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Overview of the progress in diagnosis and treatment of obstructive sleep apnea

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Abstract: *Obstructive sleep apnea (OSA) is a prevalent and severe sleep disorder with frequent upper airway obstruction during sleep, respiratory pauses and hypopneas, poor sleep quality, and higher cardiovascular, metabolic, and cognitive dysfunction. Since then, the diagnosis of OSA has also improved, with diagnostic technologies that are now available, such as polysomnography (PSG) and portable monitoring devices, making diagnosis more accurate and easier. But there are other issues to be overcome, such as standardization and usage. Oral appliances have developed over the years, and surgical procedures have been refined to make treatment more personalised with regards to general lifestyle changes and positive airway pressure (PAP) therapy. This review summarizes the most recent diagnostic techniques and therapeutic strategies for OSA, the pros and cons of each, and future directions for diagnostics and treatment. The goal is to give clinicians a scientific and comprehensive foundation, to standardize treatment, and to provide a scientific basis for enhancing the treatment effects of patients with OSA.*

Keywords: *Obstructive sleep apnea, diagnosis, polysomnography, positive airway pressure therapy, oral appliance, surgical treatment*

1. Preface

OSA is a frequent condition, mainly defined by frequent upper airway collapse during sleep, which causes apnea or hypopnea. It has a constantly increasing prevalence worldwide and a high incidence rate across various population groups. For example, one study conducted in the community found that more people had positional OSA (POSA) than non-positional OSA. Patients with positional OSA are slightly older, less severely obese, have higher levels of SBP, and their sleep is more severely disturbed [1]. In addition, there is also a high prevalence of OSA among certain occupational groups. In Saudi Airlines, for instance, among pilots and co-pilots, the prevalence of OSA, based on home sleep monitoring, was 69% (64% mild OSA), and moderate-to-severe OSA was also noted [2].

OSA is not just associated with disruption of sleep patterns and poor quality of life in patients, but there are close links between OSA and a range of chronic diseases. Patients with diabetes are also prone to OSA. Relevant studies indicate that 55% of patients with type 2 diabetes have OSA and that the severity of the OSA is positively associated with body mass index and waist circumference. Furthermore, blood glucose and glycated hemoglobin, markers of hyperglycemia, are markedly elevated in patients with severe OSA [3]. Moreover, OSA is strongly linked to several cardiovascular and mental diseases, such as hypertension, coronary heart disease, stroke, depression, and anxiety. Veterans, for instance, have a study diagnostic rate of 21% compared to 9% in non-veterans, and people with post-traumatic stress disorder are at increased risk of OSA [4]. OSA patients are also at high risk of depression and anxiety, with 35% and 43.8% prevalence, respectively. These mental symptoms are more common in female patients and patients with sexual dysfunction, suggesting that psychology should be given due consideration in the treatment of OSA [5].

In the approach and management of a patient with OSA, a diagnostic evaluation is highly significant and must be performed in a timely and accurate manner. Multi-night monitoring has been shown to decrease the rate of misdiagnosis by 20-50% compared with single-night monitoring [6], so the night-time variability should be considered in diagnostic strategies. Evaluation of OSA is considered the gold standard with polysomnography (PSG), and home sleep apnea testing (HSAT) is a common, easy, and affordable alternative [7]. Diagnosis and treatment of OSA in special populations (children and Newborns) has also been slowly gaining ground as an area of interest. Positional OSA is determined to be

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about 50% of children, and most cases of this will resolve following adenoidectomy [8].

Continuous positive airway pressure (CPAP) therapy is the first-line treatment for OSA and may improve sleep quality, reduce the apnea index, reduce cardiac burden, and prevent cognitive decline [9]. Patient compliance and tolerability to CPAP is difficult, however, and patient-specific therapy is needed, including oral appliances, positional therapy, surgical therapy (e.g., uvulopalatopharyngoplasty, lingual nerve stimulation), and pharmacotherapy [10]. OSA patients can also suffer from other illnesses such as metabolic syndrome and obesity. Cardiology/metabolic diseases are more common than OSA and are exacerbated by obesity, which is associated with a beneficial effect of metabolic surgery in treating OSA [11]. Through more-effective OSA research, we can better identify patients with distinct underlying pathogenic mechanisms, and apply this knowledge to construct a theoretical framework for personalized treatment and optimize treatment management. [12].

To summarise, OSA is common, very widespread, and is linked to chronic diseases. Prognosis is very important, and rests on the timely and correct diagnosis, plus the correct treatment. Over the years, the diagnostic and therapeutic procedures have been enhanced and focused on individualisation and diversification of management. More research is needed to better understand the pathological mechanisms and the optimal treatment for patients with different subtypes of the disease, and to improve clinical outcomes.

