

# An algorithm of dental/dentofacial-based options for managing patients with obstructive sleep apnoea referred to a dentist/dental specialist by a physician

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## In brief

Emphasises the importance of coordination, cooperation and collaboration between dentists/dental specialists and physicians in the multidisciplinary team management of OSA patients.

Highlights the importance of the role of the dentist/dental specialist in the management of the OSA patient.

There are so many documents in the literature discoursing the aetiology, nature, diagnosis and treatment planning of obstructive sleep apnoea (OSA). Almost all of them mention that OSA has to be evaluated and treated through the multidisciplinary teamwork of physicians and dentists. Due to a lack in the literature, this article focuses on dentists' and dental specialists' role in the treatment algorithm of OSA.

## Introduction

The International Classification of Sleep Disorders (ICSD), revised, explains OSA under the title of 'Dyssomnias', under the subtitle 'Intrinsic Sleep Disorders', as a medical disorder characterised by repeated episodes of cessation of breathing (apnoea) or the reduction of airflow (hypopnea) during sleep.<sup>1,2</sup> It is a common problem which reduces quality of life, with daytime sleepiness that can lead to motor vehicle accidents and have an impact on mortality.<sup>3</sup>

Apnoea is the cessation of respiration during sleep for at least ten seconds while the oxygen saturation level decreases under 97% and/or ends with arousal which is classified as central, obstructive and mixed. It can be rated as mild, moderate or severe according to the number of apnoeas and hypopneas during sleep time.<sup>4</sup>

In the evaluation and diagnosis of OSA, supervised overnight polysomnography (PSG) is the gold standard.<sup>5</sup> Clinically five or

more obstructive respiratory events (apnoeas, hypopneas or respiratory effort related arousals, referred to as respiratory disturbance index - RDI or apnoea hypopnoea index - AHI) per hour of sleep indicate the presence of OSA. The severity of OSA is defined as mild for AHI/RDI 5-15/hr, moderate for AHI/RDI 15-30/hr and severe for AHI/RDI+30/hr.<sup>3,6,7</sup>

Excessive daytime sleepiness is the classic symptom of OSA.<sup>8</sup> The most common nighttime symptoms are snoring, witnessed apnoea, gasping during sleep, repeated awakenings from sleep and restless sleep. In addition to this, bruxism and dry mouth during the night are the other associated nighttime symptoms of OSA.<sup>9</sup>

Some of the other diagnostic tools to assess OSA are: Epworth Sleepiness Scale, endoscopy, laryngoscopy, pharyngometry, radiologic evaluation (computed tomography[CT]), magnetic resonance imaging([MRI] and cephalometry), MR Fluoroscopy, acoustic reflection, manometry and home monitoring.<sup>4,10-13</sup>

Starting from the less invasive option, the treatment modalities for OSA are: behaviour modification, diet and medication, continuous positive airway pressure (CPAP), oral appliances and surgery.<sup>4</sup>

Sometimes a combination of these treatment options can be applied together.<sup>14,15</sup> Although CPAP is still the gold standard treatment

option for patients with moderate to severe OSA,<sup>4,16,17</sup> it has some side effects like local irritations on the face and nose, and difficulties due to the application of the mask.<sup>17</sup>

## Discussion

### Dentists' and dental specialists' role in the management of OSA patients

The role of dentists and dental specialists in the team management of OSA is increasingly being recognised.<sup>18</sup> Due to their area of practice, dentists and dental specialists have the opportunity to diagnose OSA, refer the patient to a physician and contribute to treatment.<sup>3,4,19-21</sup>

The pharynx and the dentofacial structures are in close proximity to each other, and an anatomically narrowed airway is a pathophysiologic obstruction factor in the upper airway area.<sup>22</sup> So, the position of dentists and dental specialists in the diagnosis and treatment of OSA should not be overlooked.<sup>20</sup>

In general terms the role of dentists and dental specialists is to notice the symptoms of snoring and OSA, to refer the patient to a physician for a detailed examination and diagnosis of OSA, and to apply oral appliance (OA) therapy or behavioural therapy certainly after the request of a physician.<sup>3</sup>

A detailed dental examination of an OSA patient includes: patient's medical and dental

