

Treatment of Obstructive Sleep Apnea Using Mandibular Advancement Device

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ABSTRACT

Background: Obstructive sleep apnea (OSA) is a respiratory sleep disorder characterized by partial or complete obstruction of the upper airway. [1] The most common complaints are loud snoring and disruption of normal sleep architecture and witnessed apnea. Patients with undiagnosed sleep apnea represent a major public health problem. Treatment of OSA varies from simple oral appliances and nasal continuous positive airway pressure to surgical procedure. Oral appliance therapy is an important treatment modality for obstructive sleep apnea. This study aimed to present a case report using oral appliance for treatment of mild OSA.

Keywords: Obstructive sleep apnea, mandibular advancement device.

INTRODUCTION

Sleep is the basic necessity of life. But more important is breathing. When we sleep, air travel through the nose, down the throat through the windpipe and to the lungs. The narrowest pathway is the back of the throat. When we are awake, muscle keep that pathway relatively wide open but when we sleep those muscle relax making the opening narrow. The air passing through this narrow opening may cause the soft palate to vibrate, this causes snoring. In some patient because of the large tongue, small air pathway or abnormal throat anatomy block the air way. This blockage restricts breathing, lowering the concentrations of oxygen in the blood until brain signals the body, causing the individual to wake up and normal breathing is restored. This disorder is known as obstructive sleep apnea [OSA].

It is well documented by various studies that Obstructive Sleep Apnea (OSA) have many health-related consequences which include hypertension, myocardial infarction, stroke, diabetes, depression, excessive day time fatigue and greater risk of automobile accidents. [2]

Etiology

Obstructive sleep apnea occurs in 2-4% of adult population between the ages 30-60 years. [2] The world wide OSA prevalence rate in adults ranges between 3.5% to 27%. In India, its prevalence ranges between 3% and 28% in men and 2.2% and 16% in women. [3]

Pathogenesis:

Pathogenesis of OSA is classifies into two types: the primary form and secondary form. Primary form

Received: Sept. 5, 2018; Accepted: Oct. 22, 2018

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(central form) is an alteration of central nervous system. The alteration of ventilation is related to nervous stimulus at respiratory centers.

The secondary form is due to reduction of upper ways width, anterior pharyngeal space reduction, redundant soft palate, prominent base of tongue, obese, alcoholism, smokers [4] Continuous positive airway pressure represents the gold standard in the treatment of obstructive sleep apnea. (CPAP)

CPAP is used in severe OSA because it normalized respiratory parameter, however oral appliances are recommended for milder cases such as primary snoring and mild OSA. [5] The oral appliances are of two groups; mandibular advancement devices (MADs) anchored to the teeth and move the mandible anteriorly and tongue retaining devices, which use suction to position the tongue anteriorly inside a bulb [6]

CASE REPORT

A 39 -year old female referred to the department of prosthodontics with a history of intrusive snoring. A subjective evaluation was done using Epworth sleepiness scale, and Berlin questionnaire. Patient gave history of overnight polysomnography test but had denied to undergo any further treatment.

During a clinical examination, the patient showed a body mass index (BMI) of 28.7KG/m² and neck circumference of 39cm. The oral examination showed localized gingivitis so scaling and oral prophylaxis was done. The anchoring and stability of MAD were evaluated and was satisfactory.

The patient was informed about the treatment plan and used of MAD to bring the mandible forward, which in turn would enlarge the posterior pharyngeal space.

Method

Maxillary and mandibular preliminary impression was made with alginate impression material (Algites) and the cast was poured using dental stone (Kalabhai dental stone). Facebow records was taken and transferred onto Hanau wide-vue articulator. Fig (1).

Interocclusal wax using modelling wax (Hindustan modelling wax) in patients' comfortable protrusive

mandibular position was recorded. Using the wax record the maxillary and mandibular cast were mounted in articulator. Fig. (2).