2. Diagnostic methods for obstructive sleep apnea

2.1 Clinical assessment and screening tools

Symptoms of OSA include snoring at night, respiratory pauses, awakening from sleep due to breathlessness, excessive daytime sleepiness, impaired concentration, and daytime cognitive decline [13]. This is often accompanied by snoring. Sleep quality during the night deteriorates significantly when associated with respiratory pauses, which cause daytime fatigue, attention deficits, and, consequently, an adverse effect on the quality of life and productivity of patients. Moreover, OSA patients tend to have metabolic syndromes and also cardiovascular diseases [14]. Thus, early diagnosis is clinically important.

The Epworth Sleepiness Scale (ESS) and STOP-Bang questionnaire are the most widely used screening instruments in the clinical setting. Daytime sleepiness is the main measure used in the ESS; it has good sensitivity, but poor specificity [15]. The STOP-Bang questionnaire accounts for multiple risk factors, achieving a sensitivity of up to 98% and a relatively low specificity [15]. Compared to this, the Berlin questionnaire is about 88% sensitive, and the ESS is the least sensitive (about 63%). They, however, do not serve a diagnostic function and cannot be used as an alternative to polysomnography (PSG).

Clinical assessment plays a crucial role in the initial OSA evaluation, assessing patients for OSA risk and the need for further monitoring tests. But the clinical evaluation is limited, especially by the subjectivity of symptoms and the lack of obvious symptoms in some patients, which increases the risk of misdiagnosis. Moreover, while screening tools in questionnaires are simple to use and inexpensive, they are yet limited in their ability to accurately diagnose the problem due to limitations in questionnaire design and the authenticity of patient responses [15]. Therefore, clinical evaluation and screening tools are frequently used as screening tools rather than as definitive diagnostic criteria and should be used in conjunction with sleep monitoring results for combined evaluation.

2.2 Polysomnography (PSG)

Polysomnography (PSG), considered the gold standard, is the most commonly used test for diagnosing Obstructive Sleep Apnea (OSA). It is based on simultaneous measurement of multiple physiological parameters during sleep such as Electroencephalogram (EEG) for sleep stages, Electrooculogram (EOG) for rapid eye movement sleep, Electromyogram (EMG) for muscle tension, nasal airflow and oral airflow for respiratory status, chest and abdominal movements for respiratory effort, Oxygen Saturation (SpO_2) for blood oxygen level and heart rate and Electrocardiogram (ECG) for cardiovascular status [16]. These parameters can be analyzed to accurately detect apneas and hypopneas and their effects on sleep architecture.

PSG has high technical requirements, which require specialised equipment and a high level of technical personnel. It is complicated and time-consuming, and is typically performed in a sleep clinic, where the patient must remain overnight for monitoring [16]. However, PSG is still considered the

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standard assessment for OSA because it comprehensively assesses OSA. PSG technology continues to be developed through increasing research into more comfortable ways to detect and improve the efficacy and comfort of sensors, including intelligent auxiliary analysis and sensor design optimization [17].

Over the past couple of years, Home Sleep Monitoring Devices (Home Sleep Apnea Testing, HSAT) have become increasingly popular. Usually, they facilitate easier monitoring of the parameters and enable home sleep testing, thereby reducing the burden on medical resources [18]. HSAT has not achieved the level of diagnostic accuracy of conventional PSG in sleep staging and in the diagnosis of mild OSA, and has also suffered from several points. The diagnostic accuracy of HSAT for sleep staging and mild OSA remains lower than that of conventional PSG and has also been compromised by reduced channel count and data integrity [18]. Therefore, PSG is the recommended technique for patients with complicated medical conditions and other medical illnesses, and HSAT may be employed for screening and follow-up in high-risk patients.

2.3 Portable sleep monitoring technology

There are different types of portable sleep monitoring devices that measure respiratory airflow, blood oxygen, body movements, and heart rate variability. These have advantages such as portability, low space requirements, and ease of operation, which make them suitable for resource-poor environments or poor laboratory infrastructure [19]. Portable devices reduce the sensor count and ease monitoring, lightening the burden on patients and increasing patient acceptance.

Portable polysomnography (PSG) devices are slightly less accurate than standard PSG. Portable devices demonstrated good sensitivity and specificity in the diagnosis of moderate-to-severe OSA (around 87% and 80%, respectively), but poor performance in moderate-to-severe OSA, mild OSA, and sleep structure analysis [19]. Additionally, sleep staging and sleep arousal detection using portable devices are less accurate than PSG. It can be affected by the environment, use of devices, and can lead to misjudgment and misinformation [20].

