



Original Research Article

Obstructive sleep apnea: A comprehensive review

Lalita Sheoran^{1,*}, Puneet Kumar², Abhishek Singha Roy¹, Nasir Ul Sadiq¹, Zahid Manzoor¹

¹Dept. of Orthodontics, Kalka Dental College and Hospital, Meerut, Uttar Pradesh, India

²ITS Dental College Muradnagar, Ghaziabad, Uttar Pradesh, India



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ABSTRACT

Obstructive sleep apnea occurs when the patient's throat muscles intermittently relax and block the airway during sleep, the initial sign of the OSA is snoring or sometimes it may be asymptomatic in the 1st stage of its clinical course. Although, OSA is related to sleep and respiration, but it's non-surgical as well as surgical management can also be done in dental practice apart from the medical and surgical management, and lifestyle modification. And so, in this article, we are going to study about the obstructive sleep apnea and its management along with its clinical features, classification, complication and also the role of the dentist in OSA.

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1. Introduction

Obstructive sleep apnea (OSA) is a potentially serious sleep disorder which causes breathing to repeatedly stop and start during sleep. Obstructive sleep apnea occurs when the patient's throat muscles intermittently relax and block the airway during sleep and the most common noticeable sign of obstructive sleep apnea is snoring. These days OSA has become a common, chronic, sleep-related breathing disorder with an increasing population. Young et al. reported its prevalence commonly in a population with the mid-aged population affecting 2-4% of adult population.¹

1.1. Epidemiology

Obstructive sleep apnea is defined as the occurrence of at least 5 episodes per hour of sleep during which respiration temporarily ceases. Although OSA is a relatively common medical condition, it is believed that more than 85% of patients with clinically significant OSA have never been diagnosed and this reflects the fact that many patients with

symptoms of OSA are not aware of their heavy snoring and nocturnal arousals. Also, it is estimated that 1 out of 5 adults has at least mild symptoms of obstructive sleep apnea, while 1 out of 15 has moderate to severe symptoms.²

1.2. Clinical features

The signs and symptoms of OSA are

1. Excessive daytime sleepiness
2. Loud snoring
3. Observed episodes of stopped breathing during sleep
4. Abrupt awakenings accompanied by gasping or choking
5. Awakening with a dry mouth or sore throat
6. Morning headache
7. Difficulty concentrating during the day
8. Experiencing mood changes, such as depression or irritability
9. High blood pressure or hypertension.³
10. Nighttime sweating
11. Decreased libido.³
12. Neck size >17 inches in males and >16 inches in females – high risk.⁴

* Corresponding author.

E-mail address: lalitasheoran2010@gmail.com (L. Sheoran).

13. Nasopharyngeal narrowing.⁴
14. Pulmonary hypertension but rare.⁴

Most common symptoms associated with obstructive sleep apnea.

| Nocturnal | Diurnal |
|-------------------|-------------------------|
| Snoring | Excessive sleepiness |
| Witnessed apnoeas | Morning headaches |
| Choking at night | Depression/irritability |
| Nicturia | Memory loss |
| Insomnia | Decreased libido |

1.3. Classification of OSA

Before classifying the obstructive sleep apnea there is the term apnea-hypopnea index on the basis of which OSA has been classified into mild, moderate & severe forms. The apnea-hypopnea index (AHI) is an index of severity that combines apneas and hypopneas (slow or shallow breathing) i.e., recording of the numbers of apnea and hypopnea episodes per hour of sleep supervision in order to analyses them and determine the degree of sleep apnea severity the patient suffers from. It is also used to define the severity of the disease from mild (AHI five to 15 events/hour), to moderate (AHI 15–30 events/hour), to severe (AHI >30 events/hour).⁵

1. **Mild OSA:** With apnea–hypopnea index [AHI] of 5–15). In mild conditions, there are involuntary sleepiness at times of activities that demand little attention, such as watching TV or reading.
2. **Moderate OSA:** In moderate conditions there is an AHI of 15–30 and involuntary sleepiness during activities that need some attention, such as meetings or presentations.
3. **Severe OSA:** With AHI of >30 and this involves the involuntary sleepiness during activities that need more attention such as talking or driving.⁴

