

OBSTRUCTIVE SLEEP APNEA AND ITS PROSTHODONTIC MANAGEMENT

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Abstract

The role of dentistry in sleep disorders is becoming more significant, especially in co-managing patients with simple snoring and mild to moderate Obstructive Sleep Apnea (OSA). OSA is repeated episodes of partial or complete upper airway obstruction during sleep. A Prosthodontist's role cannot be limited to *removable, fixed or implant supported dentures*. The treatment of Sleep Apnea with the use of oral appliances has been underutilized and traditionally, they have been provided mainly in a hospital setup. This article presents a review about OSA and its management using oral appliances.

Key words: Upper airway sleep disorders, Obstructive sleep apnea, Airway collapse, Oral appliances.

Introduction

Upper airway sleep disorders (UASDs) are conditions taking place in the upper airway that lessen sleep time or sleep quality, and the patient exhibit symptoms such as day time sleepiness, tiredness, etc.¹ Patients with UASD are usually more prone to accidents due to lack of concentration. Apnea is a Greek word for "without breath".² In 1837, Obstructive sleep apnea (OSA) was first described by Charles Dickens as "Pickwickian Syndrome".³

Sleep physiology & Pathophysiology

Normally, while sleeping the throat remains open enough for proper passing of the air. In Some people the throat is narrow, the blockage of airway occurs because of the closure of tissue due to relaxing of the muscles of upper throat. This causes apnea i.e. stop in breathing.⁴ This narrowing of pharynx occurs due to craniofacial structural abnormalities and larger soft tissue mass or abnormal tissue deposits which can also increase extraluminal tissue pressure (Figure 1) and lowers the threshold for airway Collapse.⁵

Causes and risk factors

- Increased Weight
- Enlarged tonsils or adenoids
- Increased alcohol intake
- Smoking
- Larger neck size
- Hypertension
- Micrognathia or Retrognathia

Common symptoms during sleep

- Louder Snoring which bothers people sleeping nearby.
- Snoring is not continuous throughout the night.
- Sounds heard of Gaspings or choking.
- Pauses in breathing observed by someone watching sleep.
- Body movements are sudden or jerky.
- Restlessness.

- Regular awakenings from sleep.⁶

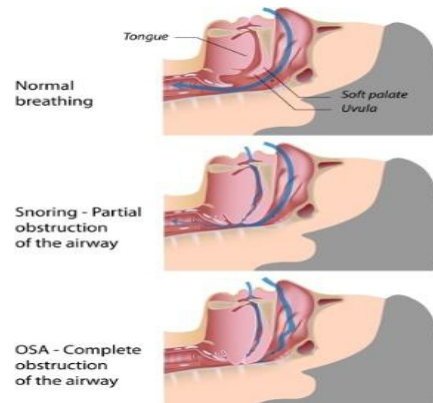


Figure 1: Normal Breathing & Obstructed Sleep Apnea Airway

Common symptoms while awake

- Feeling of insufficient sleep even after sleeping for many hours.
- Early morning headache and drowsiness during the day.
- Breathing from mouth while sleeping results in dry or sore throat in the morning.
- Feeling of weakness or tiredness throughout the daytime.
- Mood swings are very common.⁶

History and physical examination

Thorough sleep history should be taken during routine health check-ups or while patient presents with symptoms of OSA or when the patient is at high risk of OSA.

Oral examination

Most airway obstructions occur behind the maxilla and mandible at the level of the soft palate, tongue, and lateral fat pads. An evaluation of the size of the tongue, the presence and size of the tonsils, the opening of the oral and nasal airways, and the size of the neck can raise

concerns on the patency of the airway. The presence of tooth wear and TMJ symptoms is important, because these may play a role in OSA.^{3,7,8}

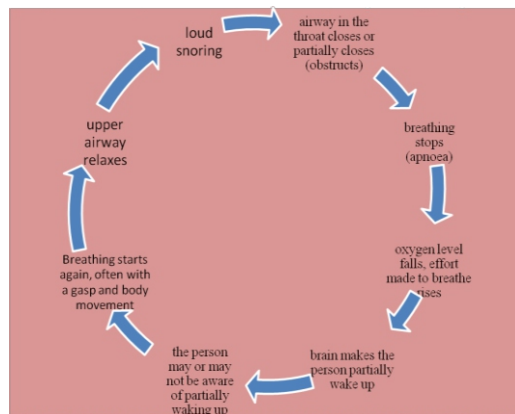


Figure 2: Obstructive Sleep Apnea Cycle

Objective Testing

The two accepted methods of objective testing are in-laboratory polysomnography (PSG) and home testing with portable monitors (PM).⁹

Polysomnography

- The use of PSG for evaluating OSA requires recording the following physiologic signals: electroencephalogram (EEG), electrooculogram (EOG), chin electromyogram, airflow, oxygen saturation, respiratory effort, and electrocardiogram (ECG) or heart rate.¹⁰

Testing With Portable Monitors

- PM for the diagnosis of OSA should be performed only in conjunction with a comprehensive sleep evaluation. A PM should, at a minimum, record airflow, respiratory effort, and blood oxygenation.¹¹

