REVIEW ARTICLE

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Integrating Sleep Apnea Care into General Dental Practice: A Clinical Review

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Abstract

Obstructive Sleep Apnea (OSA) is a prevalent yet underdiagnosed condition characterized by recurrent upper airway collapse during sleep, leading to intermittent hypoxia and fragmented sleep architecture. It is associated with significant systemic consequences, including cardiovascular disease, metabolic dysfunction, and impaired quality of life. Given their routine patient interactions and ability to identify craniofacial risk factors, general dental practitioners are uniquely positioned to contribute to the early detection and management of OSA. This clinical review aims to evaluate the role of general dental practice in the screening, referral, and adjunctive management of OSA.

Keywords: Continuous positive airway pressure, Cone-Beam Computed Tomography, Mandibular advancement devices, Obstructive sleep apnea, Oral appliance therapy, Orthodontics, Prosthodontics.

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1. Introduction

Obstructive Sleep Apnea (OSA) is a common sleep-related breathing disorder characterised by recurrent episodes of partial or complete upper airway collapse during sleep, resulting in apnea or hypopnea events. These episodes lead to intermittent hypoxemia, hypercapnia, and repeated arousals from sleep, ultimately causing fragmented sleep architecture and reduced sleep quality [1]. The underlying pathophysiology involves a complex interplay between anatomical predisposition and neuromuscular control, where reduced upper airway muscle tone during sleep, combined with structural factors such as craniofacial morphology and soft tissue enlargement, contributes to airway obstruction. Clinicians commonly classify disease severity by the apnea-hypopnea index (AHI) as mild (5–14 events/hour), moderate (15–29 events/hour), and severe (≥30 events/hour), providing a standardised framework for diagnosis and treatment planning [1]. OSA represents a significant public health concern due to its high prevalence and substantial rate of underdiagnosis. Epidemiological data suggest that approximately 17 - 22% of the adult population is affected, with higher prevalence observed among males and individuals with increased body mass index [2]. Despite this, a large proportion of cases remain undiagnosed, largely due to nonspecific symptoms and lack of routine screening in clinical practice. The global burden of OSA continues to rise, driven by increasing rates of obesity, aging populations, and associated lifestyle factors, further emphasizing the need for early identification and intervention [3].

The clinical significance of OSA extends beyond sleep disturbance, as it is strongly associated with a range of systemic complications. Cardiovascular consequences include hypertension, coronary artery disease, heart failure, and stroke, mediated through mechanisms such as intermittent hypoxia, oxidative stress, and sympathetic nervous system activation [3,4]. In addition, OSA is linked to neurocognitive dysfunction, including impaired attention, memory deficits, and excessive daytime sleepiness, which can adversely affect daily functioning and increase the risk of accidents. Furthermore, the condition profoundly affects quality of life, contributing to fatigue, mood disturbances, and reduced overall well-being [4].

In this context, general dental practitioners are uniquely positioned to play a critical role in the early detection and management of OSA. Routine dental visits provide frequent opportunities for patient interaction, allowing for the identification of clinical signs such as craniofacial abnormalities, macroglossia, and other airway-related features. Dentists can also incorporate screening questionnaires and clinical assessments into routine examinations, facilitating timely referral to sleep physicians for definitive diagnosis. Moreover, the expanding field of dental sleep medicine has highlighted dentists' role in providing adjunctive therapies, particularly oral appliance therapy, as part of an interdisciplinary approach to care. This evolving scope underscores the importance of integrating sleep apnea management into general dental practice to improve patient outcomes and address the growing burden of this condition.

2. Pathophysiology and craniofacial risk factors

OSA results from a complex interplay between anatomical susceptibility and functional changes in upper airway neuromuscular control during sleep. Craniofacial morphology, soft tissue characteristics, obesity, and age-related or developmental factors can influence airway dimensions and collapsibility. Understanding these mechanisms and associated risk factors is particularly important in dentistry, where craniofacial and oral features may provide early clinical indicators of increased OSA risk.

2.1 Mechanism of airway collapse

The pathophysiology of OSA involves a dynamic interaction between neuromuscular control and anatomical susceptibility of the upper airway. A primary mechanism underlying airway obstruction is the reduction in upper airway dilator muscle tone during sleep, particularly during rapid eye movement (REM) sleep. This physiological decline in neuromuscular activity increases airway collapsibility, especially in individuals with predisposing structural abnormalities [5]. In addition to neuromuscular factors, anatomical narrowing of the upper airway plays a crucial role. Reduced pharyngeal lumen size and increased soft tissue volume contribute to airway instability, making it more prone to collapse under negative inspiratory pressure during sleep. These mechanisms collectively result in recurrent episodes of hypoxia and sleep fragmentation [5].

2.2 Craniofacial and oral risk factors

Craniofacial morphology significantly influences airway patency and is a key determinant in the development of OSA. Skeletal abnormalities such as retrognathia and micrognathia reduce the posterior airway space, predisposing individuals to upper airway obstruction. Similarly, a high-arched or narrow palate can decrease nasal airway volume and alter tongue posture, further compromising airway dimensions [6]. Soft tissue structures also play an important role. Enlargement of the tongue (macroglossia) and hypertrophy of the tonsils can encroach upon the airway, increasing the likelihood of collapse during sleep. In addition, dental and occlusal characteristics, including malocclusion and constricted dental arches, have been associated with reduced airway space and may serve as important indicators during routine dental examinations [6].

2.3 Role of obesity and soft tissue factors

Obesity is one of the most significant risk factors for OSA and contributes to both anatomical and functional airway compromise. Excess adipose tissue deposition in the neck and pharyngeal regions leads to increased soft tissue volume, thereby narrowing the airway and increasing its collapsibility. Additionally, central obesity reduces lung volumes, particularly functional residual capacity, which decreases caudal traction on the upper airway and promotes collapse. The combined effect of altered respiratory mechanics and increased soft tissue mass significantly exacerbates the severity of OSA. These findings underscore the importance of considering both craniofacial and systemic factors in understanding the pathophysiology of the condition [7].

