Cure For Snore: Non-Surgical Management of Sleep Apnea

Madan N.¹, Yadav S.²

Abstract:
Sleep disorder breathing is characterized by repetitive upper airway obstruction and consequent oxyhaemoglobin desaturation during the deeper stages of sleep. Apnea is defined as a cessation of airflow (breathing) lasting for at least 10 seconds. Obstructive Sleep Apnea is still a poorly recognized medical condition that affects middle aged male and female population. The health related consequences of sleep-disorder breathing are hypertension, myocardial infarction, stroke, diabetes, depression, excessive day time fatigue and greater risk of motor vehicle accidents. Obstructive sleep apnea (OSA) may be a risk factor for the development of other medical conditions. Treatment of OSA patients includes behavioral changes, oral medication and topical nasal decongestants. The most common initial treatment for sleep disorder breathing is continuous positive airway pressure device (CPAP). A number of oral appliances have been developed over the years to treat snoring and sleep apnea. Wide varieties of oral appliances exist and are made to address the entire range of pathologic processes resulting in apnea. This article looks into the various non-surgical modalities for management of sleep apnea.

Key words: Obstructive sleep apnea, continuous positive airway pressure, sleep disorders, mandibular advancement device

Introduction:
Sleep disorder breathing is characterized by repetitive upper airway obstruction and consequent oxyhaemoglobin desaturation during the deeper stages of sleep. The disorder is due to combination of both abnormal upper airway anatomy and yet to be determined afferent/efferent somatosensory loop. Apnea is defined as a cessation of airflow (breathing) lasting for at least 10 seconds. Hypo-apnea is a 50% reduction in airflow for 10 seconds or more, usually associated with a fall in blood oxygen saturation. The Apnea Index (AI) is the number of apneic episodes per hour of sleep. The total number of apneic and hypoapneic episodes per hour of sleep is referred to as the Apnea-Hypopnea Index (AHI) or the Respiratory-Disturbance Index (RDI)¹. OSA is still a poorly recognized medical condition that affects approximately 4% and 2% of the middle aged male and female population, respectively². The medical ramifications of this condition are significant, may be life threatening for adults and has also been linked to sudden infant death syndrome (SIDS)³⁴. 

Correspondence: Dr. Neeraj Madan, Professor, Deptt. of Prosthodontics, PDM Dental College & Research Institute, Bahadurgarh-124507, Haryana, India. E-mail: drneerajmadan312@yahoo.com, Tel no. +91-9818396066.

¹Professor, ²Lecturer, Deptt. of Prosthodontics, PDM Dental College & Research Institute, Bahadurgarh-124507, Haryana, India.

Journal of Innovative Dentistry, Vol 1, Issue1, Jan-April 2011
The health related consequences of sleep-disorder breathing are well documented and chiefly include hypertension, myocardial infarction, stroke, diabetes, depression, excessive daytime fatigue and greater risk of motor vehicle accidents. These associated medical problems place a financial burden on society. Due to high prevalence of these conditions, cost effective management is essential.

There are three types of sleep apnea:

Central sleep apnea (CSA)-Central sleep apnea (CSA) occurs when the brain does not send the signal to breathe to the muscles of breathing. This usually occurs in infants or in adults with or without congenital diseases, can also be caused by some medications and high altitudes. It is defined as apnea lasting more than 20 seconds, usually with a change in the reduction in blood oxygen. Obstructive sleep apnea (OSA) occurs when the brain sends the signal to the muscles and the muscles make an effort to take a breath, but they are unsuccessful because the airway becomes obstructed and prevents an adequate flow of air. Mixed sleep apnea occurs when there is both central sleep apnea and obstructive sleep apnea.

Complications of sleep apnea:

Obstructive sleep apnea (OSA) may be a risk factor for the development of other medical conditions. High blood pressure (hypertension) among patients with obstructive sleep apnea is commonly reported. When the obstructive sleep apnea is treated, blood pressure is maintained. The risk for heart problems increase by 2.3 times and the risk of stroke by 1.5 times with obstructive sleep apnea. Atherosclerotic heart disease and even death are some of the known complications of untreated obstructive sleep apnea.

