Efficacy of mandibular advancement devices in the treatment of mild to moderate obstructive sleep apnea and the usefulness of sleep endoscopy

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Introduction

Scientific literature and international guidelines report that, in mild to moderate obstructive sleep apnea (OSA) cases, dental therapy with a mandibular advancement device (MAD) is at least as effective as the therapy with Positive Airway Pressure (PAP or CPAP). Sleep endoscopy, a fibroscopic examination performed under drug-induced sleep, may be very useful in predicting MAD effectiveness. MAD is often preferred by patients who are often more inclined to comply with the treatment.

Case report

The patient underwent cardiorespiratory monitoring in December 2014. Table 1 shows the examination outcomes. The medical report stated she suffered from moderate OSA with deep desaturations. Indication: overnight CPAP therapy + 6.5 cm H₂O in symptomatic patient.

After evaluating all the features of the CPAP therapy, the patient opted instead for the MAD therapy, reported in the guidelines of the American Association Sleep Medicine (AASM) as being equally effective for disorders of this type.

Sleep endoscopy consists of investigating the airways by means of fibroscopy under drug-induced sleep; during the snoring or apnea phases, the examiner can move the mandible forward by a manual manoeuvre called mandibular pull-up or using devices provided by the dentist, mimicking the position that the mandible will take when using the MAD. If in this situation the patient stops snoring or the apnea ends, it is highly probable that this will happen also when using the MAD.

The aim of this article is to highlight how sometimes sleep endoscopy can be useful in predicting the real effectiveness of dental therapy in the individual patient.

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The patient was presented to our clinic in March 2015. She scored 10 points in the Epworth test for the assessment of daily sleepiness. Her body mass
index (BMI) was 31.2. The patient reported habitual, persistent snoring and excessive daily sleepiness (EDS).

The stomatognathic examination revealed good oral health, presence of all teeth and good occlusion. The patient reported having undergone an orthodontic treatment with a fixed appliance in the recent past for aesthetic reasons. The mouth opening was 43 mm, no signs or symptoms ascribable to TMJ disorders were present (Fig. 1).

There were therefore all the pointers for MAD therapy and no contraindications.

In order to assess the probability of MAD’s effectiveness, a sleep endoscopy was prescribed. This examination was performed in June 2015 with endoscopic recording of the upper aerodigestive tract under deep sedation using Propofol (10 mg/ml; Diprivan, AstraZeneca Co.) and with electrophysiological monitoring of brain activity (BIS).

Snoring at palate/tonsil level with circular pattern, circular obstructive site at palate/tonsil level and at the base of tongue/hypopharinx level were detected. Mandibular pull-up was effective and solved the problems at both levels. Therapeutic options prescribed were: CPAP or MAD application and weight loss.

Impression taking and bite registration were carried out using George Gauge devices (Fig. 2), in order to prepare for the application of MAD (type Odontoapneia). This appliance consists of two (upper and lower) occlusal plates, linked by a frontal adjustable system, allowing sufficient freedom for mandibular movements, both in opening and in lateral excursions during use (Fig. 3). The appliance is adjustable and can be progressively advanced, as prescribed by the AASM guidelines.

The appliance’s initial position, based on the bite registration, corresponds to 60% of the mandibular maximal protrusion.

The MAD was applied in July 2015. The patient was instructed on how to use and maintain the appliance correctly. She was informed about possible initial soreness in the face in the morning due to the necessary adjustment of the chewing muscles. The patient was asked to report any experience of problems in joints or continuing soreness.

Follow up

The patient came for the first check up in September 2015. This time the Epworth test score was 2 points. The woman reported that her daily sleepiness had disappeared while the snoring had firstly disappeared but had come back sporadically in the last two weeks, but at about 10% the level of the past, according to her husband. She did not report any particular problem in her chewing muscles nor the TMJ. The mouth opening was unchanged. The occlusion examination did not reveal any teeth displacement or changes to the contacts between the two dental arches.

The mandibular position was advanced by 1.5 mm activating the MAD advancement system.

The patient had lost weight and her BMI had decreased to 28.52.

In the meanwhile, as a first assessment of the MAD effectiveness, an overnight monitoring of blood oxygen saturation was performed; this examination is less accurate than cardio-respiratory monitoring but quicker to obtain at her local health facility. This examination was carried out in October 2015 and it showed no phasic desaturations which could lead to suspecting apneic events.

Meanwhile the patient reported the complete disappearance of snoring.

In January 2016, a new cardiorespiratory monitoring was performed with the same equipment used for the first monitoring, using the MAD.

<table>
<thead>
<tr>
<th>Cardiorespiratory monitoring</th>
<th>Cardiorespiratory monitoring with MAD</th>
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<tbody>
<tr>
<td>– AHI 17.9</td>
<td>– AHI 2.5</td>
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<tr>
<td>– ODI 16.9</td>
<td>– ODI 1.7</td>
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<tr>
<td>– Snoring index 31.4%</td>
<td>– Snoring index 4.7%</td>
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<tr>
<td>– Lowest saturation 77%</td>
<td>– Lowest saturation 88%</td>
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Table 1 Values of initial cardiorespiratory monitoring

Table 2 Values of initial cardiorespiratory monitoring with MAD
Data are shown in Table 2. The medical report stated that the patient no longer suffered from OSA. At the check up in the same month, the patient reported absence of snoring and daily sleepiness. The condition of the appliance was excellent and it showed no signs of deterioration. There were no changes in dentition, dental occlusion and chewing function compared to the initial situation.

In July 2016 the patient's conditions were still stable, without snoring or sleepiness.

Conclusion
The case reported shows that MAD is as effective as CPAP in successfully treating mild to moderate OSA, as suggested in the AASM guidelines. It also shows that patients prefer MAD to CPAP, and epidemiologic data seem to confirm that this device ensures greater adherence to the treatment.

This case particularly reveals how sleep endoscopy, in association with the mandibular advancement manoeuvres, is an excellent prediction tool about the effectiveness of the MAD therapy.

References
6. Ramar K, Dort LC, Katz SG, Lettieri CJ, Harrod CG,