2.4 Pediatric obstructive sleep apnea

Unlike adult OSA, pediatric OSA commonly results from adenotonsillar hypertrophy, craniofacial abnormalities, obesity, and neuromuscular disorders. Children may present with habitual snoring, restless sleep, mouth breathing, behavioural disturbances, impaired school performance, hyperactivity, and growth impairment rather than excessive daytime sleepiness. Early diagnosis is essential because untreated pediatric OSA may adversely affect craniofacial development, cognitive function, cardiovascular health, and quality of life [8]. Dentists play an important role in recognizing early signs such as narrow maxillary arches, posterior crossbite, high-arched palate, mandibular retrusion, and chronic mouth breathing. Management often requires multidisciplinary collaboration involving paediatricians, sleep physicians, otolaryngologists, and orthodontists. Treatment options include adenotonsillectomy, weight management, rapid maxillary expansion, myofunctional therapy, and continuous positive airway pressure in selected patients [8].

3. Role of the general dentist in screening

General dentists are well positioned to contribute to the early identification of patients at risk for OSA because of their regular contact with patients and their ability to assess craniofacial, oral, and airway-related features. Although definitive diagnosis requires appropriate sleep evaluation, dental practitioners can recognize relevant signs and symptoms, apply validated screening tools, and facilitate timely referral to sleep or medical specialists. The key components of OSA screening in dental practice are outlined below.

3.1 Clinical screening in dental practice

General dental practitioners play a pivotal role in the early identification of OSA, primarily due to their regular and often long-term contact with patients. Chairside screening allows dentists to identify individuals at risk by recognizing craniofacial characteristics, oral findings, and behavioural indicators associated with OSA [9]. A comprehensive medical and sleep history is essential in this context. Dentists should inquire about sleep-related symptoms such as snoring, witnessed apneas, nocturnal awakenings, and daytime fatigue. Additionally, medical conditions such as hypertension, obesity, and metabolic disorders, commonly associated with OSA, should be evaluated as part of routine dental assessment. Incorporating such screening into daily practice enhances early detection and facilitates timely referral [9].

3.2 Signs and symptoms

OSA often presents with a combination of nocturnal and daytime symptoms that can be identified during dental visits. Common nocturnal symptoms include loud, habitual snoring, choking or gasping during sleep, and witnessed apneic episodes. Daytime manifestations typically include excessive sleepiness, fatigue, impaired concentration, and morning headaches [10].

In addition to these general symptoms, several oral signs may alert the dentist to a possible diagnosis of OSA. These include bruxism, xerostomia, and a scalloped tongue, which may reflect airway obstruction or altered neuromuscular function during sleep. Other findings such as enlarged tonsils, macroglossia, and dental wear patterns may further support suspicion of the condition [10].

Sleep bruxism has been frequently associated with OSA, although the relationship remains complex. Micro-arousals occurring during obstructive respiratory events may trigger episodes of rhythmic masticatory muscle activity, suggesting that sleep bruxism may represent a protective physiological response aimed at restoring upper airway patency. Dentists should therefore recognize recurrent sleep bruxism as a potential clinical indicator warranting further assessment for OSA [11]. Emerging evidence also suggests a bidirectional relationship between OSA and periodontal disease. Intermittent hypoxia, systemic inflammation, oxidative stress, and immune dysregulation associated with OSA may contribute to periodontal tissue destruction, while chronic periodontal inflammation may further exacerbate systemic inflammatory burden. Consequently, comprehensive periodontal examination should form part of the routine assessment of patients suspected of having OSA [12].

3.3 Screening tools

Validated screening tools are valuable adjuncts in identifying patients at risk for OSA in general dental practice. The STOP-BANG questionnaire is widely used due to its simplicity and high sensitivity. It assesses key risk factors including snoring, tiredness, observed apneas, blood pressure, body mass index, age, neck circumference, and gender. Another commonly used tool is the Epworth Sleepiness Scale (ESS), which evaluates daytime sleepiness by measuring the likelihood of dozing off in various situations. While these tools do not provide a definitive diagnosis, they are effective in stratifying patients based on risk and guiding referral decisions [13].

3.4 Clinical examination

Clinical examination in the dental setting provides additional insight into the risk of OSA. The Mallampati classification is commonly used to assess the visibility of oropharyngeal structures and predict airway obstruction risk. Higher Mallampati scores are associated with an increased likelihood of OSA. Measurement of neck circumference is another useful clinical parameter, as increased neck size is strongly correlated with airway narrowing and OSA severity. Additionally, comprehensive airway evaluation, including assessment of tongue size, tonsillar hypertrophy, palatal morphology, and mandibular position, can help identify anatomical risk factors contributing to airway collapse (Figure 1) [14].

3.5 Referral pathways

While dentists play an essential role in screening, definitive diagnosis of OSA must be established by a qualified sleep physician. Patients identified as high-risk should be referred for further evaluation, typically involving overnight polysomnography, which remains the gold standard diagnostic test. Polysomnography provides a comprehensive assessment of sleep architecture, respiratory events, oxygen saturation, and apnea - hypopnea index (AHI), enabling accurate diagnosis and severity classification. Early referral and interdisciplinary collaboration between dental practitioners and sleep specialists are critical to ensure appropriate management and improved patient outcomes [15].

4. Diagnosis of OSA

4.1 Polysomnography vs home sleep testing

The definitive diagnosis of OSA requires objective assessment of sleep-related breathing disturbances. In-laboratory polysomnography (PSG) is widely regarded as the gold standard diagnostic modality. It provides a comprehensive evaluation of sleep architecture, respiratory events, oxygen saturation, electroencephalographic activity, and cardiovascular parameters. This level of detail allows accurate identification and classification of OSA, as well as differentiation from other sleep disorders [16].