The future of development is to make portable monitoring devices more powerful with AI algorithms. For sleep studies, deep learning and machine learning can be used to process complex physiological signals and automatically determine their sleep stage, which can enhance the efficiency and accuracy of data analysis [21] and can also be used to detect abnormal events, achieving high-accuracy detection [22]. Portable sleep monitoring is also comfortable and easy to use thanks to non-contact monitoring technologies, such as millimeter-wave radar, flexible sensors, and ear-EEG [22]. These innovations should enable non-invasive, in-home sleep monitoring over an extended period, allowing early detection of OSA or other sleep disorders and dynamic management.

Finally, the portability of sleep monitoring systems has numerous advantages in terms of ease of use and availability, so it is appropriate to use them for mass screening and follow-up. However, it is still reliant on PSG for the diagnosis of more complex cases and sleep structure analysis. The era of using multimodal, portable devices with artificial intelligence and highly advanced sensor technology will mark the dawn of intelligence, personalization, and care at home for sleep apnea syndrome.

3. Treatment strategies for obstructive sleep apnea

3.1 Lifestyle intervention

Several life factors are closely associated with the occurrence of Obstructive Sleep Apnea (OSA). Of these, weight loss, quitting smoking, and avoiding alcohol and sedatives will be important for reducing symptoms of OSA. Obesity is one of the main modifiable risk factors for OSA. Weight gain may cause fat to accumulate in the upper airway, increasing airway resistance and worsening apnea severity. The Apnea-Hypopnea Index (AHI) is reduced, oxygenation improves, and symptoms are relieved when the patient loses weight [23]. The cessation of smoking decreases upper airway inflammation and mucosal edema, thereby reducing the risk of airway obstruction [24]. The use of alcohol and sedatives should be avoided as they also lead to airway collapse due to relaxing the muscles around the throat [25]. One of the most effective elements of lifestyle intervention is exercise therapy, which has been shown to benefit the symptoms and sleep quality in patients with OSA. Moderate aerobic exercise benefits the respiratory muscles, enhances airway tone, helps control weight, and decreases the number of apneas. Research has demonstrated that moderate exercise for 150 minutes per week is an effective treatment for OSA symptoms [26]. The prescription of the exercise program should be progressive and tailored to the

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individual's physical status to create a program that can be maintained over time. Lifestyle intervention, as an adjunctive therapy, doesn't replace other treatment options, but has good effects in patients with mild to moderate OSA, and no significant side effects, making it easier for patients to accept. These interventions can be problematic because patients do not always tolerate them and are not very effective in patients with severe OSA, so they must be used in conjunction with other OSA treatments [27].

3.2 Positive pressure ventilation therapy (CPAP and BiPAP)

Continuous Positive Airway Pressure (CPAP) is the best treatment for OSA. It promotes adequate airflow during sleep, thereby reducing apnea and hypopnea episodes. CPAP can be effective for patients with moderate to severe OSA, and clinical trials have shown that CPAP improves oxygenation, sleep structure and quality, and reduces the risk of cardiovascular complications [28]. Bi-level Positive Airway Pressure (BiPAP) has been demonstrated to be beneficial for some patients, especially those who are hypercapnic, have respiratory muscle fatigue, or are intolerant to CPAP. BiPAP applies different levels of pressure during breathing in and out, which reduces the work required by the lungs and makes breathing more efficient [29]. CPAP and BiPAP devices have compliance issues due to discomfort with the mask, pressure discomfort and side effects of the device. Optimizing mask design, adjusting pressure per patient, and the use of humidifiers can help to improve compliance [30].

Also, remote monitoring technology has the potential to deliver real-time feedback on treatment, allowing physicians to adjust treatments as soon as they realize they may need to make a change, and improving adherence and effectiveness [30]. Positive airway pressure therapy is a sensorimotor therapy that is approximately midway between the other therapies for OSA. It is efficient and safe – but there are compliance issues to be resolved and strategies to be put in place.

