %	28.4	20.6
Body mass index	31.6	23.6
Neck circumference, in	17.25	15
Resting heart rate, beats/min	69	66
Blood pressure	134/81	131/78
Polysomnography, AHI	55.4	3.4
Heart rate variability (HRV)		
Mean IBI, ms	817	1010
Total power	478.93	10< >546.32
Low frequency	172	3761
High frequency	67	5914

AHI, apnea-hypopnea index; *IBI*, interbeat interval.

The patient's PSG testing showed an AHI of only 3.4 events per hour, which is less than mild OSA, making the use of a CPAP machine unnecessary. The patient did use his CPAP throughout the duration of his program until his sleep physician reviewed the results of the post-therapy program PSG and instructed the patient that he could discontinue using the CPAP machine.

There was a rise in all HRV metrics at the end of the program. The mean interbeat intervals increased by over 200 ms, and all of the frequency domain measures showed positive improvements. Most notable was the increase in high frequency, which is correlated to parasympathetic function.[44] The patient gave consent to have his personal health information published in this case report.

Discussion

In this case, we used conservative therapies shown to reduce OSA symptomology.[11-13,15-29] Because each patient is unique, each therapy was modified to fit the patient's needs. There are various therapies that are possible (see supplementary data). We propose that the combination of the conservative therapies used in this case had the following effects on the patient. First, the reduction of inflammation in the patient's diet could have helped with his weight loss and may have decreased inflammation in the patient's airway and allowed for improved muscular tone and reactivity of the patient's soft palate.

The orofacial myofunctional therapy exercises have been designed to retrain the position of the orofacial and airway muscles, as well as increase the tone of muscles in these areas. We hypothesized that the chiropractic SMT may have increased parasympathetic tone in the ANS,[27-30] as well as increased local muscular tone (cervical manipulations specifically). Spinal manipulative therapy may have also helped in improving his forward head posture and craniocervical extension.[31-33] We propose that these conservative therapies combined could have had a complimentary effect to increase the tone and function of the patient's airway and decrease inflammation in the patient's airway.

Limitations and Future Studies

Limitations to this case study include the involvement of only 1 individual; thus, these findings may not necessarily be generalizable. There was no use of instrumentation to measure objective improvements in muscular tone, as this was done based on the physician's observation. The broad treatment approach did not allow for a determination of the relative contributions of each component of the treatment. As well, the long-term effects for this patient are unknown.

Future research could separate each component of the therapy from determining the relative contribution of each to the patient's outcome. Well-designed future clinical studies could assess the relative contributions of various aspects of conservative therapy for OSA. In this case, a broad therapeutic approach was chosen to optimize outcomes, and none of the therapies, when administered properly, would have any harmful effects on a patient. Future research is needed to test the combination of these treatments with more invasive therapies such as CPAP, oral appliances, and/or surgery.[20,21,23-26] Further research is needed to generalize the combination of OSA therapies used in this case to a larger patient population.

Conclusion

A patient with OSA responded favorably to a conservative therapy approach. This patient's sleep apnea and other health outcomes improved under a combination of chiropractic adjustments, orofacial myofunctional therapy, nutritional modification, postural/ergonomic correction, and exercise.

Supplementary Data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcm.2023.03.008.

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No funding sources or conflicts of interest were reported for this study.

Contributorship Information

Concept development (provided idea for the research): D.H.
Design (planned the methods to generate the results): D.H.
Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): D.H., G.C.
Data collection/processing (responsible for experiments, patient management, organization, or reporting data): D.H.
Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): D.H., G.C.
Literature search (performed the literature search): D.H.
Writing (responsible for writing a substantive part of the manuscript): D.H., G.C.
Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): D.H., G.C.

Practical Applications

- A patient presented for chiropractic care and was seeking a way to reduce snoring.
- He was treated with chiropractic manipulation, orofacial myofunctional therapy exercises, nutritional modification, postural/ergonomic correction, and regular exercise.
- After a course of care, he experienced a drop in his apnea-hypopnea index.

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