

## Research Article

### Management of Obstructive Sleep Apnoea- A Review Article

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#### Abstract:

Sleep disordered breathing is a term which includes simple snoring, upper airway resistance syndrome, and obstructive sleep apnea (OSA). Simple snoring is a common complaint affecting 45% of adults occasionally and 25% of adults habitually and is a sign of upper airway obstruction. The role of dentistry in sleep disorders is becoming more significant, especially in co-managing patients with simple snoring and mild to moderate OSA. The practicing dental professional has the opportunity to assist patients at a variety of levels, starting with the recognition of a sleep-related disorder, referring patients to a physician for evaluation, and assisting in the management of sleep disorders. Diagnosis of OSA is made on the basis of the history and physical examination and investigations such as polysomnography, limited channel testing, split-night testing, and oximetry. The American Academy of Sleep Medicine (AAOSM) has recommended oral appliances for use in patients with primary snoring and mild to moderate OSA. It can also be used in patients with a lesser degree of oxygen saturation, relatively less day time sleepiness, lower frequency of apnea, those who are intolerant to CPAP, or those who refuse surgery.

**Keywords:** Dental implications, obstructive sleep apnea, oral appliances.

#### INTRODUCTION

Upper airway sleep disorders (UASDs) are conditions that occur in the upper airway that diminish sleep time and sleep quality, resulting in patient exhibiting symptom that include day time sleepiness, tiredness and lack of concentration.

American Academy of Sleep Medicine 2009“defined by the occurrence of daytime sleepiness, loud snoring, witnessed breathing interruptions, or awakening due to gasping or choking in the presence of at least 5 obstructive respiratory events(apneas, hypopneas or respiratory effort related arousals) per hour of sleep.”

#### PATHO-PHYSIOLOGIC ASPECT OF OBSTRUCTIVE SLEEP APNEA

It is characterized by cessation of airflow because of upper airway obstruction despite simultaneous respiratory effort . The respiratory effort continues despite obstruction until the individual is aroused from sleep.<sup>1</sup> During sleeping genioglossus, tensor veli palatini and other muscles which hold the airway patent gets relaxed, mandible move posteriorly as does the tongue which decreases upper airway volume. This causes decrease in the oxygen blood level by Central reflex stimulation which increases respiratory muscle contraction. Air gets sucked in at increased velocity causing vibration of soft palate and uvula resulting in snoring .<sup>2</sup>

#### CLASSIFICATION OF SLEEP APNEAS

The American Academy Of Sleep Medicine (AASM) classify sleep apneas

(A) According to Severity :Described by **MCNAMARA ET AL**

- NORMAL : AHI/RDI < 5 Episodes/hr
- MILD : AHI/RDI = 5-20
- MODERATE : AHI/RDI = 20-40
- SEVERE : AHI/RDI > 40

Episodes can last from 10-120 seconds

#### ACCORDING TO ORIGIN:

**OBSTRUCTIVE SLEEP APNEA:** Cessation of airflow due to total airway collapse despite persistent effort to breathe. OSA is the most common type of sleep apnea.

**CENTRAL SLEEP APNEA:** Much less common than OSA occur due to lack of CNS stimulation to respiratory muscles. Airway remains open, the chest wall muscles make no effort to create airflow. Etiology is encephalitis, brain

stem neoplasm etc.

## PREDISPOSING FACTORS

Anatomical factors include nasal obstruction, micrognathia, hyoid bone displacement, hypertrophy of uvula, soft palate and tonsils, macroglossia, upper airway shape and length, posteriorly positioned maxilla and mandible, steep occlusal plane, overerupted anterior teeth, large gonial angle, anterior openbite associated with large tongue, posteriorly placed pharyngeal walls.<sup>2,3</sup>

Behavioural factors like obesity which causes deposition of fat in pharyngeal wall and smoking which result in inflammation of upper airway can increase the chance of OSA.

