Review Article
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Effectivity of oral appliance in the obstructive sleep apnea–hypopnea syndrome and snoring

Summary

Taking into account the relationship between the airway and sleep respiratory disorders, and the increase of clinical multidisciplinary management, the dentist whit training in dental medicine sleep plays a very important role in the treatment of the obstructive sleep apnea-hypopnea syndrome and snoring. The purpose of this review article is to describe one of the treatments that has taken more strength the last decades to reduce the apnea / hypopnea index (AHI) of patients with Sleep Apnea-Hypopnea Syndrome (OSAHS); I refer to mandibular advancement devices (MAD); the MAD are indicated in simple snoring, patients who have mild and moderate apnea and for patients who have obstructive severe sleep apnea when the patient has not had adherence to continuous positive airway pressure (CPAP). Patients with OSAHS have narrowing of the upper airway (VAS) during sleep; The MAD, by making advanced of the jaw and tongue, increases the space of the upper airway (VAS), preventing the tongue from collapsing later and stabilizing the muscles that support it. In patients with the following characteristics: a low or normal body mass index (BMI), reduced measurement of neck circumference and / or mandibular retrognathism, treatment with the mandibular advancement device (MAD) becomes more efficient. These devices improve the patient's quality of life by decreasing cognitive and cardiovascular problems.

Keywords: sleep, apnea, snoring, oral devices, mandibular

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Abbreviations: OSAHS, sleep apnea-hypopnea syndrome; AHI, apnea hypopnea index; MAD, mandibular advancement devices; BMI, body mass index; CPAP, continuous positive airway pressure; OA, oral appliances; AASM, American academy of sleep medicine; TMJ, temporo mandibular joint; ESS, Epworth somnolence scale

Introduction

Continuous positive airway pressure (CPAP) is considered as the treatment that has shown greater efficacy in patients with obstructive sleep apnea-hypopnea syndrome (OSAHS); some patients reject this therapy due to the discomfort and claustrophobic sensation. For this reason, there are other alternatives such as mandibular advancement devices (MAD). It has been seen a few decades ago the therapy with mandibular advancement devices (MAD) has gained strength due to its effectiveness and easy handling; It has been the first choice treatment option for patients suffering from mild, moderate OSAHS, simple snoring; and second choice in case of severe apnea when the patient has not had adhesion to positive pressure therapy, as well as an alternative treatment in patients who cannot perform surgical procedures due to medical conditions. The dentist, who is part of a multidisciplinary group, must have studied and be trained in dental sleep medicine, especially in the preparation, treatment and monitoring of mandibular advancement device MAD.[1–10]

Method

For writing this article, I consult a sort of articles published since 2004 on websites, scientific journals, and books, among others, using the keywords: oral devices for treatment of OSAHS, obstructive apnea and mandibular advancement. They were reviewed for the latest results that established the effectiveness of the MAD under the premises developed here, as well as the role of the dentist in sleep medicine.

Results

In this Search, we observe that there are many mandibular advancement devices currently for the treatment of OSAHS, all with the same function of allowing the upper airway to remain open and permeable during sleep by stabilizing the oropharyngeal space, preventing the collapse of the tongue and musculature. "It is clear that the use of intra-oral devices is not a new idea considering that since the 1900s, when some surgeons suture the tongue forward with the lower lip stabilizing the upper airway during sleep to prevent the collapse of the VAS. "(1). In the year 1934 Pierre Robín, from France, publishes a writing in which he details the use and benefit of a splint (monobloc) of mandibular repositioning in children who present with mandibular retrognathia and apnea, positioning the jaw in a more advanced position, preventing the tongue from falling backwards (glossoptis); that appeared when the child slept supine;[1] since then, therapy with oral appliances (AO) has been used for the management of sleep-related respiratory disorders, this being a non-surgical treatment option. As described by Atannasio et al.,[2] there were two options of oral appliance (AO) used decades ago (1). A tongue retention device (DRL) whose function was to keep the tongue in an anterior position during sleep used for edentulous patients and in advanced periodontal disease avoiding the collapse of the superior airway (2). A device for repositioning the jaw (ARM) today mandibular advancement devices (MAD), whose mechanism of action is to advance the jaw to improve

the superior airway permeability. In 1980, a group of US doctors and dentists began working together to study and develop mandibular advancement devices (DAM) as an alternative method of treatment of OSAHS; In 1995, the first publications on treatment with Oral appliance (OA) in obstructive sleep apnea and snoring appear. In 2006, the American Academy of Sleep Medicine (AASM) published two documents that recognized AO as an option for the treatment of OSAHS and snoring.[1,2]