3.3 Orthodontic appliances and surgical treatment

Oral appliances can provide the main mechanisms of action of mechanical advancement of the mandible, increased airway size, and increased airway resistance. Patients with mild to moderate Obstructive Sleep Apnea (OSA) or who can tolerate CPAP can use them. In the design of oral appliances, two types of devices have been evaluated: mandibular advancement devices and tongue retainers, with effectiveness measured in terms of reductions in the Apnea-Hypopnea Index (AHI) and improvements in symptoms [31]. OAT is easy to use and portable, but some individuals are more compliant and more effective with OAT than others, requiring individual selection and adjustment. Surgical treatment is mainly indicated in patients with severe structural airway obstruction and/or when other treatments have been ineffective. Common surgical procedures include Uvulopalatopharyngoplasty (UPPP), tongue root suspension, and mandibular advancement. UPPP enlarges the airway by eliminating redundant pharyngeal tissue. While effective to a certain degree, it also poses the risk of postoperative pain or dysphagia [32]. Tongue root suspension and mandibular advancement mechanically open up the airway and increase airway collapse, and are mainly indicated for patients with tongue root retraction and mandibular retrusion [33]. The risks associated with surgery include bleeding, infection, and structural damage, and functional recovery with prevention and control of complications is the key to managing the postoperative period [34]. Rather, in recent years, there has been significant improvement in the safety and efficacy of surgical procedures, such as the use of computer-aided design for surgical guides and precise positioning [35]. These are combined with oral appliances and surgery to achieve good results, especially for patients with some anatomic abnormalities. However, there is a need for treatment-specific management and assessment of the risks and benefits.

4. Individualized Treatment and Future Directions for Obstructive Sleep Apnea

4.1 The necessity of individualized treatment strategies

The clinical presentation and pathophysiology of obstructive sleep apnea (OSA) are very variable. The upper airway anatomy, neuromuscular function, respiratory control stability, and comorbidities differ greatly between patients with OSA [36]. This variety makes it difficult to develop a "one size fits all" treatment model that caters to the needs of all patients. Physiopathologic features of OSA patients are upper airway stenosis, multiple upper airway obstruction sites, diminished upper airway dilator muscle function, and diminished respiratory control loop gain. These factors can be significant and, when combined, can differ from person to person, and help to select treatment options for them and the results of treatment [36].

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Other factors such as genetic susceptibility, craniofacial morphology and lifestyle also contribute to the expression and response to OSA. Obesity is an example of structural (craniofacial developmental) obstruction of the upper airway. Lifestyle factors which may have a link to apnea events include smoking, alcohol consumption, and posture habits during the same time periods [37]. Therefore, it is particularly important to define individual treatment plans according to pathophysiological features and environmental factors of the individual patient.

Treatment is tailored to each case and is a multidisciplinary approach that includes the fields of Respiratory Medicine, Otolaryngology, Dentistry, Sleep Medicine, Nutrition, and Psychology. Multidisciplinary teams may design treatment strategies that are more scientifically and logically informed, which increase treatment efficacy and compliance, based on a patient's clinical manifestations, sleep monitoring information, anatomical imaging, genetic information, and lifestyle [38]. A multidisciplinary assessment, for instance, may help determine other treatment options, such as dental oral appliances, neuromodulation therapy, or surgery, for patients who are not tolerating CPAP, to provide personalized and diverse treatment [39].

To conclude, OSA is probably a pathophysiological heterogeneous disorder, and must be treated individually. Understanding the physiopathologic status, factors, and interactions between different parties is crucial for an effective and sustained treatment and outcome.

4.2 Emerging therapeutic technologies and research advancements

Recent advances in the understanding of the pathophysiological mechanisms of Obstructive Sleep Apnea (OSA) and the development of new treatment technologies has opened the door to individualised treatment. Innovative technologies such as Neuromodulation (NM) have been shown to activate the upper airway muscles during sleep, preventing upper airway collapse, and, as such, have been proven to improve breathing through electrical stimulation of the hypoglossal nerve (HNS). Several clinical trials and real-world studies have shown that HNS can effectively lower the Apnea-Hypopnea Index (AHI), enhance the quality of life for individuals with moderate to severe OSA, and have fewer side effects and are safe [40]. The effectiveness of HNS, however, is tightly linked to patient indications, and there are differences in adverse reactions and treatment adherence, which should lead to individual assessment and monitoring of treatment [41].

With respect to pharmacotherapy, mechanical therapy has been the primary treatment for OSA to date. Still, the introduction of drugs acting on pathophysiological processes has slowly gained ground over the past few years. Examples of these mechanisms include neuromuscular dysfunction and a defect in respiratory drive, and drugs are being investigated in preclinical and clinical trials as adjunctive or alternative therapies. A few progressions have been made in the pharmacotherapy of OSA in children – certain medications have been found to reduce AHI (e.g., mometasone and montelukast) [42].

