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GCSS
1280 17th Avenue
Suite 101
Santa Cruz, CA 95062
888-556-4277
www.gonstead.com

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Obstructive Sleep Apnea and Gonstead Chiropractic

By: Christopher J. Meyer D.C.—Gonstead Diplomate, Green Bay WI

My present project on improving sleep began as a result of my son James' birth 14 months ago! Then as part of my maters degree program in integrative health science, I further developed a sleep improvement education program. Because sleep is an integral and essential foundation of health, and found that it needed to be improved in my life, I bring you this article.

While studying sleep and how to improve it I encountered sleep apnea as a major sleep disruptor. The top 5 causes of sleep disruption according to the American Sleep Association (ASA) are:

1. Insomnia
2. Sleep Apnea
3. Narcolepsy
4. Restless Legs Syndrome
5. REM Sleep Behavior Disorder

There are several types of sleep apnea, but I will focus on Obstructive Sleep Apnea (OSA) in this discussion. With OSA breathing effort is intact, but airflow is reduced, sometimes severely! Apnea is most pronounced during the REM stage of sleep when muscle tone throughout the body is greatly reduced. This appears to allow the tissues of the upper airway and pharynx to shift to the extent that it blocks the airway.

The initial indicator is snoring which affects 48% of people. There is some evidence that chronic snoring can induce a vibration effect similar to what happens in the arms of construction workers who work with jackhammers or hammer drills over long periods; i.e. vibration induced neuropathy, but in the nerves of the upper airway muscles.

A degree of breakdown in the nerves, muscles, connective tissue and mucus membranes of the upper airway has been observed to occur in chronic snorers. It is proposed by some that snoring precedes the damage that induces the apnea/hypopnea events that are associated with full blown OSA. But what precedes the snoring? Is it a loss of tone in the nerves leading to the initial loss of tissue tone that allows the snoring to commence? A history of asthma and allergies often precedes OSA, and there also appears to be a degree of ongoing inflammatory biochemistry that coincides with OSA. This would likely overlap with the inflammatory chemistry of obesity.

"Other adipokines, such as tumor necrosis, factor α and interleukin-6 are also elevated in obesity and may be linked to depression of CNS activity and airway neuromuscular control, thus perhaps increasing OSA severity, which consequently triggers proinflammatory substances, creating a vicious circle." (Ref #1)

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The person with OSA is most often unaware that they have a problem, but will be increasingly more fatigued during the day and it is usually their bed mate who alerts them to the problem. The other person will observe the person with OSA ceasing to breathe forperiods of time that can last from 10 to 60 seconds. The sufferer will often begin to breathe with a loud snort which can be startling. In mild cases the person has 5-15 episodes of apnea an hour, in moderate cases 15-30 and in severe cases 30 or more per hour. A normal healthy sleep efficiency is >85%, which means the person is awake <15% at night. In some sleep study cases the efficiency is measured as low as 60-50-40%. OSA is worse in men, obese persons, smokers, those who drink alcohol before bed, and back (supine position) sleepers.

Continuous Positive Airway Pressure (CPAP) is the first line medical treatment after diagnosis via a sleep study (Polysomnography) to differentiate Obstructive, Central and Mixed forms, from Narcolepsy. There are over 80 types of sleep disorders. Also, in combination with CPAP, lifestyle and behavioral changes are generally advised as treatment

Recently, I heard advertised on the radio a new treatment for OSA called "Inspire". It involves implanting a pacemaker in the chest that is turned on at bed time and which detects when inhalation is being attempted and sends an electrical impulse to the Hypoglossal N, CN#12. It increases tone in the tongue muscles to move the tongue anterior and opens the airway. It is indicated for those with severe OSA who are intolerant of CPAP and who are not obese (BMI > 32)

The hypoglossal N is considered a mostly motor nerve. It has associated motor fibers from C1 and C2 via the superior loop of the Ansa Cervicalis and the lower loop of the Ansa has fibers from C2 and C3 as well as C4 in some cases.

There is a great deal of variability in the upper cervical and lower cranial nerves with anastomosis being observed in dissections that involve CNs X, XI, XII as well as C1-4 in select individuals. There are some anatomical sources that indicate a degree of interpenetration of fibers of the superior ansa loop with the hypoglossal N fibers, and some sources indicate that the spinal nerve fibers reach the blood vessels and some of the glands of the tongue. But even if they interact only with the blood vessels of the shared course with the hypoglossal N the spinal nerves may exert a trophic effect on the hypoglossal N itself, and by extension all structures supplied by the hypoglosssal.

The high degree of interconnection and individual variability in the upper cervical and cranial nervous system makes me think that there may be a place for Gonstead chiropractic analysis and care to help influence the expression of this particular sleep disorder.

"*Extensive and variable neural anastomoses exist between the lower cranial nerves and between the upper cervical nerves in such a way that these nerves with their extra-axial communications can be collectively considered a plexus.*" (Ref #4) See References for a deeper dive into this area of anatomy.