Diagnosis of sleep apnea:

History and physical examination

Obstructive sleep apnea can be diagnosed and evaluated by subjective (perceived or biased) and objective (factual, based on empirical data) methods. An example of a subjective method that measures the effects of obstructive sleep apnea is the Epworth Sleepiness Scale. The Epworth Sleepiness Scale is a self-reported test that establishes the severity of sleepiness. A person rates the likelihood of falling asleep during specific activities. Using the scale from 0-3, the risk of dozing can be ranked from the chart below.

0 = Unlikely to fall asleep, 1 = Slight risk of falling asleep, 2 = Moderate risk of falling asleep, 3 = High likelihood of falling asleep

A physical examination is performed to examine the areas of possible airway collapse. In the nose, this includes the septum, turbinates, nasal polyps, adenoid hypertrophy, and (back of the nose). In the mouth, the palate, tonsils, uvula, pharyngeal walls, and neck circumference are examined. A flexible nasopharyngoscopy is usually performed to examine the airway during active breathing and simulated snoring. The camera end is inserted through the upper throat or where the actions of the tongue and palate can be observed.

Treating OSA Patients:

The ideal results of treating OSA patients would be increased life expectancy, decreased health hazards, and improved quality of life. Due to the potentially “life-threatening” severity of apnea, diagnosis and selection of the proper course of treatment, which may include behavioral modification, surgical intervention, nasal continuous positive air pressure (NCPAP), medication, and/or removable dental prostheses, are vital.
a. Behavioral change:

Behavioral changes are the simplest method of treatment for mild obstructive sleep apnea. Occasionally, apnea occurs only in some postures, most common being lying flat on the back. Obesity is the known contributory factor to obstructive sleep apnea. A healthy lifestyle and diet that encourages weight loss will improve the obstructive sleep apnea[8]. Behavioral changes, which may include weight loss, changing sleep positions, head posture, quitting smoking and avoidance of central nervous system depressors, may be beneficial for some patients.

b. Medication:

Many medications have been employed for obstructive sleep apnea, however, because obstructive sleep apnea is due to anatomic airway narrowing it has been difficult to find medications that help overcome this problem.

Nasal steroids sprays have been shown to be effective. The respiratory disturbance index is decreased from 20-11 with use of nasal sprays.

Topical nasal decongestants:

Topical nasal decongestants such as oximetazoline, osynephrine also temporarily improve nasal swelling. People, who have obstructive sleep apnea due to hypothyroidism, improve with thyroid replacement therapy.

Other medications that have been studied include medroxyprogesterone, acetazolamide theophylline, tricyclic antidepressants and selective serotonin reuptake inhibitors.

In cases where sleep apnea may be caused by another underlying condition, appropriate treatment of such condition is recommended and may be beneficial.

c. Continuous positive airway pressure (CPAP) –

The most common initial treatment for sleep disorder breathing is continuous positive airway pressure device (CPAP.) It is effective only for patient who can tolerate the device and unfortunately can afford no permanent cure.

Continuous positive airway pressure (CPAP) is probably the best non surgical treatment for any level of obstructive sleep apnea. In finding a treatment for obstructive sleep apnea the primary goal is to hold the airway open so it does not collapse during sleep[9,10].

(CPAP) was used in Australia by Dr Colin Sullivan in 1981 for obstructive sleep apnea. It delivered the air through the nasal or face mask under pressure.

d. Bi-level positive airway pressure (BiPAP)

Bi-level positive airway pressure was designed for people who could not tolerate the higher pressure of CPAP. It is similar to CPAP in that the machine delivers a positive pressure during sleep; however (BiPAP) machine delivers a high pressure during inspiration and a low pressure during expiration which allows the person not to feel like they are breathing out against such high pressure which can be bothersome. It is helpful for people who require a higher pressure to keep their airway open.