Smart, remote management of OSA has been made possible by digital health technology. Wearable technology, smartphone applications, and remote monitoring can facilitate real-time patient status monitoring and treatment adherence, which can improve patient engagement and outcomes by optimizing treatment plans as required [43]. In addition, multimodal sleep signal analysis technologies coupled with AI have enhanced OSA diagnosis by enabling more precise and efficient diagnosis, and personalized treatment plans [44].

With the ongoing development of bioinformatics and machine learning, more patient-specific treatment decision-support systems based on patient characteristics and big data analysis will become available, further promoting the use of precision medicine in Obstructive Sleep Apnea (OSA). Meanwhile, the patient's experience and treatment efficacy will be further enhanced by the use of intelligent neural regulation devices, in addition to an individualized oral appliance design and comprehensive pharmacologic treatment [45].

4.3 Construction of integrated management model

OSA is a chronic condition, and management includes not only diagnosis and treatment, but also long-term follow-up and an all-encompassing OSA management system. A comprehensive management model (diagnosis, treatment,, and follow-up of the disease) will enable individualized monitoring and management, thereby optimizing treatment effectiveness and adherence. This model focuses on screening, risk assessment, treatment planning, treatment implementation, and ongoing follow-up; the collaboration between PACHz, specialist care, rehabilitation therapy, and patient self-management; and the overall management of the process.

It is crucial to educate patients and help them manage their OSA to ensure long-term adherence to OSA therapy. Systematic health education increases patients' awareness and interest in OSA and its treatment, thereby increasing patients' motivation to seek treatment and compliance. Patients can be trained to operate their machines and motivated to supplement the machines with other therapies to minimize interruptions and side effects. Meanwhile, there are regular review and monitoring tools available to help facilitate the ongoing care and guidance of patients, improving their self-management.

OSA will become more personalized and automated in the future, with the help of intelligent and precise technologies. Thanks to smart devices, artificial intelligence algorithms, and big data analysis, the monitoring and intelligent adjustment of sleep states, treatment responses, and patient lifestyles will be possible. This will contribute to the transition towards "precision medicine + telemedicine," better use of medical resources, and greater equity in medical services. Additionally, an approach to treatment that focuses on the patient and teamwork will be essential for the effective treatment of OSA. They are going to continually enhance patients' quality of life and fine-tune treatment plans.

Finally, but most importantly, a thorough system and integration for diagnosis, treatment, and long-term management are the cornerstones of improving the quality of OSA care. With the advent of intelligence and precision in the future, the management model of OSAs will be established quickly, and it will be comprehensive, efficient, and personalised treatment.

5. Conclusion

Several factors can affect obstructive sleep apnea (OSA), a complex condition, and will make a big difference in the prognosis and quality of life of an OSA patient if he or she is diagnosed and treated. The literature was analyzed from multiple angles, and polysomnography (PSG) is the most useful diagnostic technique for OSA. However, it is a very expensive instrument and is complex in use. Portable monitoring technology provides a more mobile and cost-effective screening tool for clinical use, particularly in low-resource, low-patient-adherence environments. The hope is that this new technology will help increase early detection of OSA, decrease false-negative diagnoses, and enable early intervention.

Generally, it is patient-centered, respects patients' differences, and accommodates and adapts. These are important inclusions, such as intention to live a healthy lifestyle, continual patient involvement, and encouragement of a healthy lifestyle. The first treatment is Continuous Positive Airway Pressure (CPAP), which has compliance problems but is effective. Otherwise, if there is some other pathological process or intolerance, oral appliances or surgery can be utilized as an adjunctive treatment. Based on the latest research, the individualized treatment approach has become the norm. In this way, the treatment is individualized according to the patient's characteristics, lifestyle habits, comorbidities, etc., to obtain the best results and satisfaction.

This is the research process for OSA, showing how integration can be seen across the various disciplines, according to the experts. The latest advances in disease and new therapeutic techniques have been the result of multi-disciplinary studies and treatments by a team that includes respiratory medicine, sleep medicine, otolaryngology, dentistry, and psychology. Concurrently, the field of OSA management has undergone a transformation, thanks to the advent of smart diagnostic and management devices, including Artificial Intelligence (AI) diagnostics, AI-powered remote monitoring, and AI-driven big data. These technologies all contribute to higher accuracy and efficiency in the diagnosis and greater dynamics and personalization in the treatment of patients, resulting in better prognosis and rational utilization of medical resources.