Despite its diagnostic accuracy, PSG is resource-intensive, costly, and may have limited accessibility. As a result, home sleep apnea testing (HSAT) has emerged as an alternative diagnostic approach, particularly for patients with a high pre-test probability of moderate to severe OSA and without significant comorbidities. HSAT typically records fewer physiological parameters, focusing primarily on respiratory variables such as airflow, oxygen saturation, and respiratory effort. While it offers greater convenience and cost-effectiveness, HSAT may underestimate disease severity and is less reliable in patients with complex medical conditions or suspected comorbid sleep disorders [17]. Current clinical guidelines recommend PSG for comprehensive evaluation, while HSAT may be used as a confirmatory diagnostic tool in appropriately selected patients. Importantly, both modalities should be interpreted by qualified sleep physicians to ensure accurate diagnosis and management planning (Figures 2, 3).

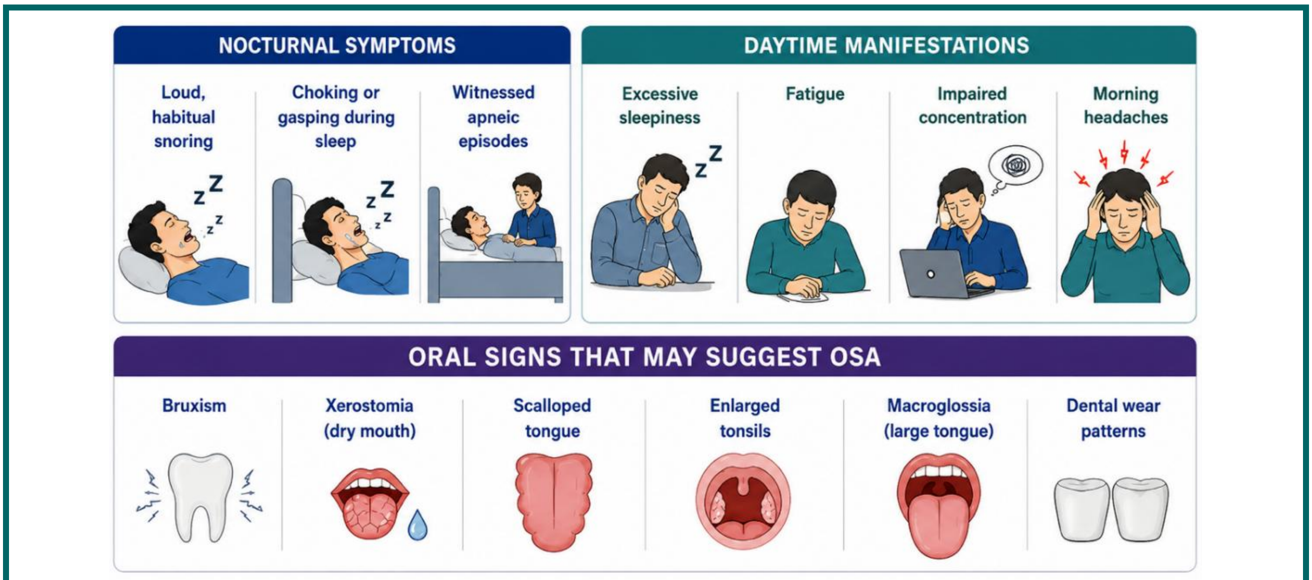

Figure 1. Signs and symptoms of OSA

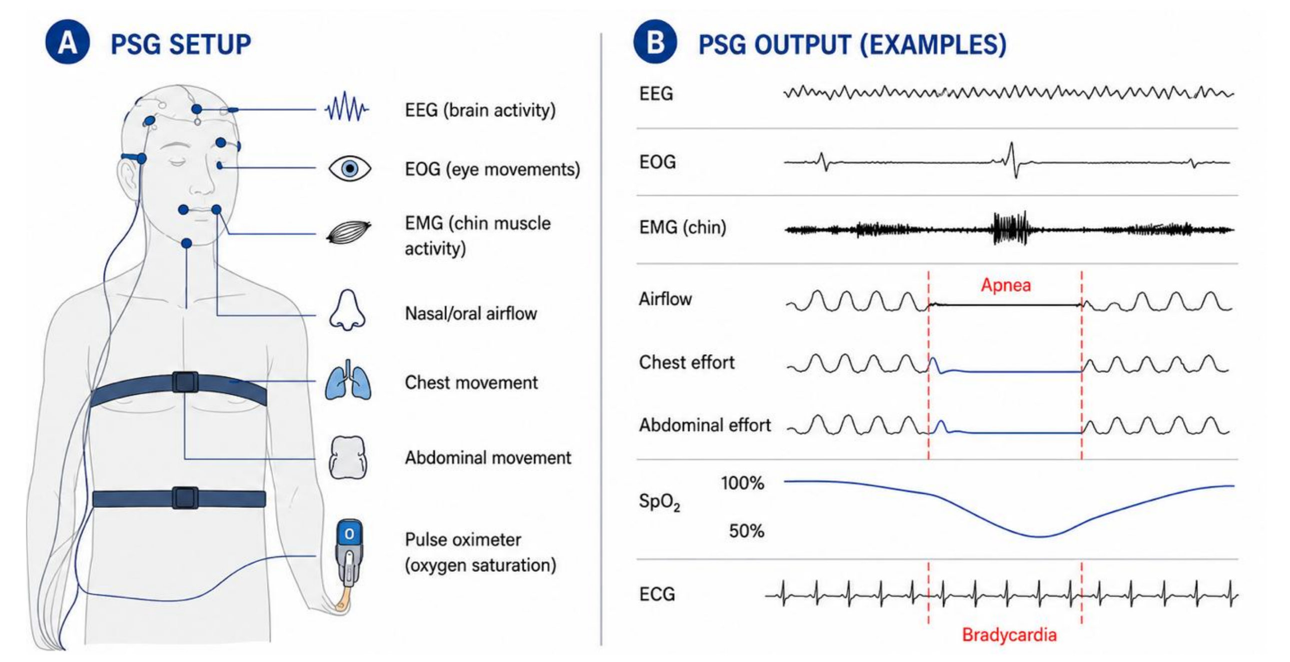

Figure 2. Components and output of polysomnography (PSG) in sleep apnea evaluation