1.4. Stages in OSA

1. **Stage of susceptibility** – this is the initial stage in OSA with asymptomatic signs or symptoms, or manifested by snoring only.
2. **Stage of pre-symptomatic disease** – In this stage, snoring is usually aggravated, nocturnal apneas appear but patient may not report a diurnal limitation in his activities.
3. **Stage of clinical stage** – This stage appears if there is no resolution in the continuity of stage 2nd and thus, the patient evolves towards a stage of clinical illness in which morbidities develop at younger ages.
4. **Stage of recovery, disability or death** – It is the stage if managed properly, patient can recover of if patients

are not identified and treated, the natural evolution is towards disability and premature death mainly due to cardiovascular events.⁶

1.5. Risk factors in OSA

Risk factors are the person's surrounding or internal factors that can precipitate or increase the susceptibility of the disease or disorder in an individual. The risk factors in OSA are divisible into three 1st is the genetic factors like craniofacial anatomy, ventilatory control or obesity genes; 2nd comes the risk factors modifiable by the life style changes of the person like obesity, smoking, alcohol use, nasal congestion and the 3rd ones are the risk factors modifiable by the intervention that these requires the involvement of the treatment plan or doctor's involvement as like in diabetes, pregnancy, menopause, hypothyroidism, anatomical defects.^{2,6} Brief of some of the factors is here -

Excess weight - Most but not all people with obstructive sleep apnea are overweight, as fat deposits around the upper airway may obstruct breathing, also medical conditions that are associated with obesity, like hypothyroidism also can cause obstructive sleep apnea.

Narrowed airway - You may inherit naturally narrow airways. Or your tonsils or adenoids may become enlarged, which can block your airway.

Hypertension - Obstructive sleep apnea is relatively common in people with hypertension.

Nasal congestion - Obstructive sleep apnea also occurs in people with nasal congestion chronically.

Smoking - People who smoke are more likely to have obstructive sleep apnea than to the non-smokers.

Diabetes - Obstructive sleep apnea may be more common in people with diabetes.

Sex - In males the chances of OSA is twice to females, and also females with menopause are more likely to have obstructive sleep apnea.

Large tori – Large mandibularis tori in mouth breathers also an anatomical risk factor for OSA.

Nasal polyps – These are also anatomical factors that contribute in the obstruction.

Asthma - It has been seen that there is an association between asthma and the risk of obstructive sleep apnea.

1.6. Causes

Various factors can contribute to the blocking or collapse of the airway. These includes lax muscles and other tissues in the mouth and throat, nasal congestion, thickened tissues and additional fat stores around the airway, an underlying neurological problem, large/swollen tonsils, etc. And the causes for OSA are also associated with the risk factors of OSA.

1.7. Diagnosis

The diagnosis of obstructive sleep apnea involves pre-medical examination and assessment, sleep tests or imaging.

1.7.1. Medical history taking, examination & assessment

This involves the proper history taking and questionnaire from the patients on the basis of their presenting symptoms. And after proper history taking, it requires proper examination of patient. The condition and size of the tongue and tonsils should be observed by the doctor. Nasal turbinate should also be examined. Nasal congestion or any kind of allergies, social habits like smoking, etc.

1.7.2. Sleep tests

Polysomnography requires a sleepover in a laboratory, is the optimum test for diagnosing sleep apnea which involves the evaluation of sleep staging, airflow and ventilatory effort, arterial oxygen saturation, electrocardiogram, body position, and periodic limb movements.⁴

1.7.3. Oximetry

Pulse oximetry and portable monitoring of cardiopulmonary channels are the alternatives to polysomnography, if polysomnography is not available.