**Other factors like** alcohol, CNS depressants, sedative, allergy, asthma, cold or sinus infection systemic disease involving mandible like rheumatoid arthritis, severe kyphoscoliosis or cushing syndrome has proved to alleviate condition of OSA.<sup>3</sup>

## CLINICAL FEATURES

Patients with OSA may have memory problems, excessive day time sleepiness, difficulty in concentrating, night drooling of saliva, depression, irritability, xerostomia, gasping for breath at night, and witnessed apneas. Poor work performance, occupational accidents and a reduction in social interactions and other aspects of quality of life appear to be associated with untreated OSA. There have been reports of exacerbations of epilepsy, asthma and hypertension<sup>4</sup>

## DIAGNOSIS

### Physical Examination

Physical condition of the patient with a neck size of 17 inches or greater for men and 15.5 inches or greater for women, indicate an increased risk for sleep apnea. Patient's body mass index (BMI) directly affects the predilection for sleep apnea. The BMI is computed by dividing the person's weight in kilograms (kg) by their height in meters squared (m<sup>2</sup>).

### Airway Evaluation

The evaluation of the airway begins at the tongue and proceeds into the oral pharynx. The condition of the tongue, its size, and related anatomic changes should be observed and noted, in a relaxed state. The Mallampati Score has been used in anesthesia is used as a predictor for determining severity of sleep apnea in some people. Friedman et al (1999) stated that patients with a Mallampati Score of III or IV are at a greater risk for sleep apnea than those with a score of I or II.

### Headache Status

Headache is a common finding among patients with sleep-disordered breathing and in some instances headache may be the symptom for which the patient seeks medical attention. If headache is present, it is appropriate to determine if the status of the headache improves in conjunction with the management of the sleep disorder.

### Muscle Assessment

It is important to evaluate and determine tenderness of the muscles of the head and neck region. Many patients with sleep-related breathing disorders may be fatiguing the muscles of the head and neck region and have coexisting jaw, face, or neck pain. These muscles may be responsible for pain referral that is expressed as headache

## Polysomnography

Nocturnal attended polysomnography, which requires an overnight stay in a sleep facility is the standard diagnostic modality in determining if a patient has OSA. This study records sleep staging like electroencephalography (EEG), electrooculography (EOG), electromyography (EMG), and physiological variables like sleep positioning, respiratory activity, oxygen saturations, blood pressure, and ECG. Unattended polysomnographic tests, which are done with four to six channel sleep study, include measuring the nasal airflow using the snoring microphone, thoracic and abdominal effort channels, ECG, EOG, and pulse oximetry.

Split-night polysomnography refers to a single night of attended sleep testing; in addition to aiding in diagnosis, it has a therapeutic component, namely the nasal continuous positive airway pressure (CPAP) titration, which helps in assessment of a positive airway pressure, also serves to maintain the patency of the patient's airway on the night of the test. Split-night testing has also been used to demonstrate the changes in sleep disordered breathing caused by an adjustable airway dilator at different positions of mandibular advancement.

Epworth sleepiness scale is a validated questionnaire which indicates a patient's level of day time sleepiness. Scores range from 0 to 3, and measure the likelihood of the patient dozing off while watching television, driving, or reading: 0 = would never doze, 1 = slight chance of dozing, 2 = moderate chance of dozing, and 3 = high chance of dozing. The blood pressure, blood sugar, and body mass index (BMI) are also recorded prior to treatment.

## Pulse Oximetry

Arterial oxygen saturation can be monitored continuously by pulse oximetry in the emergency room, during surgery, and during Polysomnography. Pulse oximetry is relatively simple and reliable. Despite limitations, oximetry may be a useful diagnostic tool over a wide range in Obstructive Sleep Apnea severity.<sup>6</sup>

## MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA

The treatment of Obstructive sleep apnea depends on several factors such as the severity of the symptoms, site of airway obstruction, and co-operation of the patient. There are several modalities ranging from simple lifestyle measures such as weight loss and avoidance of alcohol, to more substantial measures such as continuous positive airway pressure, or oral appliances, and in more severe cases, even surgical intervention.