The indications for the use of the mandibular advance device (MAD)

"The American Sleep Disorders Association (ASDA) defines MAD as devices that are inserted into the mouth and modify the position of the jaw, tongue and other support structures of the upper airway".[3] The mandibular advancement (MAD) are indicated for patients with mild, moderate OSAHS, upper airway resistance syndrome (SRVAS) and in those who have severe apnea that does not suit to the treatment of positive airway pressure (PAP),patients that due to medical conditions it is not convenient to perform surgical procedures and for simple snorers. The therapy that these patients receive with the mandibular advancement device must be carried out by a dentist who has adequate training in dental sleep medicine, and who is part of a multidisciplinary team.

Classification of the DAM

The mandibular advancement devices can be classified according to its manufacture and the mechanism of action.

According to its manufacture

Prefabricated: As the name implies, they are already pre-manufactured device that the same patient adapts in the house with hot water; they are not recommended, due to the fact that those have not control of the mandibular advance; they are made of polyurethane.

The manufactured ones: They are custom made devices for each patient; They consist of two thermo formable splints, one superior (maxillary) and one inferior (mandibular); they can be adjustable or fixed, the adjustable ones are connected to each other by different mechanisms to be able to realize the corresponding mandibular advance according to the case; these allow mobility; in the case of fixed (monobloc), it does not allow mobility and to make adjustments is more difficult. The most recommended mandibular advancement devices (MAD) are those that are made to measure and adjusted for each patient since they allow modifications in the case that this requires a greater or lesser mandibular advance.

According to its mechanism of action

Retaining devices of the tongue (DRL): The mechanism used in the retaining device of the tongue is: the tongue is placed in a capsule to allow free oropharyngeal space and maintain the upper airway permeable during sleep; it is indicated in toothless patients or in patients with advanced periodontal disease. Currently they are not used.

Mandibular advancement devices (MAD)

Looking at comparative studies, it was found that adjustable and fixed mandibular advancement devices (MAD) decreased the apnea-hypopnea index (AHI), the number of awakenings, decreased daytime sleepiness, and improved the patient's quality of life.[5,6]

Effectiveness of the mandibular advancement devices (MAD)

The mandibular advancement devices (MAD) are effective in eliminating snoring in more than 50% of cases and in reducing it significantly between 80 and 100%; They help improve sleep quality as well as reduce the

apnea-hypopnea index (AHI), being a therapeutic option with wide acceptance of patients, not only for its cost but also for its easy adaptation. The effectiveness depends largely on achieving a good diagnosis and determining which will be the best mandibular advancement device in each case. In those devices in which a mandibular advance is made between 70-80%, a lower collapse of the upper airway is achieved. There are some cases in which treatment with the mandibular advancement devices (MAD) therapy is less effective as in the case of severe OSAHS, as opposed to the good results obtained in patients with mild and moderate OSAHS. The use of mandibular advancement device is not recommended when there are pathologies of the temporo mandibular joint (TMJ), dental problems, diminished mandibular protrusion capacity, periodontal problems and increase overbite.[4] Hoekema et al.,[9] they highlighted the effectiveness of mandibular advancement devices to improve breathing during sleep; taking into account three mechanisms: (1) The suprahiodeus and anterior genioglossus muscles move when making the mandibular advance in this way the possibility of a collapse decreases. (2) The downward movement of the jaw accompanies the advance, therefore exerts tension on the soft palate and preserves the pharyngeal veil space. (3) Maintains a forward position of the jaw and hyoid bone during sleep, preventing backward movement of the jaw and a collapse of the upper airway by the tongue.[7,9]

Discussion

CPAP vs DAM

Although the continuous positive airway pressure (CPAP) is more effective in controlling most cases of OSAHS. Ferguson compared efficacy, side effects, treatment follow-up and individual preferences in a prospective randomized study. The IAH was lower with continuous positive airway pressure (CPAP) than with the mandibular advancement device (MAD). Other studies show similar figures in oxygen saturation, but when assessing patient satisfaction, they are more comfortable with the mandibular advancement device (MAD) since it does not make any noise, there is no skin irritation neither of the upper airway and for patients who suffer from claustrophobia is the best option of treatment. The mandibular advancement device (MAD) being less effective for patients with severe OSAHS and more effective for cases of mild and moderate OSAHS; However, in clinical practice, it has been observed that by using the mandibular advancement device (MAD) some patients with severe OSAHS manage to reduce AHI, improve oxygen saturation and quality of life in those who do not have adherence to CPAP.

