ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 3, Issue – 4, July - 2020, Page No. : 116 - 121

Obstructive Sleep Apnoea-Review Article

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Citation of this Article: Rahul Sharan , Ashish Choudhary, Shailesh Jain , Cheena Sethi, "Obstructive Sleep Apnoea-Review Article", IJDSIR- July - 2020, Vol. – 3, Issue -4, P. No. 116 -121.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Obstructive sleep apnoea is a common disorder of breathing during sleep which is characterized by prolonged partial upper airway obstruction or intermittent complete obstruction that disrupts and alters the sleep pattern**,** and its prevalence increasing continuously. There are certain factors that contribute to OSA such as the anatomical structure, neuromotor tone and inflammation. So if left untreated it may be associated with long-term health consequences including cardiovascular disease. This review article summarizes about its causes, pathophysiology, various symptoms that are associated with OSA, diagnostic test and treatment modalities.

Keywords: Sleep-disordered breathing, Pathophysiology, Upper airway physiology

Introduction

Obstructive sleep apnea (OSA) is a sleep disordered breathing disease involving repeated obstruction of the upper airway during sleep.

The obstruction of the upper airway is caused by:

- Prolonged inflammation of the nasal mucosa which is associated with allergies or chronic infection- Allergic Rhinitis
- sleeping in supine position,
- upper airway edema caused by smoking
- hypothyroidism,
- Acromegaly
- nasal obstruction

Pathophysiology

During inspiration a negative intrapharyngeal pressure develops. (but airway collapse prevented by the action of the pharyngeal abductor and dilator muscles).These muscles are activated rhythmically during daytime respiration but, they become hypotonic during sleep, and airway stability becomes dependent upon pharyngeal size and pharyngeal tissue compliance.

Apnea occurs when the throat muscles and tongue relax during sleep and partially block the opening of the airway.

Diagnosis of OSA

Symptoms:

Nocturnal symptoms-

- Snoring: Snoring is the indicative symptom of sleep apnea[1].
- Nocturnal choking or gasping: Many patients with OSA report waking at night with a choking sensation, which can be quite frightening and presumably reflects an episode of outright wakening during an obstructive apnea. This choking almost invariably passes within a few seconds of wakening.
- Insomnia: Sleep maintenance insomnia is a symptom of obstructive apnea and likely reflects the disturbing effect on sleep.
- Apneas: These events are a good diagnostic predictor of OSAS but do not predict severity of the disorder.[2,3]

Apnea is defined as the cessation of air flow a complete obstruction for at least 10 sec with an associated 2 to 4% drop in arterial oxygen saturation. Hypopnea is a reduction in air flow of at least 30 to 50% with a drop in oxygen saturation. The apnea-hypopnea index (AHI) is the average number of apneas and hypopneas per hour of sleep.[4]

The severity of OSA is classified on the basis of the patient's AHI index into three categories:

1. Mild OSA (5 to 15 events per h),
2. Moderate OSA (15 to 30 events per h)
3. Severe OSA (more than 30 events per h).

Diurnal symptoms

Excessive daytime sleepiness: Sleep apnea is the most common cause of excessive daytime sleepiness (EDS). The severity of EDS can be assessed subjectively by various questionnaires, the most widely used being the Epworth Sleepiness Scale.

The symptoms other than EDS such as fatigue, memory loss, mood swings, dry mouth in the morning, morning headaches, reduced concentration, and depression.[2,3,5]

Physical Characteristics/Examination

Obesity: Obesity is commonly found in OSA, particularly upper body obesity, and there is also evidence that patients with OSA are particularly prone to having fat necks. Neck circumference is a strong predictor of OSA and values less than 37 cm and greater than 48 cm are associated with a low and high risk, respectively.[3,6]

Craniofacial anatomy- Anatomic factors that predispose to upper airway narrowing should be sought in the physical examination of a patient suspected of having OSA. These include retrognathia, micrognathia, tonsillar hypertrophy, macroglossia, and inferior displacement of the hyoid. However, the most common physical finding in patients with OSAS is a nonspecific narrowing of the oropharyngeal airway, with or without an increase in soft tissue deposition.[1]