## Behavior modification

Behavior modification suggestions include changing the sleep

position from the supine position to the side position; this can be accomplished by placing a tennis ball in the centre of the back of their pajamas or by positioning a pillow such that they cannot roll on to their back (positional training). The avoidance of alcohol and sedatives for 3 hours before sleep has been recommended, because they have a depressing effect on the central nervous system; they may also act as muscle relaxants, reducing airway patency. In obese patients, weight loss should be recommended; when the BMI becomes 10% more than ideal, the loss in airway space becomes significant.<sup>7</sup>

### Oral appliances

Oral appliances were used by Robin to treat glossoptosis in infants with micrognathia as early as 1905. There is sporadic mention of dental devices for prevention of snoring in patent records before 1980. In 1990, adjustable mandible-advancing oral appliances became the predominant form of dental therapy for SDB, signaling the entry of dentistry into mainstream sleep medicine. In 1991, The American Academy of Sleep Dentistry was formed for the education and certification of dental sleep disorders specialists. In 1995, controlled studies indicated similar effectiveness of, and greater patient preference for, oral appliances compared with CPAP in mild to moderate OSA. In 2000, a section on oral appliances was created in the Academy of Sleep Medicine.

Oral devices are basically thermoplastic materials with retainers and supports and are usually custom made.

Mandibular repositioning or advancement devices (MRD/MAD) which may be titratable, e.g., Herbst appliance/snoreguard/ silencer. 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.

Tongue repositioning or retaining devices (TRD), e.g., SnorEx. A tongue-retaining device is a custom-made soft acrylic appliance that covers the upper and lower teeth and has an anterior plastic bulb. 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. Soft palate trainers and tongue posture trainers are rarely used.<sup>8</sup>

The third type of intra oral device is designed to lift the soft palate or reposition the uvula (equalizer). The rationale for the use of palate lifting devices is to reduce the vibration of the soft palate that causes the snoring sound.

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.

### RATIONALE OF ORAL APPLIANCES AND HOW THEY WORK

Oral appliances are worn only during sleep and work to enlarge the airway by moving the tongue (anteriorly) or the mandible to enlarge the airway.

Factors which predict the response of the sleep disorder to oral appliances include the age of the patient, marital situation, abstinence from stimulants such as caffeine and alcohol, change in weight over 12 months or weight loss, lowering of BMI < 25, percent obesity, initial severity of the AHI scores, supine sleeping position, and the patient's tolerance and motivation. Positionality and percent obesity account for 83% of the response to treatment.<sup>7,8</sup>

Oral appliances improve the blood oxygen saturation levels as they relieve apnea in 20-75% of patients. They reduce AHI to < 10 events per h or bring about 50% reduction in AHI. Oral appliances also reduce the AHI to normal in 50- 60% of patients. Lateral cephalometric radiographs which show the measurements of the neck and pharynx could be used to predict posttreatment AHI with good accuracy.

The main advantages of using oral appliances are that there is good patient compliance and the appliances are noninvasive and relatively inexpensive; they can also be easily carried anywhere by the patient.

### NASAL CONTINUOUS POSITIVE AIRWAY PRESSURE

Nasal continuous positive airway pressure (N- CPAP) is a highly effective and safe treatment for obstructive sleep apnea and is generally considered to be the current primary treatment of obstructive sleep apnea. Fundamentally, the application of a therapeutic level of continuous positive airway pressure results in immediate relief in the upper airway obstruction. This benefit has been attributed to the continuous positive airway pressure functioning as a pneumatic splint for the upper airway.<sup>9</sup>

Additional physiologic benefits of continuous positive airway pressure application to include improvement in the function of pharyngeal dilator muscles, ventilator drive, and upper airway morphology.

Patient's perceived quality of life increases. Interestingly, the spouses of obstructive sleep apnea patients also gained from this therapy. Reduced sleepiness and the improved ability to steer a motor vehicle and hence frequency of driving accidents were reduced.<sup>8,9</sup>

### CONCLUSION

In rapidly industrializing country like India, with soaring rates of obesity, it is quite likely that prevalence of Obstructive Sleep Apnea is far higher than detected and rising rapidly. Although this disease traditionally thought to affect mainly middle aged obese person of male sex, over recent years there has been increasing evidence of occurrence of this disease in persons with certain craniofacial structures and female sex. At present there are several mandibular advancement appliances, which has been shown to enjoy high compliance rates and achieve excellent resolution of symptoms. It is important however for these patients to undergo regular medical referrals to monitor their condition and switch to an alternative

treatment plan if required.<sup>10</sup>

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