The severity of OSA as measured by the Apnea Hypopnea Index (AHI) is worse when lying supine or when in REM sleep. When a person is in any other sleep stage than REM, their AHI is greatly reduced.

"Various estimates indicate that positional therapy alone could be used to treat approximately 30 to 50% of all patients with OSA. 8,9 " (Ref # 6) and " There were striking improvements in AHI and arousal index (AI) from stage 1 to 4 NREM sleep ($p < 0.001$), with intermediate levels in REM sleep. AHI and AI were also markedly reduced in lateral versus supine sleep in all sleep stages ($p < 0.001$), with an effect size comparable to that of the slow wave sleep effect." (Ref #5) The same degree of improvement in AHI is observed when a patient is able to sleep side lying vs supine. (Ref #5)

How many of you have had patients comment when under acute care for pain, that they are able to sleep better? What if it is due to more than simply a reduction in pain and suffering? It is estimated that 90% of people with OSA do not know they have it. I believe that a large number of our patients who report sleep improvement with chiropractic care may be suffering from mild or moderate OSA. What if they are now able to sleep side lying

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again and therefore can breathe again possibly even in REM sleep? May we find that restoring the functional capacity of the pelvis and especially SI joints allow for longer periods of side sleeping? The same would likely apply to the shoulders and cervical spine which can also limit side sleeping ability when they are bad.

It may be worth asking those who note increased sleep if they are dreaming more, as this may indicate an increase in their duration of REM sleep. By the way, decrease in REM sleep is associated with increased mental health complaints such as anxiety, depression and others.

OSA is worse in those who are obese, but it has been shown that CPAP use can lead to weight loss. It may be a vicious circle where lack of sleep increases weight gain, and weight gain makes OSA worse, which makes sleep worse. There appears to be a complex interplay of metabolic and hormonal disruption that goes along with OSA.

Questions:

- To what extent is lack of general physical conditioning through the body a factor? Does a sedentary lifestyle and lack of physical activity lead to a progressive loss of functional capacity of upper airway patency? See: Fat, Sleep, and Charles Dickens: Literary and Medical Contributions to the Understanding of Sleep Apnea. Dickens described in 1836 an obese character who has an amazingly accurate depiction of a typical modern sleep apnea patient. (Ref #2)

- It has been shown that exercises such as Didgeridoo or singing are able to restore muscle tone and improve OSA. This would indicate a neuro-muscular tone component is involved. Does this fit with the idea that a deconditioning process is in play with the development of OSA, or does the neural component diminish first: i.e. subluxation, inflammation of nerve, toxicity?

- Have any Gonstead doctors specifically worked with OSA? I came up with one case study of a Diversified doctor in Georgia who had success and wrote up a case study. Might we do similarly? (Ref #7)

- What else have you, my fellow Gonstead doctors, found in your practice that helps OSA and sleep in general? The more minds working on these questions the better. I look forward to you responses.
  cjm125@students.jefferson.edu

Note of interest:

"Neck-tongue Syndrome"

- Neck-tongue syndrome is a pain on one side of the upper neck or back of the head, usually involved with a rapid rotation of the neck. The syndrome also typically involves the tongue, causing the ipsilateral side of the tongue to feel the pain as well. The cause of the syndrome is unknown although two theories have been suggested, and both involve strain/pressure on the C2 nerve. As the C2 nerve route is involved with the hypo-glossal nerve route, tongue pain can result.[7][8][7] (Ref #3)

References:

1. *Interactions Between Obesity and Obstructive Sleep Apnea* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3021364/#:~:text=It%20is%20possible%20that%20obesity,upper%20airway%2C%20predisposing%20to%20apnea.

2. *Fat, sleep, and Charles Dickens: literary and medical contributions to the understanding of sleep apnea* https://pubmed.ncbi.nlm.nih.gov/3910333/

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3.*Neuroanatomy, Cranial Nerve 12 (Hypoglossal)* https://www.ncbi.nlm.nih.gov/books/NBK532869/

4. *A comprehensive review with potential significance during skull base and neck operations, Part II: Glossopharyngeal, vagus, accessory, and hypoglossal nerves and cervical spinal nerves 1–4* https://onlinelibrary.wiley.com/doi/abs/10.1002/ca.22342

5.*Marked Reduction in Obstructive Sleep Apnea Severity in Slow Wave Sleep* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2792966/

6.*Percentage of patients with mild, moderate and severe sleep apnea* https://www.researchgate.net/figure/Percentage-of-patients-with-mild-moderate-and-severe-sleep-apnea-with-positional sleep_fig1_7529378#:~:text=Positional%20sleep%20apnea%20was%20seen%20in%2049.5%25%20(95%25%20CI,%25)%20when%20it%20was%20severe.

7.*Resolution of Obstructive Sleep Apnea in a Patient Undergoing Corrective Chiropractic Care: A Case Study*. https://risetowellnesschiropractic.com/wp-content/uploads/2020/03/2014-1304_sleep_apnea.pdf

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