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Abstract

The obstructive sleep apnea–hypopnea syndrome (OSAHS) is a common sleep-related breathing disorder characterized by repetitive obstructions of the upper airway during sleep. Nasal continuous positive airway pressure (CPAP) is the primary choice of treatment for OSAHS, but many patients are unable or unwilling to comply with the treatment. The modification of pharyngeal patency by oral appliances (OA) is an alternative treatment for OSAHS. This article provides a brief review and information of the oral appliance application in treating OSAHS.

Keywords

obstructive sleep apnea; oral appliance

Review Article

The Use of Oral Appliances for Obstructive Sleep Apnea-Hypopnea Syndrome (OSAHS)

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The obstructive sleep apnea–hypopnea syndrome (OSAHS) is a common sleep-related breathing disorder characterized by repetitive obstructions of the upper airway during sleep. Nasal continuous positive airway pressure (CPAP) is the primary choice of treatment for OSAHS, but many patients are unable or unwilling to comply with the treatment. The modification of pharyngeal patency by oral appliances (OA) is an alternative treatment for OSAHS. This article provides a brief review and information of the oral appliance application in treating OSAHS. ***(Taiwanese Journal of Orthodontics. 29(1): 4-7, 2017)***

Keywords: obstructive sleep apnea; oral appliance

BACKGROUND

Obstruction of the upper airway during sleep may result in snoring, and reduction (hypopnea) or cessation (apnea) of airflow. In adults, apnea is defined as cessation of airflow for greater than 10 seconds. Hypopnea is defined as a 50% or greater decrease in airflow, often accompanied with hypoxaemia or arousal. The obstructive sleep apnea-hypopneasyndrome (OSAHS) is defined as a patient suffering from five or more apneas/ hypopneas per hour of sleep with daytime symptoms, and is a relatively common condition occurring in 2 to 4% of men and 1 to 2 % of women in middle age.[1]

The pathophysiology of OSAHS involves factors that relate to the anatomical dimensions of the upper airway, upper airway resistance and upper airway muscle activity during sleep.[2] The patients with OSAHS often present with symptoms noticed by their bed partner, who often reports the loud snoring of the patient followed by an apnea associated with respiratory effort and terminated

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by an awakening and resumption of snoring. The patient then resumes the sleep cycle and may repeat itself many times during the night. Excessive daytime sleepiness and an impairment of cognitive function are often presented due to sleep fragmentation. Patients may experience other symptoms including mood disturbance, decreased libido and social withdrawal (ASDA 1995). Several epidemiological studies have reported associations between OSAHS and health related outcomes such as cardiac arrhythmias, systemic and pulmonary hypertension, ischemic heart disease and cerebrovascular disease.[3] Some evidences indicated that OSAHS may be linked to sleepiness and road traffic accidents which has medico-legal implications. Some countries even require drivers suffering with OSAHS should report themselves to the appropriate licensing authority.[4]

DIAGNOSIS OF OSAHS

The diagnosis of OSAHS is usually made by polysomnography, which also provides an indication of severity (ASDA 1995). Polysomnography involves recording during sleep of chest and abdominal movements, oxy-hemoglobin saturation, airflow, ECG tracing, sleep state (EEG, EOG and EMG), activity whilst asleep, and arousals. The number of episodes of apnea and hypopnea per hour of sleep is calculated from the polysomnography and is referred to as the apnea-hypopnea index (AHI). Severity of OSAHS has two components: severity of daytime sleepiness and AHI (AASM 1999).

Epworth Sleepiness Score (ESS), combined the subjective sleepiness and apnea-hypopnea index, is currently the most widely used tool to assess sleep disordered breathing from an overnight monitoring. Both measurements have their limitations and the outcomes should be considered independently to evaluate the effectiveness of OSAHS treatment.

TREATMENT OF OSAHS

Treatment options for OSAHS include behavioral modification, such as weight loss, alcohol avoidance and alteration of sleeping, CPAP, as well as a range of upper airway surgical procedures. Oral appliances (OA) that modify the upper airway size are increasingly prescribed to patients with OSAHS.

MECHANISM OF ORAL APPLIANCE

Upper airway muscle activity decreases during sleep, leading to increase collapsibility of the pharyngeal tissues, mandibular opening and posterior displacement of the tongue. These changes result in narrowing of the oro-pharyngeal and hypo-pharyngeal airway.[2] A variety of OAs are available, the primary actions are to advance the mandible or tongue and thus increase the upper airway size. Another mode of action that mentioned but less recognized, was that the OA cause stretch-induced activation of the pharyngeal motor system, reducing soft tissue laxity and airway collapse.[5]

EFFECTS OF ORAL APPLIANCE

48% of patients treated with OA were considered successful, with reduction of AHI to <10/h and relief of symptoms; 24% were considered compliance failures due to unable or unwilling to comply with the treatment; and 28% were considered treatment failures as failure to reduce AHI to <10/h or failure to relieve symptoms.[6] OAs come with different designs and all appear to show effective treatment results.

A soft elastic silicone positioner was used for opening and advancing the mandible. The results showed a decrease in the mean apnea–hypopnea index (AHI), number of arousals per hour, ESS, snoring score, and total FOSQ score.[7]

Mandibular advancement splint (MAS) comprised of two upper and lower dental arch acrylic splints anchored with screw device, which enable to advance the mandible of patients with OSAHS. The patients with the MAS experienced significantly improvement in mean sleep latency on the multiple sleep latency test and Epworth sleepiness scale score as comparing with the control device after 4 weeks of observation.[8] Another study reported significant improvements in AHI, MinSaO2, and arousal index with MAS, as comparing with the control. The MAS was reported as an effective treatment in some patients with moderate or severe OSAHS.[9]

The mandibular advancement appliance (MAA) was constructed from a bilaminate acrylic material with a soft fitting surface. MAA was constructed as the mandible advanced by 75% of maximum protrusion and a 40 mm inter-incisal vertical clearance. When wearing the MMA, 33% of the OSAHS subjects had a reduction in the pre-treatment AHI to 10 or less. However, the MAA was less effective in the subjects with the most severe OSAHS (pre-treatment AHI >50).[10]

SIDE EFFECTS OF THE ORAL APPLIANCE

The side effects of the OA have been reported including discomfort in the temporomandibular joint, teeth or facial musculature, sleep disruption, dental crown damaged, bite change, excessive salivation or dryness of the mouth.[11,12]

CONCLUSION

The oral appliances are aimed to anteriorly displace the mandible, and maintain airway patency. The evidences demonstrated benefits in sleepiness and health status with the use of oral appliance.

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