The design of this MAD consists of maxillary and mandibular acrylic splint. Additional modelling wax was added to maxillary and mandibular buccal aspect of the interocclusal record. Fig. (3) forming buccal flanges angled at 70° with the maxillary splint which fitted against buccal blocks on the upper splint to prevent the posterior movement of the mandible. Fig. (4) and it was cured, and finishing and polishing was done to form two acrylic splints. Fig 5 shows the patient with MAD appliance installed [4]



Fig 1: Facebow transfer.



Fig 2: Interocclusal wax in protrusive comfortable mandible position.

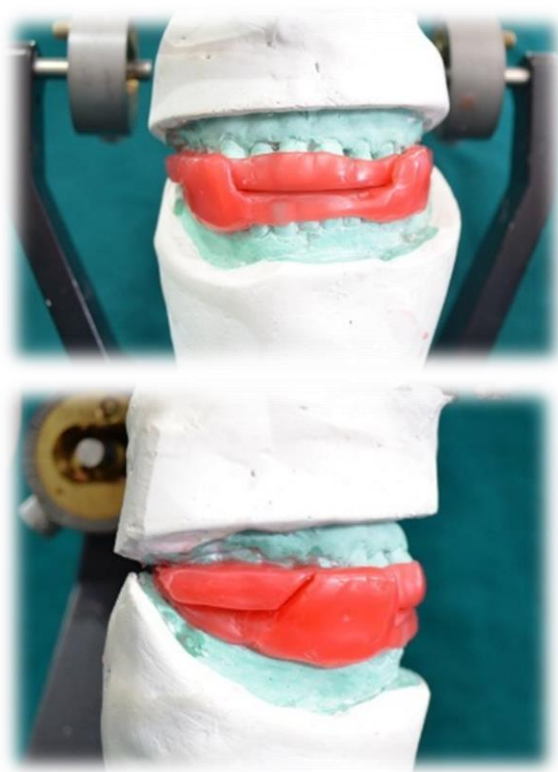


Fig 3 & 4: The splint had two buccal flanges angled at 70°



Fig 5: MAD in placed

DISCUSSION

The present study reports a successful treatment using a MAD construction using two acrylic splints. The patient was recalled after 2 weeks, 1-month and 6-month interval. Snoring is a sign of partial upper airway obstruction during sleep. Snoring and OSA are caused by abnormal airway (base of tongue and soft palate) anatomy and altered respiratory control mechanisms. The current first choice therapy is CPAP that keeps the upper airway open

during sleep. However, this treatment can be difficult for some patients to tolerate.

The method of fabricating this specific MAD has already being described. [4] The MAD was easy to use and didn't require electric power. The use of two separate acrylic splints makes it easier and more comfortable to the patient. The MAD was made in most comfortable protrusive position to avoid any possible anterior impingement of the glenoid fossae by the condyles. Even though a tongue retainer does not require dental support and it is normally not recommended as it is not comfortable to wear, produced several side effects, including irritation of the soft tissues and excess drooling. [7]

The recognition and treatment of snoring and obstructive sleep apnea are two medical areas where dentistry can play a valuable role. Dental appliances may prevent snoring and OSA by modifying the position of the upper airway structures so as to enlarge and reduce collapsibility of the airway and the posterior airway space (between the base of the tongue and posterior oropharynx) may be increased. The effectiveness of appliance therapy, however, depends on the severity of the sleeping disorder, the airway anatomy and whether the patient can tolerate the appliance. It is generally advocated for mild OSA and simple snoring (i.e. snoring in the absence of OSA) and moderate to severe OSA as an alternative to nasal continuous positive airway pressure (CPAP) or craniofacial surgery. The use of intra-oral appliances is simple, non-invasive, reversible and cost effective and may be the basis of definitive lifelong treatment. [8]

Considering that obstructive sleep apnea greatly increases patients' chances of heart attack, stroke and early death, dentist might be in a critical position to screen patients, refer patients and treat patients and assume a primary role in saving lives. [2]

CONCLUSION

In conclusion, this specific MAD is effective in reducing sleep apnea, snoring and improving sleep efficiency. In addition, while CPAP is actually the gold standard therapy for OSA, due to its complexity patient are often reluctant to use it. MAD has

advantage to be comfortable, simple to fabricate, and economical to the patient. For these reason MAD seems worth of further research in OSA therapy.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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