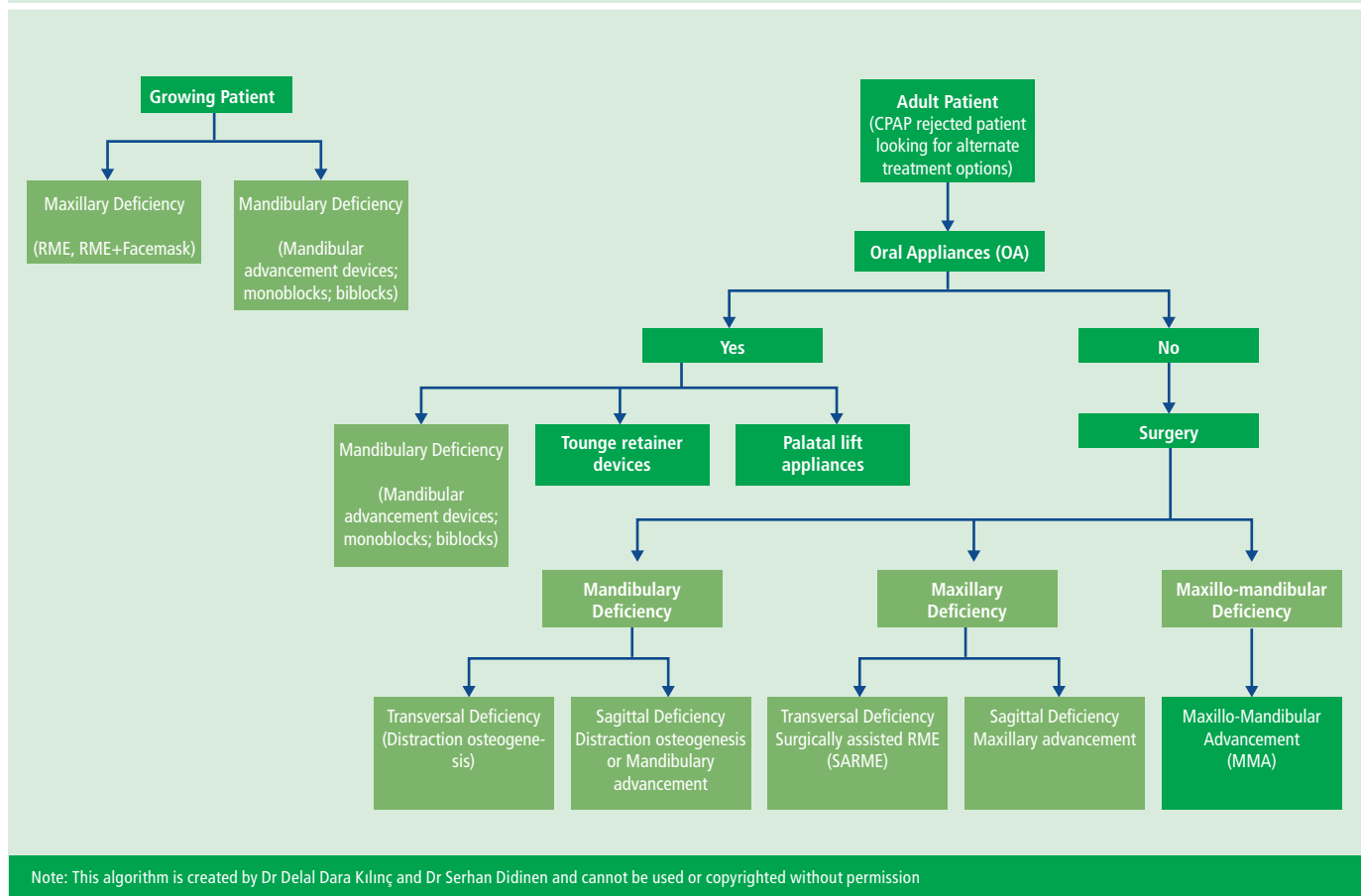
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Fig. 1 An algorithm for managing OSA patients referred to a dentist/dental specialist by a physician for dental/dentofacial interventions



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history, assessment of sleepiness, intraoral and extraoral tissues, periodontal structures, TMJ, concomitant bruxism, orofacial pain and/or headaches, present occlusal relationship, teeth and restorations, cephalometric and panoramic radiographs, and diagnostic dental models.<sup>3</sup>

The aim of this article is to propose an algorithm of dental/dentofacial options for management of patients with OSA referred to a dentist/dental specialist by a physician (Fig. 1).

As this article focuses on the dental and dentofacial interventions applied by dentists and dental specialists, the other treatment modalities in the treatment of OSA will not be mentioned here.

