The Treatment of Severe Obstructive Sleep Apnoea with Mandibular Advancement Appliance

Dear Editor,

Obstructive sleep apnoea syndrome (OSAS) is a sleep disorder characterised by excessive snoring, periodic breathing with repetitive apnoeas, hypopneas, and frequent arousals leading to fragmented sleep. Therapeutic interventions include weight loss, abstinence from alcohol, nasal continuous positive airway pressure (CPAP), uvulopalatopharyngoplasty, maxillomandibular surgery, or tracheostomy.[1] However, many of these therapeutic modalities are limited by patient compliance, lack of efficacy, or serious side effects.[2] Thus, oral appliances (OA) are thought of as alternative therapies for patients with OSAS. Though they have been proven to be a potentially effective option in mild to moderate cases of OSAS for some patients, there is not enough evidence to prove that they are effective in the treatment of severe OSAS.[3] We report a case of severe OSAS treated with mandibular advancement appliance (MAA) as an alternative therapy to CPAP.

A 36-year-old Caucasian male admitted to our Sleep Disorders Center with complaints of snoring, apnoea, and excessive daytime sleepiness. His medical history revealed that he was suffering from headache, inability to concentrate, chronic fatigue, and sore throat. He did not use any sedatives, alcohol, or tobocco. The results of the diagnostic polysomnography (44-channel, Compumedics E series, Australia) indicated that the patient had severe OSAS, with an apnoea hypopnea index (AHI) of 36, 1 event/hour, and a minimum oxygen saturation of 87% (Table 1). Radiofrequency (RF) therapy was applied to the patient's concha after consultation with otolaryngologists. Nasal continuous positive airway pressure (CPAP) titration was tried one month after RF but he was uncomfortable with CPAP. Thus, he was referred to a dentist specialising in sleep dentistry for OA. A monoblock sleep appliance was prepared using an acrylic resin (Ortocryl®, Dentaurum, Ispringen, Germany) and delivered to the patient (Figs. 1a and b). Before the treatment, a lateral cephalomertic radiograph in the upright position at the end of expiration was taken to evaluate the upper airway dimensions and dentoskeletal pattern with and without the MAA. The control PSGs (polysomnograms) were performed at the first and eighth month of the treatment After every PSG examination, the patient indicated that his quality of life had improved and that he was comfortable with the device. His complaints had significantly reduced and AHI was decreased by 79%. Moreover, an improvement was seen in the slow-wave and REM sleep of our patient after using the device for 8 months (Table 1).

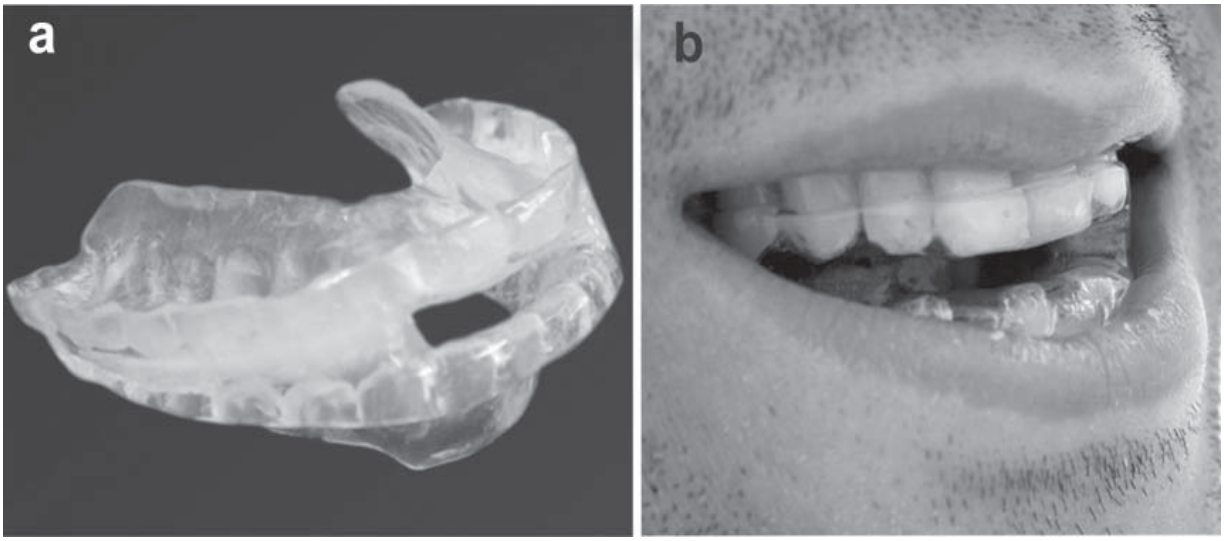

Fig. 1(a). The apperance of mandibular advancement appliance. (b) Located in patient's mouth.