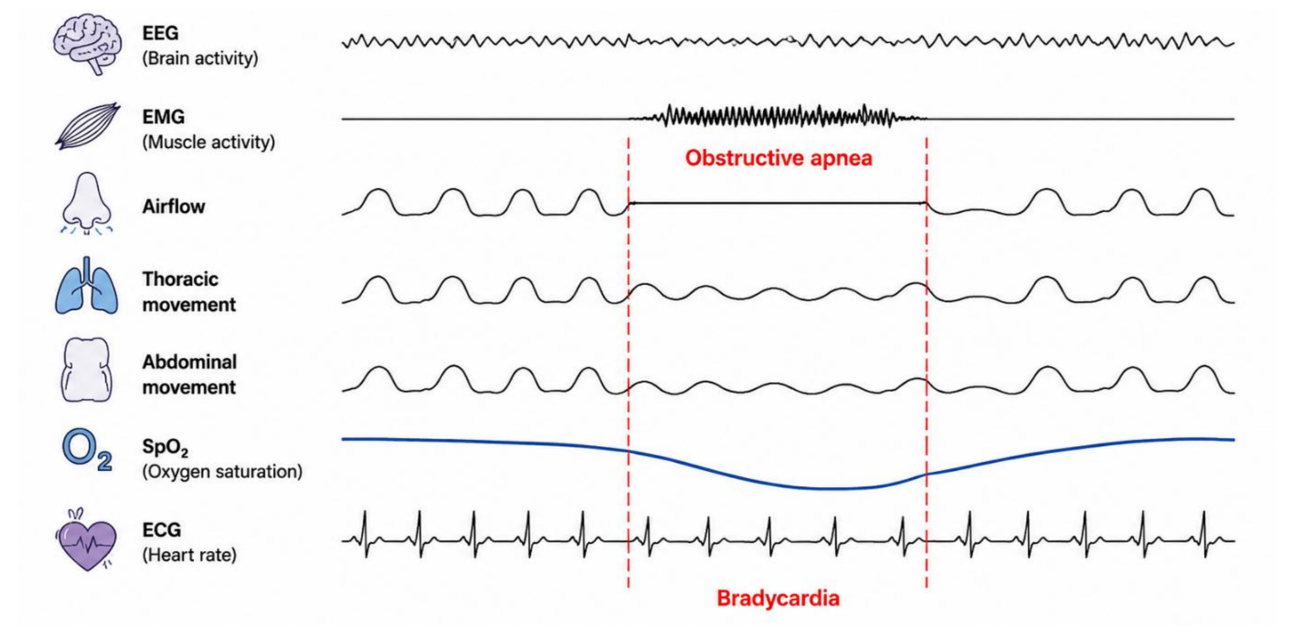

Figure 3. Polysomnographic recording demonstrating obstructive sleep apnea events

Table 1: Apnea - hypopnea index

AHI (events/hour)	Severity of OSA	Clinical Interpretation
< 5	Normal	No clinically significant Obstructive Sleep Apnea
5 - 14	Mild OSA	May present with mild symptoms such as snoring and occasional daytime sleepiness
15 - 29	Moderate OSA	Noticeable daytime sleepiness, impaired function, increased health risks
≥ 30	Severe OSA	Marked symptoms, high risk of cardiovascular and systemic complications

4.2 Apnea - Hypopnea Index (AHI)

The apnea - hypopnea index (AHI) is the primary metric used to diagnose and quantify the severity of OSA. It represents the average number of apnea (complete cessation of airflow) and hypopnea (partial reduction in airflow associated with oxygen desaturation or arousal) events per hour of sleep. AHI is derived from PSG or HSAT data and serves as the cornerstone for clinical decision-making.

Diagnostic thresholds for OSA are based on AHI values in conjunction with clinical symptoms. An AHI of ≥5 events per hour, in the presence of symptoms such as excessive daytime sleepiness, snoring, or witnessed apneas, is considered diagnostic of OSA. In asymptomatic individuals, higher thresholds may be required to establish diagnosis due to variability in clinical significance [18].

Severity classification of OSA is commonly defined as mild (AHI 5–14 events/hour), moderate (AHI 15 - 29 events/hour), and severe (AHI ≥30 events/hour). This stratification is essential for guiding treatment decisions, including the selection of continuous positive airway pressure therapy, oral appliance therapy, or surgical interventions. However, it is important to recognize that AHI alone may not fully capture disease burden, as factors such as oxygen desaturation, duration of events, and patient-specific comorbidities also influence clinical outcomes (Table 1) [18, 19].

4.3 Cone-Beam Computed Tomography (CBCT) in OSA evaluation

Cone-beam computed tomography (CBCT) has become an increasingly valuable imaging modality in dental sleep medicine because of its ability to provide three-dimensional visualization of craniofacial structures and upper airway anatomy with relatively low radiation exposure compared with conventional computed tomography. Unlike polysomnography, which evaluates the physiological severity of obstructive sleep apnea, CBCT provides detailed anatomical information that helps identify structural factors contributing to airway obstruction [20].

CBCT enables assessment of upper airway volume, minimum cross-sectional area, nasal cavity dimensions, maxillomandibular relationships, tongue position, hyoid bone location, and craniofacial skeletal abnormalities such as retrognathia, maxillary constriction, and vertical facial growth patterns. These findings are particularly valuable during orthodontic evaluation, prosthodontic treatment planning, orthognathic surgery, and oral appliance therapy. Despite these advantages, CBCT images are obtained while patients are awake and usually in an upright position; therefore, they do not represent dynamic airway collapse during sleep. Consequently, CBCT should be considered an adjunctive imaging tool rather than a standalone diagnostic modality for OSA and should always be interpreted alongside clinical findings and sleep study results [20].