Hypertension: The finding of hypertension in a patient with symptoms suggestive of OSA increases the likelihood of the disorder. The likelihood of OSA appears to be particularly high in patients with drug-resistant hypertension.[7,8,9,10]

Diagnostic Test / Studies

- Polysomnography (testing in a sleep laboratory):- The gold standard for the diagnosis of OSAS is full polysomnography, which provides detailed

information on sleep state and respiratory and gas exchange abnormalities, in addition to a range of other variables including body position, heart rate and rhythm, and muscle tone and contraction.[11]

- The Epworth Sleepiness Scale
- Malampatti score/ Fried Staging
- The multiple sleep latency test (MSLT)
- Lateral cephalometric radiographs
- Flexible fiberopticsopharyngoscopy

Treatment Modalities

Medical Approach

A) CPAP

This technique can be most often used for more severe condition of OSA but it's rather excessive for mild form like snoring. This technique is a gold standard for treatment of OSA.[12]

CPAP splints the patient's airway open during sleep by means of flow of pressurized air into throat. Patient wears a plastic facial/nasal mask connected by a flexible tube to a small bedside CPAP machine.

This machine generates the required air pressure to keep the patient's airway open during sleep

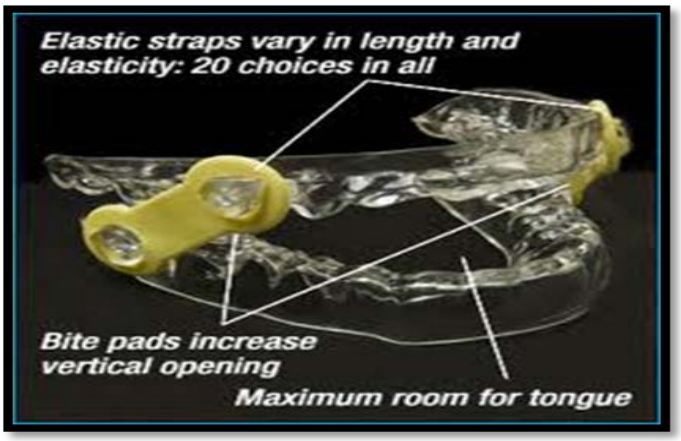
But the disadvantage includes the lack of portability and the sound produced by the motor and the discomfort of wearing the mask while trying to sleep.

Prosthodontic Approach

Oral Appliances

Oral devices are basically thermoplastic materials with retainers and supports and are usually custom made. Patients with mild to moderate OSA are candidates for placement of appropriate oral devices.

Most oral appliances are designed to maintain the mandible and/or tongue in a protruded posture during sleep, thereby preventing upper airway occlusion. The precise mode and site of action of oral appliances remains unclear, however proposed mechanisms of action include increased upper airway calibre, decreased upper airway compliance, or activation of upper airway dilator muscles.[16-20]

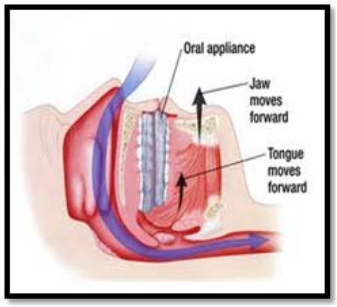


A)Mandibular repositioning or advancement devices (MRD/ MAD)

They function by engaging one or both of the dental arches to modify mandibular protrusion; they require dental impressions, a centric relation record, and protrusive record.These oral appliances help in increasing the retroglossal and retropalatal space when the patient assumes a supine position or in sleep.(eg-Herbst appliance[13], snoreguard[12])

They reposition the mandible and associated structures (ie, tongue and hyoid bone) anteriorly to increase the anteroposterior and lateral dimensions of the upper airway, especially at the level of the velopharynx. The advancement of the mandible is titrated based on symptoms up to 80% of the patient's maximum protrusive capacity followed by polysomnography to establish efficacy. Patients with severe OSA require greater advancement of the mandible and should be closely monitored for temporomandibular joint symptoms.