e. Surgical procedures

American Sleep Disorders Association listed the following surgical procedures for the treatment of OSA: tracheostomy, mandibular surgery, nasal septal surgery, hyoid bone suspension, partial tongue resection, maxillo-mandibular advancement osteotomy (MMO), inferior mandibular osteotomy, lingualplasty, genioglossal advancement with hyoid myotomy and suspension (MOHM), and uvulopalatopharyngoplasty (UPPP). Tonsillectomy and adenoidectomy may be indicated for children with OSA, caused by adenotonsillar hypertrophy. Tracheostomy is
successful because it provides an airway below the obstruction; however, because of negative psychological and esthetic effects, its indication is limited.

f. Oral appliances

Patients with significant sleep disorder breathing always have some components of soft palate and tongue base obstruction. A number of oral appliances have been developed over the years to treat snoring and sleep apnea. Wide varieties of oral appliances are made to address the entire range of pathologic processes resulting in apnea.

Oral appliances can advance the soft palate, tongue and mandible and thus opening the airway. The appliances that advance the soft palate are seldom employed, because of gag reflex and in such cases the success of laser and radio frequency soft palate procedures is more appreciable. Probably for similar reasons and because of success of adjustable oral appliances, devices that advance the tongue alone are rarely used. Oral appliances that fixate or alter the relative position of mandible to the maxilla, affects the pharyngeal soft tissues by increasing the airway space, stabilizing the mandible in anterior and closed position, advancing the tongue and increasing genioglossus muscle activity.

Variations in design include restricted elastic bands, clasps or tube for opening the mouth. These modifications act to relieve pressure and produce posterior extension of the maxillary components so as to modify the position of soft palate and tongue.

Oral appliance therapy has several advantages of simplicity, reversibility, cost effectiveness and broad applicability for varying degree of SDB and OA and thus can be used to treat simple snoring, upper airway resistant syndrome and full-blown obstructive sleep apnea. OA therapy offers the most logical way to initiate the treatment in most cases. To date, more than forty OA devices have been patented. They can be divided into basic categories of fixed OA and adjustable OA. Each group can be subdivided into non custom devices and custom devices. A newer treatment option is the pillar palatal implant system. Originally developed for the treatment of snoring, recent studies have demonstrated some efficacy in treating mild to moderate sleep apneas. Also this system involves the placement of three mesh polyethylene terephthalate implants within the soft palate muscles under local anesthesia. Oral appliances may be an option for patients who cannot tolerate CPAP and other options of treatment.

Various oral devices available for treatment of OSA:

Mandibular advancement device is the most widely used dental device for sleep apnea. It is similar to appearance to sports mouth guard. A mandibular advancement device forces the lower jaw forward and slightly down which keeps the airway open.

Tongue restraining device-this is the splint that holds the tongue in place to keep the airway as open as possible. Dental devices have shown better long term control when compared to uvulopalatopharyngoplasty surgical treatment.

The TRD, first described by Cartwright and Samelson, prevents the tongue from dropping posteriorly by suction created when the patient forces the tongue into a hollow bulb built into the device. Patients can maintain the tongue in the bulb for several hours per night, often all night long, once they are accustomed to wearing the device. An advantage of this device over the MADs is that it can be used for edentulous patients, while TRDs have been shown to be effective in reducing the number and duration of apneas. In counteracting fluctuating genioglossus muscle activity, which block the oral airway and therefore any compromise of the nasal passage must be surgically corrected.
Orthodontic treatment:

An Orthodontic treatment called rapid maxillary expansion in which a screw device is temporarily applied to the upper teeth and tightened regularly may help the patients with sleep apnea.

Conclusion:

Obstructive sleep apnea (OSA) may be a risk factor for the development of other medical conditions. Treatment of OSA patients includes behavioral changes, oral medication, and topical nasal decongestants. The most common initial treatment for sleep disorder breathing is continuous positive airway pressure device (CPAP.) A number of oral appliances have been developed over the years to treat snoring and sleep apnea. Mandibular advancement device is the most widely used dental device for sleep apnea and has several advantages of simplicity, reversibility, cost effectiveness and broad applicability for general population.

References:

3. Boudewyns A.N., Van de Heyning P.H. Obstructive sleep apnea syndrome