4.4 Drug-induced sleep endoscopy (DISE) and functional MRI

Drug-induced sleep endoscopy (DISE) is an emerging diagnostic technique that allows direct visualization of the upper airway during pharmacologically induced sleep. By reproducing sleep-related airway collapse, DISE enables clinicians to identify the precise anatomical level and pattern of obstruction, including collapse at the velum, oropharynx, tongue base, and epiglottis. This information is particularly useful for selecting appropriate candidates for oral appliance therapy, upper airway surgery, or hypoglossal nerve stimulation, thereby supporting individualized treatment planning [21].

Functional magnetic resonance imaging (functional MRI) provides dynamic, radiation-free assessment of upper airway anatomy and soft tissue behavior during respiration. Unlike static imaging modalities, functional MRI can evaluate airway movement, neuromuscular activity, and tissue interactions that contribute to airway collapse. Although currently used primarily in research settings because of high cost and limited availability, functional MRI offers valuable insights into the pathophysiology of OSA and may facilitate personalized treatment strategies in the future. Neither DISE nor functional MRI replaces polysomnography for diagnosing OSA, instead, these modalities complement conventional sleep studies by providing detailed anatomical and functional information that supports comprehensive patient evaluation [22].

5. Treatment modalities in OSA

Management of OSA requires a comprehensive and individualized approach based on disease severity, patient-specific factors, and associated comorbidities. Treatment strategies broadly include behavioural modifications, device-based therapies, and surgical interventions. While continuous positive airway pressure remains the gold standard, alternative and adjunctive approaches are often necessary due to variability in patient tolerance and response.

5.1 Behavioral and lifestyle modifications

Behavioral and lifestyle interventions are considered first-line strategies, particularly in patients with mild OSA or as adjuncts to other therapies. Weight loss is one of the most effective non-invasive interventions, as obesity is a major risk factor contributing to airway narrowing and collapsibility [22,23]. Even modest reductions in body weight have been shown to significantly improve OSA severity and symptom burden. Positional therapy is another important strategy, especially in patients with positional OSA, where apneic events occur predominantly in the supine position. Techniques aimed at encouraging lateral sleeping positions can reduce airway obstruction and improve sleep quality. Additional measures such as avoidance of alcohol, sedatives, and smoking cessation may further enhance treatment outcomes [23].

5.2 Positive airway pressure (PAP/CPAP)

Continuous positive airway pressure (CPAP) therapy is widely regarded as the gold standard treatment for moderate to severe OSA. It functions by delivering a constant stream of pressurized air through a mask, thereby preventing airway collapse during sleep. CPAP effectively reduces the apnea - hypopnea index, improves oxygenation, and alleviates symptoms such as daytime sleepiness [24].

Despite its high efficacy, CPAP adherence remains a significant clinical challenge. Reported compliance rates vary widely, with approximately 17-60% of patients demonstrating suboptimal use. Factors contributing to poor adherence include discomfort, mask-related issues, nasal congestion, and perceived inconvenience. These limitations often necessitate alternative or adjunctive treatment modalities, including oral appliance therapy [25].

5.3 Surgical interventions

Surgical management is typically considered in patients who are intolerant to CPAP therapy or in whom anatomical abnormalities significantly contribute to airway obstruction. One of the most commonly performed procedures is uvulopalatopharyngoplasty (UPPP), which involves removal or remodelling of soft tissue structures in the oropharynx to enlarge the airway. However, outcomes are variable and depend on patient selection and site of obstruction.

Maxillomandibular advancement (MMA) is a more invasive but highly effective surgical option that involves forward repositioning of the maxilla and mandible to increase upper airway space. This procedure has demonstrated significant improvements in airway patency and reduction in OSA severity, particularly in patients with craniofacial abnormalities. Surgical interventions are typically part of a multidisciplinary treatment plan and require careful evaluation of risks, benefits, and long-term outcomes (Figure 2) [26, 27].

5.4 Orthodontic interventions

Orthodontic treatment can contribute to airway improvement in selected patients with craniofacial abnormalities associated with OSA. Rapid maxillary expansion has demonstrated significant benefits in growing children by increasing nasal cavity width and upper airway volume. In adolescents and selected adults, mini screw-assisted rapid palatal expansion (MARPE) and surgically assisted rapid maxillary expansion (SARME) may provide skeletal expansion when indicated [28].

Functional orthopaedic appliances that promote mandibular advancement during growth may also improve airway dimensions in children with mandibular retrognathia. In adults, orthodontic treatment is frequently combined with orthognathic surgery, oral appliance therapy, or multidisciplinary management to optimize both occlusal function and airway patency (Figure 4) [28].

6. Oral appliance therapy

6.1 Mechanism of action

Oral appliance therapy (OAT) is an established, non-invasive treatment modality for OSA, primarily aimed at maintaining upper airway patency during sleep. The most widely used mechanism involves anterior repositioning of the mandible, which leads to enlargement of the upper airway, particularly in the oropharyngeal region.

Mandibular advancement increases the tension of the genioglossus and other pharyngeal dilator muscles, thereby reducing airway collapsibility. Additionally, forward positioning of the mandible results in displacement of the tongue and associated soft tissues away from the posterior pharyngeal wall, improving airflow and reducing resistance. This mechanical stabilization of the airway significantly decreases the frequency of apnea and hypopnea events [28].

6.2 Types of oral appliances

Oral appliances used in OSA management can be broadly classified into mandibular advancement devices (MADs) and tongue-retaining devices (TRDs). Mandibular advancement devices are the most commonly prescribed appliances and function by holding the mandible in a forward position during sleep. These devices are typically custom-fabricated and titratable, allowing gradual adjustment to achieve optimal therapeutic positioning. Tongue-retaining devices, on the other hand, function by holding the tongue in a forward position using suction, thereby preventing posterior displacement and airway obstruction. Although effective in certain cases, TRDs are generally less well tolerated compared to MADs due to discomfort and compliance issues [29].