Table 1. Nocturnal Polysomnogram Report

Scoring Variables	At the diagnosis	First month of MAA treatment	Eighth month of MAA treatment
Total sleep time, min	419	350	396
Sleep efficiency, %	88.3	96.4	92.6
Sleep onset latency, min	6.5	10.5	8.5
REM onset latency, min	228.5	164	206
Wake after sleep onset, min	47.5	18.5	21.5
Awake Average SpO_2 %	96	94	96
Sleep Lowest SpO_2 %	87	90	90
Sleep period, %			
Stage 1	3.2	2.4	4.7
Stage 2	49	59.6	48.5
Stage 3	7.0	25.1	25.3
REM	20.3	13.1	21.6
Arousal index, events/h	28.5	23	11.8
AHI events/h	31.6	6.5	5.2

REM: rapid eye movement; NREM: non-rapid eye movement; SpO_2: oxyhemoglobin saturations are measured via the pulse oximetry; AHI: apnoea hypopnea index; h: hour; min: minute

Patients with severe sleep apnoea have been successfully treated with oral appliances, just like non-apnoeic snores, with or without upper airway resistance syndrome have been successfully treated with CPAP. It has been traditionally believed that the primary mechanism of action of MAA is to cause mechanical advancement of the mandible and thereby increasing the anteroposterior dimensions of the oropharynx, which is clearly seen in the lateral cephalomertic radiographies of the patient (Figs. 2a and b). However, this notion has been challenged by the upper airway imaging studies, which have demonstrated that mandibular advancement improves the patency of the velopharyngeal segment of the upper airway, with improvement made predominantly in the lateral dimension.[4,5] Although the precise reason for this effect on velopharyngeal potency is still unclear, this effect is the same as that of CPAP,[6] which acts mechanically by increasing the pressure in the upper airway.[7] Furthermore, the appliances (MAA) cause stretch-induced activation of the pharyngeal motor system, thereby reducing soft tissue laxity and airway collapse, and they also act by advancing the mandible during sleep, but the stimulation of neuromuscular reflex pathways in the oral cavity and alteration of the bite relationship have not been explored to any extent.[8] Thus, there are potential advantages over nasal CPAP in that they are far less obtrusive, more portable, noise-free, and are generally

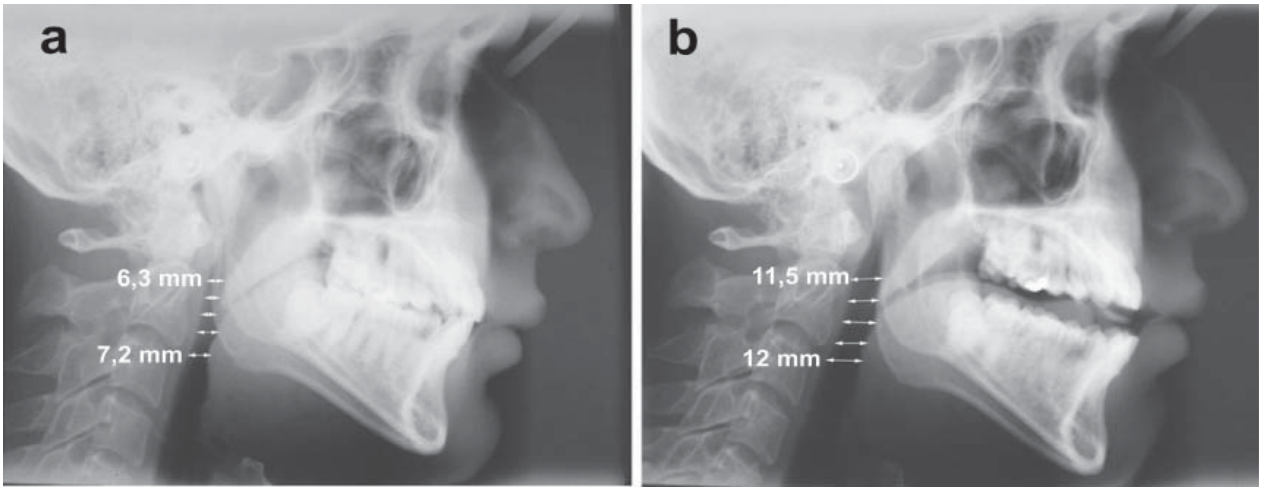

Fig. 2. The lateral cephalomertic radiograph in the uprigth position (a) before mandibular advancement appliance, (b) after mandibular advancement appliance.

less costly.[7] However, it is still unclear if patients with severe OSAS can benefit from the MAA treatment. Further studies are, therefore, needed to understand the factors (demographic or anthrometric variables) contributing to the success of treatment.

CPAP is currently the more effective long-term treatment modality of OSAS.[9] However, it requires the use of a mask interface, sealed tubing, and connection of a device to a power source. This complexity and nasal irritation may cause intolerance or refusal in a substantial proportion of patients. Although dental appliances have been shown to be less effective than nasal CPAP therapy for severe OSA cases, these applicances should still be considered when patients have intolerance to CPAP and unsuccessful surgical managment.

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