1.7.4. Imaging

A number of imaging modalities like acoustic reflexion, fluoroscopy, nasopharyngoscopy, cephalometry, MR imaging, CT scanning have been used to assess the airway. MR imaging is probably the best, if not an ideal, imaging modality. A panoramic radiograph is useful because of its ability to display a wide variety of structures in a single view with minimum irradiation. Cephalometric is also useful in the evaluation of the airway dimension, cranial or skeletal structures, or plan for orthognathic surgery.⁷

1.8. Management of OSA

1.8.1. Non-surgical management –

1.8.1.1. CPAP. Continuous positive airway pressure is the option for the treatment of moderate to severe cases of obstructive sleep apnea. A CPAP machine connects the mask to the machine with a hose. Air pressure prevents the airway from collapsing or becoming blocked during sleep & thus helpful in OSA patients, and thereby improves quality of sleep, relieves daytime sleepiness, reduces the risk of heart diseases and improves the quality of life.

1.8.1.2. Oral appliances. Oral appliances are preferred to people with mild-to-moderate OSA who either prefer it than CPAP or they are not able to successfully comply with CPAP therapy. Oral appliances aid in maintaining an open and unobstructed airway by repositioning or stabilizing the lower jaw, tongue, soft palate, or uvula.

These appliances may include mandibular repositioning or advancement devices e.g., Herbst appliance, snoregard; tongue repositioning devices like snorex; soft palate lifters, tongue trainers, or the combination of oral appliances and CPAP.⁷

1.8.2. Surgical methods

The surgical methods include the tracheostomy, a temporary measure which results in quick reduction of sequel of OSA in surgical procedures where the airway can't be maintained by the oral and nasal routes. The other surgical methods are uvulopalatopharyngoplasty, palatal advancement pharyngoplasty, tonsillectomy, excision of tori mandibularis (these four are oropharyngeal & nasopharyngeal methods); functional rhinoplasty, nasal valve surgery, nasal polypectomy are the bypass procedures; laryngeal procedures include epiglottoplasty and hyoid suspension & hypopharyngeal procedures include tongue reduction, partial glossectomy, lingual tonsillectomy, and mandibular advancement. The most common widely performed procedure is the uvulopalatopharyngoplasty with a success rate in a period of 6 months to be 80% patients.⁸

1.8.3. Lifestyles changes & medical management

The lifestyle changes adjunct to other management methods, but are equally important like management of weight, quit smoking and alcohol use, less salt intake and sugars in case of HTN & DM, etc; as these are risk factors associated with the obstructive sleep apnea. Also, the medical management for hypertension, diabetes, hypothyroidism is also important.

2. Complications

Complications of untreated obstructive sleep apnoea include increased risk of premature death, myocardial infarction, dysrhythmias, stroke, hypertension, motor vehicle accidents, metabolic syndrome, and neurocognitive dysfunction.

Complications of continuous positive airway pressure treatment include sleep disturbance due to congestion, rhinitis, bleeding from nose but humidification can often help with these symptoms, dermatitis due to the irritation of mask. Also, many patients at first find the mask uncomfortable, claustrophobic or embarrassing (). Complications of oral appliance therapy include occlusal changes and facial pain. Complications of surgery include bleeding, haematoma, velopharyngeal insufficiency, pharyngeal stenosis, dysphagia, airway obstruction, and, very rarely, death.

3. Conclusion with the role of dental practioner in OSA

In a day-to-day dental OPD, dentists play an important role in identifying patients with OSA and also in many

other diseases as part of their routine dental & medical examinations, thus, dentists can recognize a small upper airway and other anatomic risk factors for OSA and thus referring the patients to physicians for the proper diagnosis & management of OSA. Besides this dentist also plays an important role in non-surgical as well as surgical management of OSA either by selecting oral appliances for the patient or removal of tori or other surgical procedures. Also, dentist can make a patient aware of his condition so that he can take consultation from the physician and get his treatment done, and thus making the better life for a patient. So, we can also conclude that the most important and widely used medical device CPAP is very important in managing the OSA, but the role of dental practitioner for oral appliance selection and patient awareness cannot be ignored at all.

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Conflicts of interest

The author declares that they do not have any conflict of interests.

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Author biography

Lalita Sheoran, Post Graduate 3rd Year Student

Puneet Kumar, Senior Lecturer

Abhishek Singha Roy, Professor

Nasir Ul Sadiq, Post Graduate 2nd Year Student

Zahid Manzoor, Post Graduate 1st Year Student

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