The diagnostic criteria, the effectiveness of the therapy and its evaluation, as well as the maintenance treatment plan, however, differ between the various studies, due to the diversity of OSAS and the different research design. A field of interest is the balance between scientific evidence and clinical practice, which will need further research and application to the field to prevent overtreatment, missed diagnoses, and unnecessary treatment. Multi-center long-term clinical trials should be improved to ensure consensus on the diagnostic and therapeutic plan and the best pathway.

Lastly, Otsuka Bikes is continually evolving in diagnosis and treatment. Synchronous application of polysomnography and portable devices has improved the diagnostic process, and the synergistic application of lifestyle changes and diversified medical interventions has personalized treatment. The collaboration of MDT and the incorporation of intelligent technologies will greatly enhance overall

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management of OSA, and, in the future, the prognosis for patients will be much better. In the medical system, further improvement is needed by harmonisation of procedures and the application of technology to guarantee all OSA patients are scientifically, accurately, and humanely treated.

References

[1] Duce BL, Kulkas AE, Leppänen TT, Oksenberg A, Töyräs J, Hukins CA. Community prevalence of positional obstructive sleep apnea. J Clin Sleep Med. 2025;21(5):875-882. doi:10.5664/jcsm.11584

[2] Alhejaili F, Hafez A, Wali S, et al. Prevalence of Obstructive Sleep Apnea Among Saudi Pilots. Nat Sci Sleep. 13:537-545. Published 2021 May. doi:10.2147/NSS.S299382

[3] Singh A, Chaudhary SC, Gupta KK, et al. Prevalence of obstructive sleep apnea in diabetic patients. Ann Afr Med. 2021 Jul-Sep;20(3):206-211. doi:10.4103/aam.aam_43_20

[4] Goldstein LA, Bernhard PA, Hoffmire CA, Schneiderman A, Maguen S. Prevalence of Obstructive Sleep Apnea Among Veterans and Nonveterans. Am J Health Promot. 2025;39(2):215-223. doi:10.1177/08901171241273443

[5] Gharsalli H, Harizi C, Zaouche R, et al. Prevalence of depression and anxiety in obstructive sleep apnea. Tunis Med. 2022 juillet;100(7):525-533.

[6] Lechat B, Naik G, Reynolds A, et al. Multinight Prevalence, Variability, and Diagnostic Misclassification of Obstructive Sleep Apnea. Am J Respir Crit Care Med. 2022;205(5):563-569. doi:10.1164/rccm.202107-1761OC

[7] Hussein O, Alkhader A, Gohar A, Bhat A. Home Sleep Apnea Testing for Obstructive Sleep Apnea. Mo Med. 2024 Jan-Feb;121(1):60-65.

[8] Ulualp SO, Johnson RF, Mitchell RB. Assessment of Positional Obstructive Sleep Apnea in Children Undergoing Adenotonsillectomy for Obstructive Sleep Apnea. Laryngoscope Investig Otolaryngol. 2025;10(2):e70116. Published 2025 Apr. doi:10.1002/lio2.70116

[9] Šarić-Jurić J, Jurić S, Marković I. INFLUENCE OF CONTINUOUS POSITIVE AIRWAY PRESSURE TREATMENT ON AUDITORY EVENT-RELATED POTENTIALS P300. Acta Clin Croat. 2022;61(3):373-378. doi:10.20471/acc.2022.61.03.01

[10] Coughlin K, Davies GM, Gillespie MB. Phenotypes of Obstructive Sleep Apnea. Otolaryngol Clin North Am. 2020;53(3):329-338. doi:10.1016/j.otc.2020.02.010

[11] Bonsignore MR. Obesity and Obstructive Sleep Apnea. Handb Exp Pharmacol. 274:181-201. doi:10.1007/164_2021_558

[12] Raphelson JR, Fuentes AL, Holloway B, Malhotra A. Obstructive Sleep Apnea Endophenotypes. Sleep Sci. 2025;18(1):e109-e113. Published 2025 Mar. doi:10.1055/s-0044-1788287

[13] Sheta A, Thaher T, Surani SR, et al. Diagnosis of Obstructive Sleep Apnea Using Feature Selection, Classification Methods, and Data Grouping Based Age, Sex, and Race. Diagnostics (Basel). 2023;13(14). Published 2023 Jul 20. doi:10.3390/diagnostics13142417

[14] Wickwire EM, Albrecht JS. Occult, undiagnosed obstructive sleep apnea increases risk of depression among a national sample of older adult Medicare beneficiaries. Sleep Health. 2023;9(4):532-536. doi:10.1016/j.sleh.2023.05.008 https://pubmed.ncbi.nlm.nih.gov/37380592/

