



Obstructive Sleep Apnea – Current Perspectives

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Article History	Abstract
Received: 06 June 2023 Revised: 05 July 2023 Accepted: 11 Aug 2023	<i>Obstructive sleep apnea is a common sleep related breathing disorder. The demand for sleep medicine services has increased exponentially since the recognition of sleep apnea as a disease in the 1960s. The involvement of dentists in the treatment of sleep apnea has increased. It is important that dentists are aware of the problem of sleep disorders and the potential they have to help in their management.</i>
CC License CC-BY-NC-SA 4.0	Keywords: Sleep, Apnea, Obstructive, Airway, Polysomnography

1. Introduction

Sleep apnea means "cessation of breath." It is characterized by repetitive episodes of upper airway obstruction that occur during sleep, usually associated with a reduction in blood oxygen saturation.¹

Signs & Symptoms:

NOCTURNAL: Drooling, xerostomia, sleep restlessness, witnessed apneas, choking or gasping, diaphoresis.

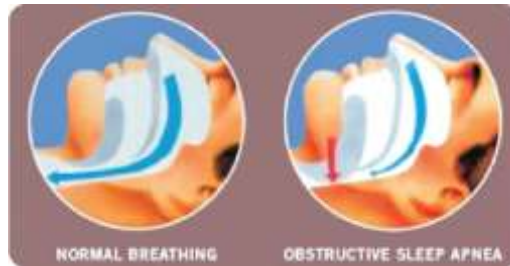
DAYTIME: Excessive sleepiness, xerostomia, morning headaches, non-restorative sleep, gastroesophageal reflux disease, impaired concentration, depression, decreased libido, impotence, irritability.

ASSOCIATED FEATURES: Loud snoring, dry mouth, chest retraction, high blood pressure, overweight, heartburn, nocturia, nocturnal snorting, gasping, choking, rapid weight gain, confusion upon awakening.¹

Pathogenesis: Apnea occurs when the throat muscles and tongue relax during sleep and partially block the opening of the airway thereby reducing the airway dimension.²

Types Of Apnea - Obstructive Apnea, Central Apnea, Mixed Apnea³

1. Obstructive sleep apnea - is a condition in which the flow of air pauses or decreases during breathing while you are asleep because the airway has become narrowed, blocked, or floppy.
2. Central sleep apnea - is a condition when repeatedly breathing stops during sleep because the brain temporarily stops sending signals to the muscles that control breathing.
3. Mixed Apnea - a condition marked by signs and symptoms of both central sleep apnea and obstructive sleep apnea. It often begins as central sleep apnea and develops into the obstructive form. Mixed sleep apnea may also result from obstructive sleep apnea as hypoxia and hypercapnia induce signs and symptoms of the central form.



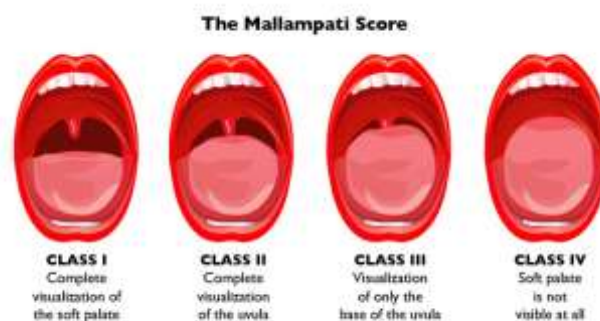
RDI INDEX - The American Academy of Sleep Medicine (AASM) rates the average number of obstructive sleep apnea events per hour as Respiratory Distress Index (RDI).⁴ An RDI of 0 to 5 is normal, 5 to 20 is mild, 20 to 40 is moderate over 40 is considered severe.

Diagnosis

Physical Examination – usually normal in OSA, other than the presence of obesity with body mass index > 28.5 kg/m² and neck diameter > 16 inches.⁵

Oral Examination –

Mallampati scores used in anesthesia determine the difficulty of performing an intubation as the tongue obstructs the airway. Scores of 3 and 4 are at a greater risk of sleep apnea.