Surgery and DAM

It is important to take into account the combination of treatments that is the case of surgery and mandibular advancement device (MAD) refers, once they have been performed, the relevant surgery (s) will proceed to perform therapy with the mandibular advancement device allowing than the upper airway VAS remains permeable during sleep.[8] "In relation to some surgical procedures, such as

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uvulopalatopharyngoplasty, there are jobs where a mandibular advancement device (MAD) are confirmed superior in terms of individual preference and treatment efficacy, or in those cases in which surgery has not been successful, the mandibular advancement devices (MAD) are considered as rescue treatment".

Protocol for placing mandibular advance device (DAM)

When the sleep unit professional refers the dentist with training in sleep medicine to perform a mandibular advancement device (DAM)? When snoring is the main symptom, when the patient does not tolerate the continuous positive pressure of the pathway aerial (CPAP), surgical failure, frequent trips, and claustrophobia.

When is therapy with the mandibular advancement device (MAD) not indicated?: If drowsiness is the main symptom, insufficient dentition, diseases of the temporal mandibular joint (TMJ), marked nauseous effect, morbid obesity, severe oxygen desaturation. **"**If snoring is the main symptom, there is little daytime symptoms (sleepiness) and hypoxemia is not a preponderant factor, the mandibular advancement device (MAD) may be the treatment of choice. But when sleepiness is the main symptom, continuous positive airway pressure (CPAP) is a better choice, since the positive response to the treatment improves and ensures its acceptance".

Adverse effects

The most common are: Excessive salivation, pain in the muscles of the face and mandibular temporo joint (TMJ), changes in the occlusal relationship, difficulty swallowing and sometimes opening interproximal contacts.[2]

Follow-up

Follow-up is perform two weeks after starting therapy with the mandibular advancement device (MAD), monitoring should be done to assess the device as such, dental structures, the mandibular temporo joint (ATM) and muscles involved in the treatment; the patient will be cited every month to verify adjustment of the mandibular advancement device (MAD), symptoms are evaluated, also the dentist trained in dental sleep medicine evaluates whether there are side effects or not, efficacy tests are carried out taking into account the parameters of the AASM for Oral appliance therapy in the OSAHS. The follow-up test is not indicated in those patients with primary snoring. To ensure that the therapy works, a polysomnography or cardiorespiratory polygraphy should be done with the device in the mouth while the patient sleeps to verify the effectiveness and adherence to the treatment; it is done at six (6) months; Similarly, clinical control with the multidisciplinary team and the sleep specialist dentist is important.[2] There are two areas that improve significantly in the patient; the neurocognitive that can be evaluated with the Epworth somnolence scale (ESS), and the cardiovascular that is observed by improving the patient's blood pressure. It also improves the patient's mood and quality of life.

Conclusion

a. The dentist who performs therapy with mandibular advancement devices must be trained in dental sleep medicine, to make the treatment effective, with optimal results.

b. It is essential, to bring a successful treatment with the mandibular advancement device (MAD), to correctly select the patient and the device that suits their needs.

c. When selecting the mandibular advancement device (MAD) as an alternative treatment, clinical follow-up of both the patient and the device should be done.

d. Adjustable mandibular advancement (MAD) devices are very effective for the treatment of simple snoring and in mild and moderate OSAHS, improving the Apnea-Hypopnea (IAH) index, decreasing daytime sleepiness.

e. The use of the mandibular advancement device (MAD) is another treatment alternative for patients who do not have adherence to therapy with continuous positive airway pressure (PAP), or who, due to medical conditions, are not candidates for surgery.

f. It is observed that with the use of mandibular advancement devices the patient's cognitive level improves, the apnea and hypopnea index decreases and the patients' blood pressure improves.

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Conflicts of interest

There was no conflict of interest for any of the authors in this study.

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