Custom-made for each patient special heat-sensitive acrylic material that will fit snugly, over the upper and lower teeth and it will hold the lower jaw slightly forward. This will advance the tongue and soft tissues of the throat to open the airway and restore normal breathing during sleep.



Mandibular retaining appliances: Does not interfere with breathing through themouth, and is one of the more comfortable designs. It is not made for severe grinders, but it is a comparatively small device with tiny connectors attached to transparent flexible upper and lower forms.

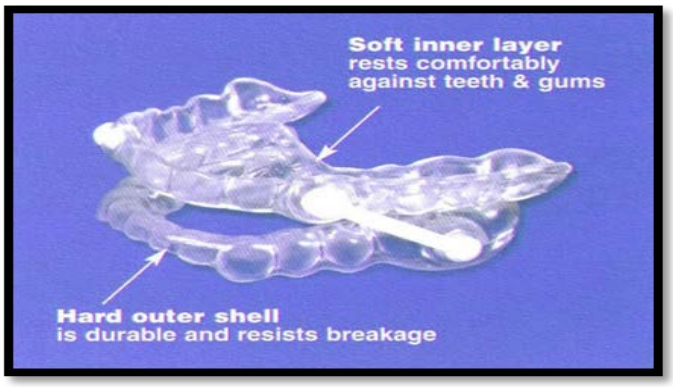
B)Tongue repositioning or retaining devices (TRD)

e.g., SnorEx[14]

It uses negative suction pressure to hold the tongue in a forward position inside the bulb. By holding the tongue in a forward direction through its attachment to the genial tubercle, it stabilizes the mandible and hyoid bone, thus preventing retrolapse of the tongue. These devices, reverse pharyngeal obstruction both at the level of the oropharynx and the hypopharynx, thereby enlarging the airway and reducing snoring and the related apnea.[This device is used most for patients with dentures or patients who cannot adequately advance their lower jaw.

The patient must be able to breathe well through their nose or they may have difficulty tolerating this appliance

Tongue retaining devices which position the tongue anteriorly by means of negative pressure, are indicated in patients who have few or no teeth, macroglossia, or cannot adequately advance their mandible. They function to enlarge the volume of the upper airway.



A combination of oral appliance and CPAP in the new products deliver pressurized air directly into the oral cavity and eliminates the use of head gear or nasal mask and avoids the problems of air leaks and the claustrophobia associated with CPAP treatment.[15]

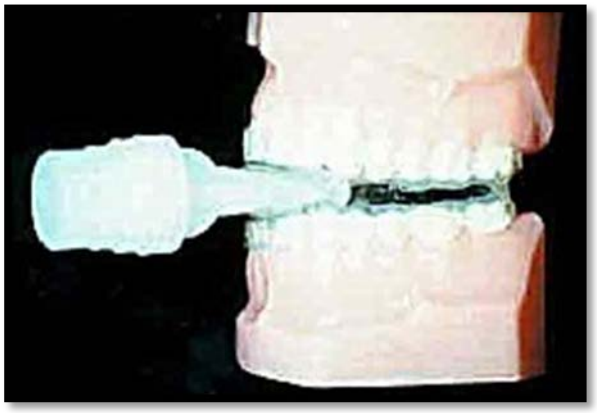
Recent Advances

MODIFIED HERBST- This appliance design links upper and lower splints with a piston-post and sleeve adjustable telescopic mechanism on each side.

Patients who severely grind their teeth at night can use this appliance.


Elastic Mandibular Advancement(EMA) - It uses specially designed, patented elastic bands to reach the desired position with considerable freedom of movement. EMA is the thinnest and least bulky of all the appliances**.** It is a "combination" therapy which

combines a nonadjustable MRD with continuous positive airway pressure (nCPAP). The air pressure is delivered through a small conduit that fits across the roof of the patients mouth.



Conclusion

Obstructive Sleep Apnoea is a chronic medical condition which can have serious medical complication. Its prevalence is increasing with the increased prevalence of obesity. The number one reason for morning headache is OSA and it needs to be ruled out and should not be overlooked. So treating the patient with sleep apnoea will actually providing a better quality of life.

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