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Dentists and Orthodontists Role in Obstructive Sleep Apnea

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A B S T R A C T

Sleep disordered breathing includes different conditions such as snoring, upper airway resistance syndrome, and obstructive sleep apnea (OSA). The role of dentist and orthodontists in obstructive sleep apnea is becoming more important primarily due to the increased awareness regarding the alternative options available for management of OSA. This review will explain regarding the role of dentists and orthodontists and physicians in the diagnosis and management of OSA. The treatment options for OSA include behavioral modifications, exercise, weight loss, and CPAP from a physician's stand point. From the dental standpoint, there are management options such as oral advancement appliances, expansion appliances, surgery. The review will discuss about these options in detail.

Keywords:obstructive sleep apnea, sleep disordered breathing, orthodontist, dentist, oral appliance

1. Introduction

Sleep disordered breathing includes different conditions such as snoring, upper airway resistance syndrome, and obstructive sleep apnea (OSA). Obstructive Sleep Apnea (OSA) is a chronic disorder with serious implications as it can decrease the lifespan of an individual and also significantly reduce the quality of life.[1] Positive airway pressure (PAP) is the most common treatment modality used for the management of OSA. However, a good proportion of patients are not comfortable with PAP and cannot tolerate it.[2] In such cases, oral appliances have become an alternative treatment method.[3] A lot of things need to be considered while constructing an oral appliance and therefore, it should be undertaken by qualified dentists or orthodontists.[4]

1.1. Role of Physicians

The management of OSA often requires team approach and a collaborative effort with dentists can help in management of OSA.[5],[6] There was a delineation of the role of dentists in the assessment and management of OSA by American Academy of Sleep Medicine (AASM) and American Academy of Dental Sleep Medicine (AADSM).[4],[7],[8] The clear cut guidelines state that physicians are the primary doctors for diagnosis of OSA.[4],[8] Dentists can screen the patients for OSA using clinical examination and/or index and refer to the physicians for further investigation and diagnosis. Physicians usually recommend a polysomnography for the evaluation of OSA if required. The interpretation of polysomnographs and home sleep studies is performed by the physician to diagnose and classify the severity of OSA.

1.2. Role of Dentists and Orthodontist

As a routine part of dental examination, dentists can examine the upper airway and anatomic risk factors for OSA. Dentists and specifically orthodontists can screen the patients using screening questions, and screening index.[9] With the screening, the population of underdiagnosed OSA can be identified and managed appropriately.[10] Orthodontists play a vital role in assessment of patients with OSA and determining whether oral appliance treatment

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approach is suitable for the patient.[7],[11] A large variety of oral appliances are available with different mechanism of action. The orthodontist has the appropriate training to select the proper appliance for the patient's needs depending on the malocclusion and the potential side effects. The orthodontist monitors the appliance at regular intervals after delivery and works in collaboration with the physician for appropriate follow up and progress.

1.3. Diagnosis of OSA

The diagnosis of OSA can be performed by undertaking a detailed history, clinical examination, screening questionnaires, and advanced tests such as polysomnography or home sleep study. Apnea is the cessation of airflow for at least 10 seconds and hypopnea is the reduction in airflow leading to decrease in the oxygen saturation. With polysomnography in the sleep center is performed, EEG, EMG, ECG, EOG, and other variables of oxygen saturation, oxygen pressure, etc. are measured during the sleep.[12] Unattended polysomnography testing includes 4-6 channel sleep study in which the nasal airflow is measured with the help of snoring-microphone, thoracic and abdominal effort channels. Split night polysomnography uses a single night of attended sleep analysis. For this type of polysomnography, a treatment approach of CPAP is also applied which can be useful in evaluation of positive airway pressure and can maintain the airway patency for the patient.[13] The identification of patient's growth status is also an important aspect of comprehensive diagnosis of OSA as that can help to plan eth treatment accordingly and is evaluated with cervical vertebral maturation index.[14] Patients with advanced CVMI index may require surgery as growth is over. After the surgery, portable sleep studies such as Polysomnography and CPAP titration are useful for patients during the postsurgical period.[15] Testing oximetry alone is also a portable and low cost method for assessment of the response to the surgical treatment or placement of pressurized airway.

1.4. Treatment Options

The treatment options for OSA patients are dependent on the severity of OSA, patient preference, general health of the patient and the preferences of the doctors in the team treating the patient. CPAP is the first line of treatment for patients with OSA. Some form of behavior modification can be undertaken for patients with OSA.[16]

1.5. Behavior modification

The most common ones are to change the sleep position from supine to side position. This can be undertaken by using a tennis ball and placing it at the center of the back of their pajamas or having a pillow so that the patients cannot roll on their back. Another method is to not use alcohol and sedatives for 3 hours prior to sleeping as they can act as nervous system depressants. Weight loss is recommended for patients with obesity. This becomes more important when the BMI is 10% more than the ideal as the airway space loss is significantly higher.[17]

1.6. Orthodontic approaches

Orthodontic approaches include treatment with wither oral appliances, fixed orthodontic braces, or aligner therapy.[18] Oral advancement appliances can be used for advancing the mandible forward so that patients can breathe better during sleep.[19] Ivanhoe et al. showed in their study that oral advancement appliances have similar effectiveness and higher patient likeability than CPAP appliances for mild to moderate OSA.[20] These appliances are custom made for advancing the patient's mandible forward.[21],[22] They work by attaching to both upper and lower teeth. The expansion of maxilla can also be done to facilitate other appliances. Expansion in adult patients is done with the help of mini-screws in the palate. Mini-screw assisted rapid palatal expansion has shown to increase the nasopharyngeal airway volume in patients compared to controls.[23] Different designs of MARPE appliances can be performed depending on the patient's malocclusion.[24],[25] These appliances need to be used by orthodontists who are experienced with the technique. When used for the appropriate patients, MARPE can be helpful as a conjunction with other appliances in decreasing the nasal resistance.[26] In some cases, the MARPE appliances can be combined with Class III elastics from skeletal anchorage to move the maxilla forward.[27] This can be beneficial for the airway and can help to correct the malocclusion.[28] MARPE has high success rates for expansion and opening of midpaltal suture. One reason for this is the mini-screws inserted into the palate which has shown be more stable than buccal mini-implants.[29] Another type of appliances are the tongue repositioning devices. These appliances are used to train the tongue or lift the soft palate.[30],[31] For patients who are not opposed to surgical treatment, orthognathic surgery can be performed to move the maxilla and mandible forward and help increase the airway dimensions.

1.7. Patient Evaluation

The evaluation of the patient requires a team approach. The screening, diagnosis, and management of patients with OSA needs to be done by a team of physician, radiologist, dentists, and orthodontists.[32] Currently, the technology strides in the field of artificial intelligence has made it possible to identify the radiographic structures automatically.[33] This paints a hopeful picture that in the future, artificial intelligence would be a useful aid in screening, diagnosing, and evaluation of OSA.[34]

1.8. Conclusions

OSA is a common condition affecting mainly middle aged adults and is underdiagnosed. OSA can be screened by dentist and orthodontists with questionnaire and clinical examination. Polysomnography is undertaken by physicians and is a key diagnostic tool for OSA. The management of OSA can be done with CPAP as the first line of treatment. When patients are not able to tolerate CPAP, an alternative treatment with oral appliances can be undertaken. OSA requires a team approach for diagnosis, treatment planning, and regular evaluation to monitor the treatment progress.

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