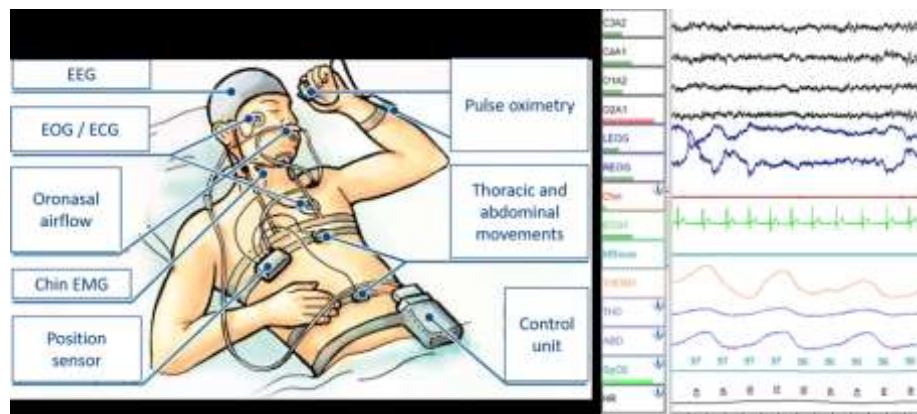
Enlarged tonsil These patients may have an enlarged floppy uvula or tonsillar hypertrophy, elongated soft palate.

SELF-ADMINISTERED SCREENING QUESTIONNAIRE IS PRESENTED AS EPWORTH SLEEPINESS SCALE - chances of dozing off during sitting and reading, watching TV, sitting inactive in a public place, lying down to rest in the afternoon when circumstances permit, sitting and talking to someone, sitting quietly after a lunch without alcohol.

0 - No Chance of Dozing, 1 - Slight Chance of Dozing, 2 - Moderate Chance of Dozing, 3 - High Chance of Dozing. More than 10 on the scale is considered to be pathological and indicates that sleep specialist should be consulted.⁶

Polysomnography is the gold standard of sleep apnea diagnosis. Polysomnography features ECG, brainwave EEG measurements (fig 3), motor activity extremity measurements, diaphragmatic/chest movement, eye movement, pulse oximetry for oxygen desaturation measurement, and inhalational / exhalational oro-nasal flow characteristics.

Multiple sleep latency test measures the speed of falling asleep. Pulmonary function tests should be obtained if any evidence of cor-pulmonale or nocturnal asthma.



Investigations:

Lateral cephalometric Radiographs characterizes- Mandibular retrognathia, Retruded maxilla, Posterior vertical maxillary deficiency, Retropositioned tongue, High mandibular plane angulation, short chin-neck line, Decreased PAS, Poor definition of gonial angles, Class II dental occlusion (but sometimes Class I), Steeper and shorter anterior cranial base, longer soft palate^{5,6}

Craniocervical angle⁷ - Apneic subjects have craniocervical extension and forward head position.

CT (Computed Tomography) - produces excellent resolution of images to evaluate both the soft tissue and the osseous structures of the pharynx-larynx complex.⁸

MRI (Magnetic Resonance Imaging) - allows scanning in multiple planes, allowing the whole airway to be visualized at one time.⁷

Visualisation of upper airway - Rigid bronchoscopy and laryngoscopy are done under general anesthesia.⁷

Treatment Options:

Nonspecific Therapy - done in patients with very mild apnea.² Therapy includes losing weight, avoid use of alcohol prior to bedtime, sleeping pills, positional therapy by body positioning during sleep.

Specific therapy - Medications are generally not effective in the treatment of sleep apnea.²

Oxygen Administration: Appropriate oxygen flow rate and appropriate nasal CPAP pressure if monitored during night time sleep in a qualified sleep disorders center or apnea laboratory will be beneficial.

Positive Pressure Therapy - has three forms: Continuous positive airway pressure (CPAP), Autotitration and Bi-level positive airway pressure.

Pharmacological Agents: Certain medications which increase respiratory drive are helpful in some patients.