[15] Güngör K, Gülbay B, Acican T. Investigating the effectiveness of nonpolysomnography diagnostic methods used in sleep disorders in predicting the diagnosis of obstructive sleep apnea syndrome. Tuberk Toraks. 2025;73(2):102-111. doi:10.5578/tt.2025021111

[16] Hiensch R, Rapoport DM. Sleep Studies Interpretation and Application. Otolaryngol Clin North Am. 2020;53(3):367-383. doi:10.1016/j.otc.2020.02.012

[17] Li C, Ye J, Guan J. Development of an Intelligent Multi-Parameter Sleep Diagnosis and Analysis System. Chinese Journal of Medical Instrumentation. 2024;48(4):373-379. doi:10.12455/j.issn.1671-7104.240036

[18] Zhou B, Li X, Zhang J, Jia Q. Analysis of the Current Application Status for Clinical and Home Monitoring of Obstructive Sleep Apnea-Hypopnea Syndrome. Chinese Journal of Medical Instrumentation. 2024;48(3):306-311. doi:10.12455/j.issn.1671-7104.230605

[19] Khalil C, Zarabi S, Kirkham K, Soni V, Li Q, Huszti E, Yadollahi A, Taati B, Englesakis M, Singh M. Validity of non-contact methods for diagnosis of Obstructive Sleep Apnea: a systematic review and meta-analysis[J]. Journal of Clinical Anesthesia, 2023, 87: 111087.

[20] Lauteslager T, Kampakis S, Williams AJ, Maslik M, Siddiqui F. Performance Evaluation of the Circadia Contactless Breathing Monitor and Sleep Analysis Algorithm for Sleep Stage Classification. Annu Int Conf IEEE Eng Med Biol Soc. 2020:5150-5153. doi:10.1109/EMBC44109.2020.9175419

[21] Luo J, Zhao Y, Liu H, et al. SST: a snore shifted-window transformer method for potential obstructive sleep apnea patient diagnosis. Physiol Meas. 2024;45(3). Published 2024 Mar 11. doi:10.1088/1361-6579/ad262b

ISSN 2616-5791 Vol. 7, Issue 4: 35-43, DOI: 10.25236/AJMHS.2026.070405

[22] Wang J, Zhang Z, Wang Q, et al. Comparative Accuracy of Millimeter-Wave Radar and Polysomnography in Sleep Apnea Detection. Med Sci Monit. 31:e948079. Published 2025 Jul 15. doi:10.12659/MSM.948079

[23] Hui L, Benca R. The Bidirectional Relationship Between Obstructive Sleep Apnea and Chronic Kidney Disease. J Stroke Cerebrovasc Dis. 2021;30(9):105652. doi:10.1016/j.jstrokecerebrovasdis.2021.105652

[24] Lan CC, Lee C, Jao LY, et al. Interrelationship Between Obstructive Sleep Apnea Syndrome and Small Airway Disease: A Comprehensive Review. Biomedicines. 2025;13(4). Published 2025 Apr 8. doi:10.3390/biomedicines13040905

[25] Shah RM, Sethi JM, Wolf L, LaCavera M, Koo P. Obstructive Sleep Apnea: Strategies for Screening, Management, and Overcoming Treatment Challenges in the Outpatient Setting. Am J Lifestyle Med. 2025;19(5):664-675. Published 2025 Jul. doi:10.1177/15598276231217949

[26] Davis CL, Lorig K. Lifestyle Interventions for Obesity. JAMA. 2024;332(17):1488. doi:10.1001/jama.2024.17533

[27] Robbins R, Morkous SSW, Honaker S, Darby CV, DelRosso LM, . Evaluating the impact of different message strategies about OSA employed in the American Academy of Sleep Medicine Count on Sleep campaign. J Clin Sleep Med. 2025;21(2):417-419. doi:10.5664/jcsm.11394

[28] Budhiraja R, Batool-Anwar S, Quan SF. Mean disease alleviation as a comprehensive metric for evaluating continuous positive airway pressure therapy in obstructive sleep apnea: establishing reference values and clinical significance. J Clin Sleep Med. 2025;21(6):973-982. doi:10.5664/jcsm.11592

[29] See XY, Naseem Z, Synderburn S, Wallace W, Chaisson N, Culver DA. Paradoxical Hypoxemia Following Positive Pressure Ventilation: Exploring the Pathophysiology. Eur J Case Rep Intern Med. 2024;11(11):004976. Published 2024 11. doi:10.12890/2024_004976

[30] Ssegonja R, Ljunggren M, Sampaio F, Tegelmo T, Theorell-Haglöw J. Economic evaluation of telemonitoring as a follow-up approach for patients with obstructive sleep apnea syndrome starting treatment with continuous positive airway pressure. J Sleep Res. 2024;33(3):e13968. doi:10.1111/jsr.13968