### Oral appliances in the treatment of OSA

Oral appliances (OA) are especially recommended in patients who are intolerant of CPAP therapy or prefer alternate therapy.<sup>18,23</sup> The American Academy of Sleep Disorders recommends OA for OSA.<sup>4,23</sup> They increase the upper airway size by forward positioning of the mandible during sleep and this advancement relieves the snoring and OSA with the decrease

of airway resistance.<sup>9,17,18,24,25</sup>

Some of the OA used in the treatment of OSA are: mandibular advancement devices (mandibular positioners), tongue retaining devices, and palatal lift appliances.<sup>25,26</sup>

The palatal lift appliance is a removable appliance with an adjusted part in the palatal region to lift and stabilise the soft palate to reduce vibration and snoring.<sup>24</sup>

A tongue retaining device pulls the tongue forward by the help of a suction cup and relaxation of the airway reduces the incidence of OSA episodes.<sup>25,26</sup>

Mandibular advancement appliances reported in the literature are two types of orthosis in general: monoblocs and biblocks. Monobloc is a one pieced appliance while the biblock is a two pieced appliance. Patients tolerate these appliances well; they are easy to use, non-invasive, removable and have acceptable, light side effects.<sup>25</sup>

In addition to this, these appliances may have some side effects like: TMJ pain, tooth pain, increased salivation, dry mouth, irritation of gums and some occlusal changes.<sup>9,18</sup> Because of these side effects approximately 25% of the patients cannot tolerate these appliances.<sup>9</sup>

### Rapid maxillary expansion (RME) in the treatment of OSA

Children with OSA generally have a narrow maxilla with a high arched palate, and hypoplastic maxilla. Hypoplastic maxilla generally defines a transversally deficient maxilla when compared to the mandible. OSA patients generally have narrower, more tapered and shorter arches in comparison to non-OSA patients. This deficiency may result in airway obstruction.<sup>26</sup>

RME corrects maxillary transverse deficiencies and posterior crossbites by orthodontic and orthopaedic effects. It has been documented in several studies that nasal width increases and airway resistance decreases with application of RME.<sup>26</sup> There are many studies showing the effectiveness of RME treatment in children with OSA.<sup>26-37</sup>

### RME + facemask (protraction) therapy in the treatment of OSA

Many studies show the effectiveness of rapid maxillary expansion/facemask (RME/FM) application on dental, skeletal and soft tissues in growing patients. As a consequence it is mentioned that RME/FM treatment in growing patients can change airway dimensions.<sup>38-40</sup>

## Surgically assisted rapid maxillary expansion (SARME) in the treatment of OSA

Bonetti *et al.* and Bach *et al.* demonstrated in their studies that in adult OSA and sleep disordered breathing (SDP) patients respectively, surgical assistance is an effective treatment choice to expand the maxilla of adult patients and rehabilitate disordered breathing.<sup>41,42</sup>

## Distraction osteogenesis

Mandibular distraction osteogenesis is a useful method in the treatment of a hypoplastic mandible through lengthening of the retrognathic mandible. It is an effective method for the treatment of OSA accompanying mandibular retrognathia.<sup>35,43–47</sup>

Mandibular distraction osteogenesis is also applied in the treatment of patients with Pierre Robin sequence and Treacher Collins syndrome suffering from airway obstruction due to mandibular retrognathia.<sup>26</sup>

Conley and Legan and Bonetti *et al.* presented in their studies that transverse mandibular distraction osteogenesis can be a useful treatment approach in the rehabilitation of OSA due to transverse mandibular deficiency.<sup>41–48</sup>

Midfacial distraction osteogenesis (MFDO) is another method which is newer than mandibular distraction osteogenesis (MDO). MFDO aims to correct the obstruction at the level of nasopharynx and velopharynx and has satisfying results in treating OSA.<sup>26</sup>

## Maxillomandibular advancement (MMA) in the treatment of OSA

In patients who cannot tolerate CPAP, surgical treatment is the most effective treatment option.<sup>9,49,50</sup> The main aim of surgical treatment in OSA is to reduce the anatomical obstructions in nose, oropharynx and hypopharynx.<sup>49</sup>

Maxillomandibular advancement pulls forward the anterior pharyngeal tissues attached to the maxilla, mandible, and hyoid. As a result the entire velo-oro-hypopharynx gets enlarged and this treats the OSA in selected patients with a success rate of over 90%. A team of surgeons, sleep specialists and dentists is needed in this procedure.<sup>9</sup>

## Conclusion

Depending on the variation of the site and severity of obstruction in OSA patients, intervention options may also change. For the effective treatment of OSA, especially in some

cases, there has to be collaboration between physicians and dentists.

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