Progestational agents- Estrogen has shown to be used in central sleep apnea and obesity hypoventilation syndrome, not used in obstructive type.

Opioid antagonists and nicotine - shown to improve oxygenation, not clinically useful as these are short acting and disrupt sleep cycle.

Acetazolamide - produces metabolic acidosis and stimulates ventilatory control centrally, very useful in periodic breathing and central sleep apnea, may be helpful in OSA

Central nervous system stimulants:

Non-amphetamine - Used for treatment of fatigue without interfering with normal sleep architecture. They promote wakefulness.

Theophylline - used in central sleep apnea and also reduces obstructive events but causes severe sleep disruption

Surgery:

Nasal, septal and adenoid surgery - procedures like septoplasty and adenoidectomy can be done.³
Tonsillectomy - increases the caliber of the pharynx thereby reducing blockage to breathing.
Genioglossus tongue advancement - produces a larger space between the back of the tongue and the throat thereby creating a wider airway.

Midline glossectomy - efficacy of midline glossectomy (MLG) following failed UPPP is relatively low and is variably affected by body weight and OSA severity; the 3 long-term outcome after MLG is unknown.³

Uvulopalatopharyngoplasty (uppp) – involves the removal of part of the soft palate, uvula and redundant peripharyngeal tissues and effective in eliminating snoring

Uvulopalatal flap - modification of the UPPP, involves removal of the uvula, lateral pharyngeal wall, and mucosa, thereby widening the oropharyngeal airway.

Laser-assisted uvulopalatoplasty (laup) - like UPPP, LAUP may decrease or eliminate snoring but not eliminate sleep apnea itself. The gallium aluminum arsenide infrared P-laser (830 nm) has been used.

Maxillomandibular advancement - treatment is usually done if previous procedures have not completely improved the obstructive breathing episodes and the patient has persistent symptoms of daytime sleepiness and fatigue.³

Radio frequency (rf) procedure or somnoplasty – this procedure uses radiofrequency heating to create targeted coagulative submucosal lesions resulting in tissue volume

Effectiveness of Somnoplasty - Initial clinical results showed that Somnoplasty effectively treated OSA by shrinking the base of tongue - the most difficult source of obstruction to treat.

Hyoid suspension – this surgery advances the tongue base and epiglottis forward, thereby, opening the breathing passage at this level.

Tracheostomy - one of the oldest, most shunned, and least understood procedures for OSA. The tracheotomy tube must be kept exquisitely clean; otherwise, painful infections will occur, or the tube and/or windpipe could become blocked with secretions.

Oral Appliances:

Tongue retaining devices: It is a bubble shaped device made of soft polyvinyl.² The patient's teeth rest in custom fitted grooves which are extended to form a 'bubble' that sticks out from between the lips.

Appliances / oral airway dilator designs:

1. The Silencer System: A flat posterior bite plane is provided for the biting surfaces. This appliance cannot be adjusted by the patient, but must be adjusted in the dental office.¹⁰

2. The Klearway oral appliance: utilizes a maxillary orthodontic expander to sequentially move the mandible forward. Klearway is a fully-adjustable oral appliance used for the treatment of snoring and mild to moderate Obstructive Sleep Apnea. Fabricated of thermoactive acrylic.

3. The PM Positioner: which links upper and lower splints with bilateral orthodontic expanders, has attachment connectors on both lateral sides.¹⁰

4. The TAP-Thornton Adjustable Positioner: This allows for progressive ¼ mm advancements of the jaw via an anterior screw mechanism at the labial aspect of the upper splint.

5. Modified Herbst: This appliance design links upper and lower splints with a piston-post and sleeve adjustable telescopic mechanism on each side.¹⁰

4. Conclusion

Sleep-breathing disorders are potentially life threatening; therefore, the diagnosis and treatment of these diseases are the domain of the medical profession. The prevailing opinion is that patients should be

treated only with a referral by a physician. As orthodontists we have a significant role in the diagnosis of sleep apnea and the oral appliance therapy to improve the quality of life to the apneic patients.

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