[31] Alansari RA. The role of orthodontics in management of obstructive sleep apnea. Saudi Dent J. 2022;34(3):194-201. doi:10.1016/j.sdentj.2022.02.001

[32] Liang Y, Liu W. Treatment Strategies for Craniofacial Microsomia Patients With Obstructive Sleep Apnea: A Systematic Review. J Craniofac Surg. 2025;36(4):e467-e473. doi:10.1097/SCS.0000000000011059

[33] Hadad H, Mendes BC, Lima VN, Ferraz FWDS, Souza FÁ, Magro Filho O. Strategy for Optimizing Airway Volume With Genioglossal Advancement Using Cutting Guide in the Treatment of Obstructive Sleep Apnea. J Craniofac Surg. 2020 Mar/Apr;31(2):558-561. doi:10.1097/SCS.0000000000006083

[34] Klein KP, Kaban LB, Masoud MI. Orthognathic Surgery and Orthodontics: Inadequate Planning Leading to Complications or Unfavorable Results. Oral Maxillofac Surg Clin North Am. 2020;32(1):71-82. doi:10.1016/j.coms.2019.08.008

[35] Altieri F, Padalino G, Guarnieri R, Barbato E, Cassetta M. Computer-guided palatal canine disimpaction: a technical note. Int J Comput Dent. 2020;23(3):219-224.

[36] McNicholas WT, Korkalainen H. Translation of obstructive sleep apnea pathophysiology and phenotypes to personalized treatment: a narrative review. Front Neurol. 14:1239016. Published 2023 None. doi:10.3389/fneur.2023.1239016

[37] Van Daele M, Smolders Y, Van Loo D, et al. Personalized Treatment for Obstructive Sleep Apnea: Beyond CPAP. Life (Basel). 2024;14(8). Published 2024 Aug 13. doi:10.3390/life14081007

[38] Øverby CT, Sutharshan P, Gulbrandsen P, Dammen T, Hrubos-Strøm H. Shared decision making: A novel approach to personalized treatment in obstructive sleep apnea. Sleep Med X. 4:100052. Published 2022 Dec. doi:10.1016/j.sleepx.2022.100052

[39] Lowery MM, Rundo JV, Walia HK, Shah V. Personalized multimodal management for severe obstructive sleep apnea in a patient intolerant of positive airway pressure with hypoglossal nerve stimulator and mandibular advancement device. J Clin Sleep Med. 2023;19(2):403-408. doi:10.5664/jcsm.10296

[40] Wollny M, Heiser C, Sommer U, Schöbel C, Braun M. Adverse Events with Hypoglossal Nerve Stimulation in the Treatment of Obstructive Sleep Apnea-A Systematic Review of Clinical Trials and Real-World Data. J Clin Med. 2024;13(15). Published 2024 Jul 23. doi:10.3390/jcm13154282

[41] Luyster FS, Ni Q, Lee K, et al. Factors affecting obstructive sleep apnea patients' use of upper airway stimulation treatment. J Clin Sleep Med. 2022;18(9):2207-2215. doi:10.5664/jcsm.10086

[42] Zhang Y, Leng S, Hu Q, et al. Pharmacological interventions for pediatric obstructive sleep apnea (OSA): Network meta-analysis. Sleep Med. 116:129-137. doi:10.1016/j.sleep.2024.01.030

ISSN 2616-5791 Vol. 7, Issue 4: 35-43, DOI: 10.25236/AJMHS.2026.070405

[43] Lenze NR, Kazemi RJ, Ikeda AK, et al. Consumer sleep technology use in individuals with obstructive sleep apnea: does it have a role in monitoring treatment response? J Clin Sleep Med. 2025;21(3):593-597. doi:10.5664/jcsm.11504

[44] Ghafourian MS, Noori A, Taghipour S, Ramezani A. Multimodal apnea detection: advancements through convolutional neural networks and STFT analysis of EEG, ECG, and nasal signals to tackle key challenges in innovation. Comput Methods Biomech Biomed Engin. :1-11. Published online Jun 8,2025. doi:10.1080/10255842.2025.2510367

[45] Wu M, Wang K, Huang H, Wu X, Liu Z, Li S. From Big Data to AI-Driven Decisions in Obstructive Sleep Apnea: A Narrative Review Integrating the DDPP Framework. Nat Sci Sleep. 17:1863-1882. Published 2025 None. doi:10.2147/NSS.S543091