6.3 Indications

Oral appliance therapy is primarily indicated in patients with mild to moderate OSA and in those with severe OSA who are unable to tolerate CPAP therapy. It is also considered in patients who prefer an alternative to CPAP or in whom anatomical features are favorable for mandibular advancement.

Patient selection is critical to treatment success, with better outcomes observed in individuals with lower body mass index, positional OSA, and craniofacial features amenable to mandibular advancement [30].

6.4 Effectiveness and evidence

Substantial evidence supports the effectiveness of oral appliance therapy in reducing the AHI and improving clinical symptoms of OSA. Studies have demonstrated significant reductions in AHI, along with improvements in oxygen saturation, daytime sleepiness, and overall quality of life. Although CPAP therapy is generally more effective in reducing AHI, oral appliances often demonstrate superior patient compliance, which can result in comparable overall effectiveness in real-world settings. Importantly, custom-fabricated appliances are significantly more effective than prefabricated or "boil-and-bite" devices due to better fit, comfort, and titration capability [31].

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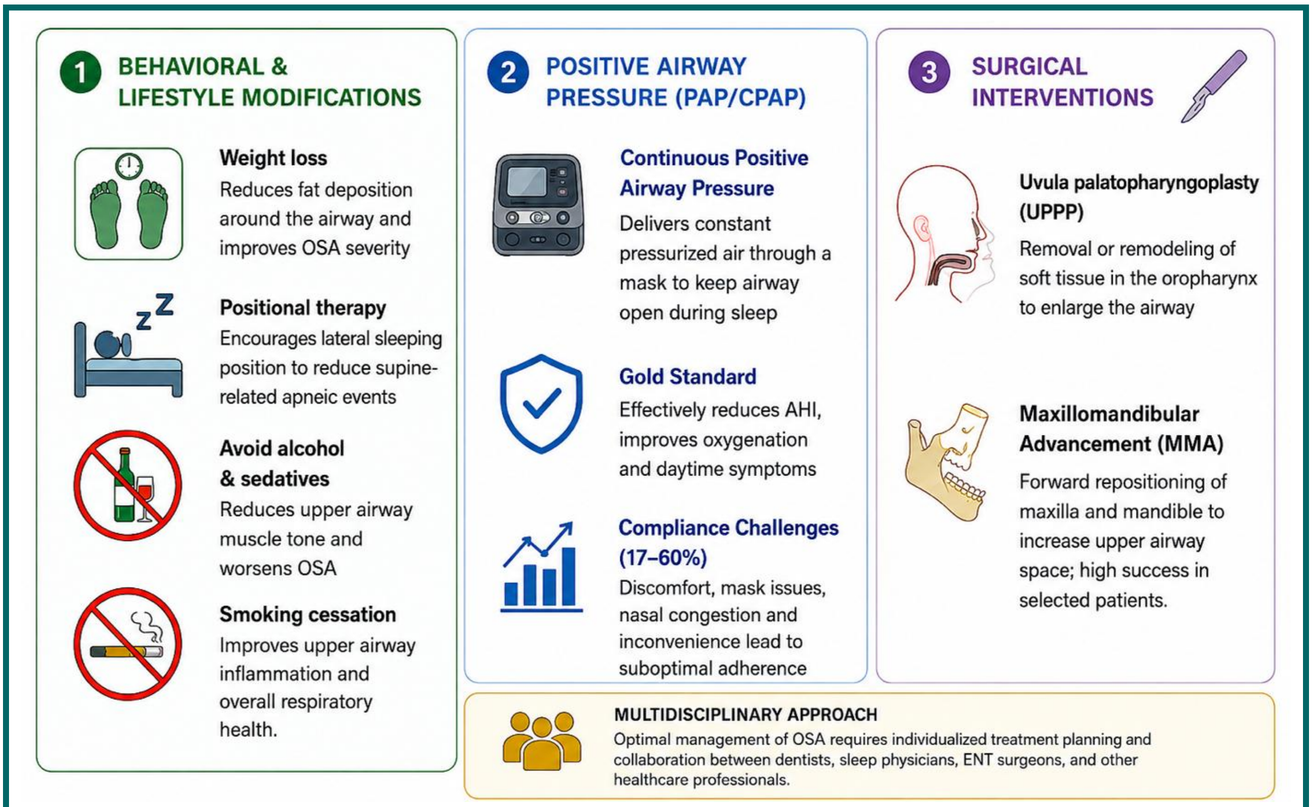

Figure 4. Treatment modalities in OSA

6.5 Rapid maxillary expansion (RME)

Rapid maxillary expansion (RME) is an orthopedic treatment primarily indicated in growing children with maxillary transverse deficiency and obstructive sleep apnea. Expansion of the maxilla increases the transverse dimension of the nasal cavity and upper airway, resulting in reduced nasal resistance and improved airflow during sleep. Several clinical studies have demonstrated significant improvements in airway volume, respiratory function, and apnea-hypopnea index following RME in appropriately selected pediatric patients [28].

In adults, conventional RME has limited effectiveness because of fusion of the mid-palatal suture. However, surgically assisted rapid maxillary expansion (SARME) or miniscrew-assisted rapid palatal expansion (MARPE) may provide airway enlargement in selected patients with maxillary constriction. Despite encouraging evidence, patient selection remains critical, and RME should be considered as part of an interdisciplinary treatment approach involving orthodontists, oral and maxillofacial surgeons, and sleep physicians [28].