Other Sleep Procedures

Multiple Sleep Latency Test (MSLT), Maintenance of Wakefulness Test (MWT), The Epworth Sleepiness Scale (ESS), Berlin questionnaire, STOP BANG, Stanford Sleepiness Scale (SSS).¹²

Management of sleep apnea

Should start with proper patient education.¹³

Patient Education

The education program should include discussion of the pathophysiology, risk factors, natural history, and clinical consequences of OSA. General education on the impact of weight loss, sleep position, alcohol avoidance, risk factor modification, and medication effects should be provided. In addition, videotapes, handouts, websites, and Boucher's can be employed.¹⁴

Treatment Modalities for Sleep Apnea

Different treatment options are available for effective management of OSA. This can be reviewed in the chart below (Figure 3).

Alternative Therapies

Oral appliances: Oral appliances are defined as the devices that help in maintaining the proper airway by stabilizing and protruding the mandible while sleeping. Example: Herbst Appliance.^{15,16} The presumed mechanism of action for OAs is that anatomical changes in the oropharynx, produced by MAA, result in an alteration of the intricate relationships between different muscle groups controlling the upper airway caliber.^{17,18,19}

Soft Palate & Uvula Lifting Appliance: The prosthesis lifts and/or stabilizes the soft palate, preventing vibration during sleep. This appliance can be used in cases where incompetency of the soft palate is the cause for snoring, as it enables lifting of the soft palate. Uvula lift appliance can be used in cases where elongated or bifid uvula was the cause for upper airway obstruction.

Tongue Retention: Tongue retaining devices (TRDs) incorporate an anterior hollow bulb, which generates a negative pressure vacuum when the tongue is inserted.

Mandible Repositioning Appliances: It holds the mandible in an antero-inferior position, which indirectly brings the tongue forward opening up the posterior airway.²⁰

Mouth Protectors: The greatest use of mouth protectors is the reduction of injuries in sports-related activities. However, mouth protectors are used with increasing frequency in other areas of therapeutic and preventive dentistry and medicine.²¹

Various surgical procedures to treat OSA Tracheotomy, Uvulopalatopharyngoplasty (UPPP), Laserassisted palatoplasty (LAUP), Tonsillectomy, Radiofrequency Ablation (RFA), Pharmacologic Agents and Oxygen Therapy, Pillar Palatal Implants & Biatric Surgery.^{17,18}

Recent Advances

Pacemakers In Sleep Apnea: Watch – Pat, Virtual 3d Planning, Advanced Brain Monitoring (ABM) , 3B MEDICAL, F&P- Nasal Mask, Whole You.^{22,23}

In Hypoglossal pacemaker, the hypoglossal nerve activation causes tongue muscles to stiffen and resist airway closure, thus preventing apnea.²⁴ Increased cost and lack of data showing its effectiveness in obese patients have led to lack of its widespread use. Thus usage of this novel therapy will increase with increase in its usage by the patients.²⁵

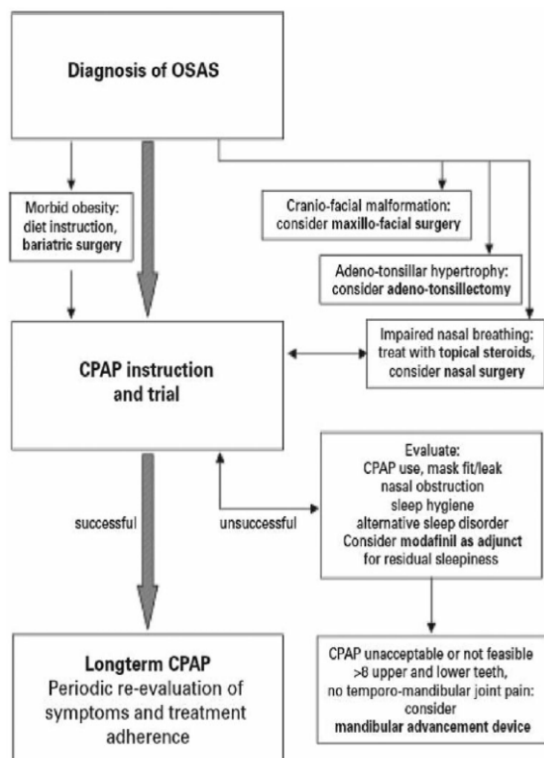


Figure 3: Treatment Options for Obstructive Sleep Apnea (Of Bloch 2006)



Figure (4a & 4b): Tongue Retaining Device



Figure (5a & 5b): Mandibular Repositioning Appliances

Conclusion

The upper airway collapsibility results due to complex relation between the anatomic and neuromuscular factors thus indicating that the etiology of OSA is multifactorial. It becomes our moral duty to diagnose and manage the sleep apnea patients. When considering the non surgical management of sleep apnea, oral appliances are considered as the primary line of management for all the apnea patients. Also the custom mouth protectors are very simple, thus they help in protection of oral structures.

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