ORAL APPLIANCE FOR THE TREATMENT OF SNORING AND OBSTRUCTIVE SLEEP APNEA: A REVIEW

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ABSTRACT

Snoring and other sleep disorders of upper airway are generally the result of a condition or disease that causes partial or complete obstruction of the airway when patient assumes supine position and goes to sleep. The oral appliances modify the upper airway by changing the posture of the mandible and tongue and thus relieving the obstruction. Despite considerable variation in the design of these appliances the clinical effects are remarkably consistent. Improvement in sleep quality and sleepiness reflects the effect on breathing. Comparison of the risk and benefit of oral appliance with other alternative suggests that oral appliances present a useful alternative to continuous positive airway pressure (CPAP), especially for patients with simple snoring and patients with obstructive sleep apnea who cannot tolerate CPAP therapy.

Key Words: Sleep Apnea; Snoring; Oral appliances

INTRODUCTION

An oral appliances was considered as treatment for upper airway obstruction as early as 1902[1]. The purpose of this review is to compare the effectiveness of oral appliance with other treatments. The term "oral appliance" is used as a generic term for devices inserted into mouth in order to modify the position of the mandible, the tongue and the other structures in the upper airway for the purpose of relieving snoring or sleep apnea.

BACKGROUND

1. Snoring and obstructive sleep apnea

Snoring is a common affliction, affecting persons of all ages, but particularly middle aged and elderly men and women who are overweight[2-4]. Snoring is a medical and social problem. Socially when it makes the snorer an object of ridicule and causes others sleepless nights and resentfulness.

Medically, since it disturbs sleeping patterns and deprives the snorer of appropriate rest. When snoring is severe, it can cause serious and long-term health problems, including obstructive sleep apnea.

Obstructive Sleep Apnea (OSA)

When loud snoring is interrupted by frequent episodes of totally obstructed breathing, it is known as obstructive sleep apnea. Serious episodes last more than ten seconds each and occur more than seven times per hour. Apnea patients may experience 30 to 300 such events per night. These episodes can reduce blood oxygen levels, causing the heart to pump harder.

2. Pathophysiology of snoring

The airway of snoring patients though patent is partially obstructed. This obstruction is very often caused by the tongue and / or hyoid bone and overlying soft tissues dropping back toward the posterior wall of the pharynx when the patient assumes the supine position and goes to sleep. In attempting to get adequate oxygen to the lungs, there is an increase in velocity of air passing through the reduced airway space. This increase in velocity may cause flabby tissue, often the soft

palate and/or uvula, to vibrate. This vibration is the sound of snoring[5].

Pathogenic factors[6]

a. Decreased or unstable upper airway muscle activity (alcohol consumption/medication)

b. Small oropharyngeal lumen due to: (obesity, adenotosillar hypertrophy, retrognathia, deviated nasal septum, surgeries of nasal region)

c. High pharyngeal compliance

d. High nasal resistance

TREATMENT OF SNORING AND OSA

1. Behavior Modification

It consists of weight loss, change of sleep position and reducing alcohol or sedative usage[5]

2. Surgery

Surgery is often in the form of uvulopato-pharyngoplasty (UPPP), tonsillectomy, tracheostomy and mandibular advancement or hyoid bone lift.

3. Continuous positive airway pressure

CPAP is a treatment modality that utilizes a pump forcing presurgical 'room air' through a mask through the patient's nasal cavity and upper airway.

4. Oral devices

4.1 Background

In the last decade, a variety of dental devices have been developed for treatment of snoring and OSA. The techniques often modify the position of the mandible within the restricted mobility defined by the TMJ and the pterygoid muscle.

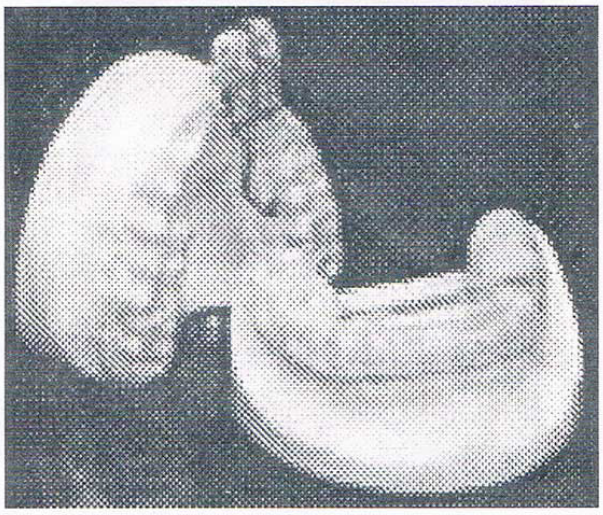
4.2 Types of oral appliance

They are of two basic configurations:

- mandibular advancing devices

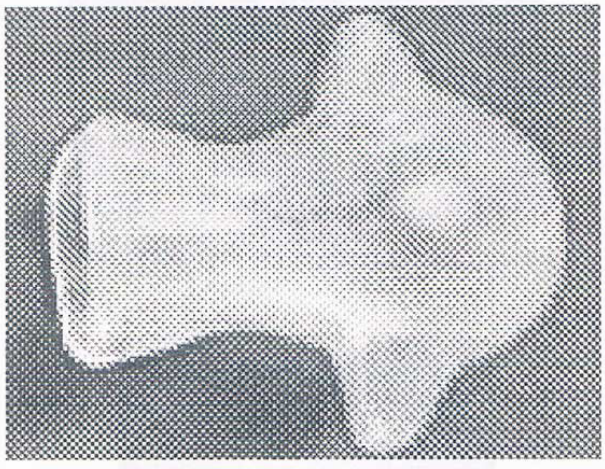
- tongue retainers

4.2.1 Mandibular advancement devices (MAD):



MAD works indirectly by holding the mandible forward and hence the tongue forward. It may be single position or adjustable, laboratory fabricated or stock devices, either one piece or two-piece device.

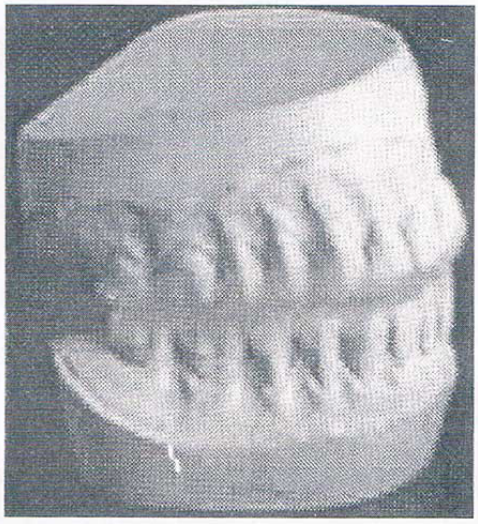
4.2.2 Tongue Retainers



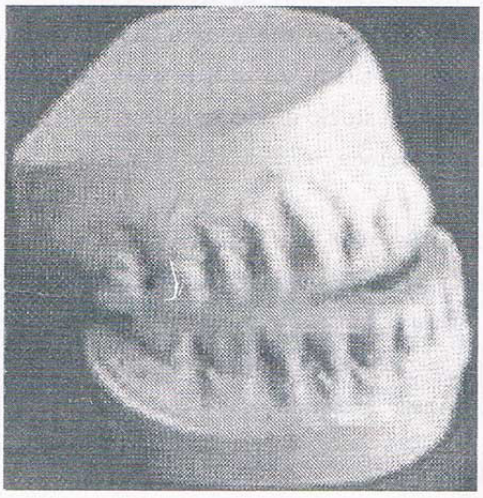
It is designed to keep the tongue in an anterior position during sleep. These device secure the tongue by means of negative pressure in a soft plastic bulb and a flange, which fits between the lips and the teeth, holds the device and tongue anteriorly in the oral cavity. It also causes the downward position of mandible.

4.3 Mechanism of action of oral appliance[7]

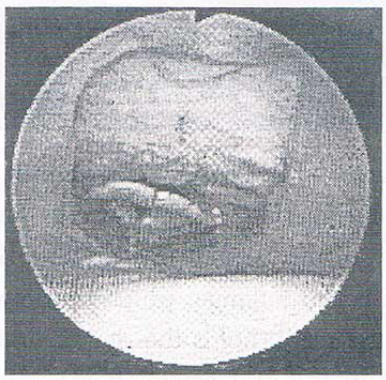
Oral devices generally work by directly or indirectly preventing the tongue and hyoid bone from approaching the posterior wall of pharynx and hence compromising the airway space.



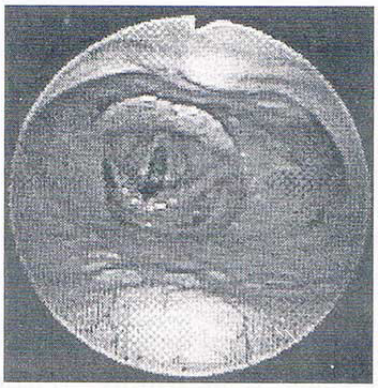
The appliance is set in the neutral position



The appliance is adjusted to provide~ 70% of the maximum mandibular advancement



Picture of the airway corresponding to the neutral setting



Picture of the airway corresponding to the 70% setting.

4.4 Common technique and procedures:[5]

A. Impression of upper and lower jaw
B. Bite registration with desired protrusive (70% of maximum advancement of mandible) either with the tongue blade or George gauge
C. Fabrication
D. Insertion, adjustment and titration

SUMMARY

Some treatment are limited by a low and unpredictable success rate (UPPP, medication and weight reduction), some are limited by inconvenience (tracheostomy), some by cost (reconstructive surgery) and some by patient non compliance (CPAP). Oral appliances offer an alternative mode of therapy. It is successful in approximately 50% of surgical failure patients[5]. Patient compliance with oral device is better than with CPAP. However excessive salivation and transient discomfort initially and TMJ pain later may prevent the acceptance of appliance[1].

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