6.6 Clinical protocol for dentists

The successful implementation of oral appliance therapy requires a structured clinical protocol. Initial assessment involves careful case selection, including evaluation of OSA severity, craniofacial characteristics, and patient preferences, in collaboration with a sleep physician. Once deemed suitable, dental impressions or digital scans are obtained for fabrication of a custom appliance. Accurate bite registration is essential to determine the initial mandibular advancement position. The appliance is then fabricated in a dental laboratory and delivered to the patient with appropriate instructions [32].

Following appliance delivery, patients should be reviewed within 2-4 weeks to assess appliance adaptation, comfort, retention, and the need for initial titration. During the titration phase, follow-up visits every 4-6 weeks are recommended until optimal mandibular advancement and satisfactory symptom control are achieved. Once treatment has stabilized, patients should undergo periodic reviews every 6-12 months to evaluate appliance integrity, patient adherence, occlusal changes, temporomandibular joint health, and overall treatment effectiveness. Repeat objective sleep testing (polysomnography or home sleep apnea testing) should be considered after completion of titration, in patients with persistent symptoms, significant weight changes, recurrence of symptoms, or when major modifications to the appliance are made. This structured follow-up protocol facilitates long-term treatment success and early identification of complications [32].

6.7 Side effects and complications

While oral appliance therapy is generally well tolerated, it is associated with certain side effects and complications. Short-term effects include excessive salivation, dry mouth, tooth discomfort, and soft tissue irritation. These symptoms are usually transient and resolve with continued use or minor adjustments. Long-term use may result in occlusal changes, including reduction in overjet and overbite, tooth movement, and alterations in bite relationship. Temporomandibular joint (TMJ) discomfort and muscle soreness may also occur, particularly during the initial stages of therapy. Careful monitoring and regular follow-up by the dentist are essential to identify and manage these complications early. Patient education and informed consent regarding potential long-term changes are also critical components of treatment planning [33].

7. Interdisciplinary management

The multifactorial nature of OSA often necessitates coordinated care among dental and medical professionals. Dentists have an important role in screening, oral appliance therapy, and monitoring oral and treatment-related outcomes, while diagnosis and management of systemic, respiratory, and anatomical factors require collaboration with other healthcare specialists. Effective interdisciplinary communication and long-term follow-up are therefore essential to ensure appropriate treatment selection, monitor therapeutic effectiveness, and optimize patient outcomes.

7.1 Collaboration with sleep physicians

Effective management of OSA requires close collaboration between dental practitioners and sleep physicians. While dentists play a crucial role in screening and providing adjunctive therapies such as oral appliance treatment, the definitive diagnosis of OSA must be established by a qualified physician. This is typically achieved through objective sleep assessment methods, including polysomnography or home sleep apnea testing. Sleep physicians are responsible for confirming the diagnosis, determining disease severity, and formulating an overall treatment plan. Dentists, in turn, contribute by delivering oral appliance therapy and monitoring oral health-related outcomes. Clear communication between providers ensures appropriate case selection, treatment customization, and optimal patient safety [34].

7.2 Multidisciplinary approach

OSA is a multifactorial disorder that often requires input from multiple healthcare disciplines. An interdisciplinary approach enhances treatment outcomes by addressing both anatomical and systemic contributors to the condition. Otolaryngologists (ENT specialists) play a key role in evaluating upper airway anatomy and performing surgical interventions when indicated. Pulmonologists and sleep medicine specialists contribute to respiratory assessment and management, particularly in patients requiring positive airway pressure therapy or those with complex comorbidities [35].

Dietitians are essential in managing obesity, one of the most significant modifiable risk factors for OSA. Weight reduction strategies can substantially improve disease severity and overall treatment outcomes. In addition, other healthcare providers such as primary care physicians and psychologists may contribute to managing associated conditions, including cardiovascular disease and behavioural factors affecting treatment adherence [35, 36].

7.3 Follow-up and long-term care

Long-term management of OSA requires continuous monitoring and follow-up to ensure treatment efficacy and patient compliance. In patients undergoing oral appliance therapy, dentists play a key role in assessing appliance fit, monitoring occlusal changes, and managing potential side effects. Objective evaluation of treatment effectiveness is essential and may involve repeat sleep studies, particularly when symptoms persist or clinical changes occur. Follow-up assessments also provide an opportunity to reinforce patient education, optimize therapy, and make necessary adjustments to the treatment plan. Given the chronic nature of OSA, long-term care must be dynamic and patient-centered, involving periodic reassessment by both dental and medical professionals. This integrated approach ensures sustained therapeutic benefit and minimizes the risk of disease progression or complications [37, 38].

8. Clinical implementation in general practice

Successful integration of OSA screening and management into general dental practice requires more than clinical recognition alone. It involves establishing practical workflows, ensuring adequate professional training, and maintaining appropriate ethical and medico-legal standards. These considerations help dentists incorporate OSA-related care safely and effectively within routine practice.

8.1 Workflow Integration

Integrating OSA screening into general dental practice requires a structured and systematic approach. Routine dental examinations provide an ideal opportunity for early identification of at-risk patients through targeted history taking and clinical assessment. Incorporating simple screening questions related to snoring, daytime sleepiness, and sleep quality into standard patient records can facilitate early detection [39]. Effective documentation and referral systems are essential components of clinical implementation. Dentists should maintain detailed records of screening findings, risk assessments, and patient-reported symptoms. Establishing clear referral pathways to sleep physicians ensures timely diagnosis and appropriate management. Integration of digital health records can further streamline communication and interdisciplinary collaboration [40].

8.2 Training and education

The expanding role of dentists in OSA management underscores the need for adequate training and education in dental sleep medicine. General practitioners must develop a foundational understanding of sleep physiology, pathophysiology of OSA, screening methodologies, and treatment modalities, including oral appliance therapy. Continuing education programs, workshops, and certification courses play a crucial role in equipping dentists with the necessary skills to safely and effectively participate in OSA care. Enhanced training not only improves diagnostic confidence but also ensures adherence to evidence-based clinical protocols [41].

8.3 Medico-legal considerations

The integration of OSA management into dental practice raises important medico-legal considerations. Dentists must operate within their defined scope of practice, recognizing that definitive diagnosis of OSA is the responsibility of a qualified physician. Any dental intervention should be based on a confirmed diagnosis and a collaborative treatment plan. Informed consent is a critical component of care. Patients should be clearly informed about the benefits, limitations, and potential side effects of oral appliance therapy, including possible occlusal changes and temporomandibular discomfort. Proper documentation of consent and treatment discussions is essential to ensure ethical practice and legal protection [42].

9. Limitations and controversies

Despite the established role of oral appliance therapy in OSA management, several limitations and controversies remain regarding its comparative effectiveness, appropriate clinical use, and long-term dental effects. These considerations highlight the need for careful patient selection, interdisciplinary management, and regular follow-up.

9.1 Oral appliances vs CPAP

While oral appliance therapy is an effective treatment modality, it is generally considered less efficacious than CPAP therapy in reducing the AHI. CPAP remains the gold standard due to its superior ability to maintain airway patency. However, its clinical effectiveness is often limited by poor patient compliance, whereas oral appliances tend to have higher acceptance and adherence rates. This trade-off between efficacy and compliance continues to be a subject of ongoing debate [43].

9.2 Overuse by non-specialists

A growing concern in the field is the potential overuse or inappropriate prescription of oral appliances by non-specialists without proper diagnosis or interdisciplinary coordination. Initiating treatment without physician-confirmed diagnosis may lead to mismanagement of OSA or overlooking other sleep-related disorders. This highlights the importance of adhering to established clinical guidelines and maintaining collaborative care models [44].

9.3 Long-term dental changes

Long-term use of oral appliances has been associated with progressive dental and occlusal changes, including reduction in overjet and overbite, tooth movement, and alterations in bite relationship. While these changes are often gradual and may be clinically manageable, they represent a significant consideration in long-term treatment planning. Continuous monitoring is essential to detect and manage these effects early [45].

10. Future directions

The future of OSA management is likely to be shaped by advances in digital dentistry, personalized treatment strategies, and an expanding role for dental professionals in interdisciplinary healthcare. Emerging technologies and a better understanding of individual disease characteristics may enable more precise screening, treatment planning, and patient-specific interventions. These developments are expected to further strengthen the contribution of dentistry to comprehensive OSA care.

10.1 Digital dentistry and sleep medicine

Advancements in digital dentistry are rapidly transforming the landscape of OSA management, particularly in the design and delivery of oral appliance therapy. The integration of computer-aided design and computer-aided manufacturing (CAD/CAM) technologies has enabled highly precise fabrication of custom oral appliances, resulting in improved fit, retention, and patient comfort. Digital impressions obtained through intraoral scanners eliminate many of the inaccuracies associated with conventional impression techniques, thereby enhancing reproducibility and reducing laboratory errors.

Furthermore, digital workflows allow for efficient data storage, modification, and remote collaboration between dental practitioners and laboratories. Emerging technologies such as 3D printing are also contributing to faster production times and cost-effective customization of appliances. In addition, digital imaging modalities, including cone-beam computed tomography (CBCT), are being explored for airway analysis and treatment planning, although their routine use remains a subject of ongoing research. Collectively, these innovations are expected to improve treatment precision, streamline clinical workflows, and expand access to oral appliance therapy [46].

10.2 Personalized treatment approaches

OSA is increasingly recognized as a heterogeneous disorder with variable underlying mechanisms, including anatomical, neuromuscular, and ventilatory control factors. As a result, there is growing interest in phenotype-based and personalized approaches to treatment. Rather than relying solely on disease severity indices such as the AHI, emerging strategies aim to tailor therapy based on individual patient characteristics, including craniofacial structure, upper airway collapsibility, arousal threshold, and loop gain.

Personalized treatment models may improve clinical outcomes by identifying patients who are more likely to respond to specific interventions, such as oral appliance therapy, positional therapy, or surgical procedures. Advances in imaging, computational modeling, and biomarker research are expected to further refine patient stratification and treatment selection. This shift toward precision medicine represents a significant evolution in OSA management, moving beyond the traditional "one-size-fits-all" paradigm toward more targeted and effective therapeutic strategies [47].

10.3 Expanding role of dentists in healthcare

The role of dentists is undergoing a paradigm shift, extending beyond the management of oral diseases to encompass broader contributions to systemic health. Increasing recognition of the bidirectional relationship between oral health and systemic conditions has positioned dentists as key participants in interdisciplinary healthcare delivery. In the context of OSA, dentists are uniquely positioned to contribute to early detection through routine clinical examinations, identification of craniofacial risk factors, and implementation of validated screening tools. Their involvement in the provision of oral appliance therapy further reinforces their role in the management continuum.

Looking ahead, the integration of dental professionals into collaborative care models is expected to expand, with greater emphasis on preventive healthcare, chronic disease management, and patient education. Enhanced training in dental sleep medicine, along with advancements in digital and diagnostic technologies, will further strengthen the ability of dentists to contribute meaningfully to patient care. This evolving role highlights the potential for dentistry to play a central part in holistic, patient-centered healthcare systems [48].

11. Conclusion

The integration of OSA management into general dental practice represents a significant advancement in patient-centered care. Dentists play a critical adjunct role in the early identification, screening, and management of patients with OSA. Routine dental visits provide valuable opportunities for early detection, which can lead to timely intervention and improved clinical outcomes. Oral appliance therapy has emerged as an effective and well-tolerated treatment option, particularly in patients with mild to moderate OSA or those intolerant to CPAP therapy. However, its success depends on appropriate case selection, careful monitoring, and adherence to clinical protocols. Ultimately, the management of OSA requires an interdisciplinary approach involving collaboration between dental and medical professionals. Such integrated care models are essential to ensure accurate diagnosis, effective treatment, and long-term patient well-being.

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