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CLEAR ALIGNERS AND SLEEP DISORDERS

The Role of Clear Aligner Therapy to Address Patients with Sleep-related Breathing Disorders



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Clear Aligners and Sleep Disorders

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ABSTRACT

Treatment methods are now available that address the needs of the large number of patients who require orthodontic clear aligner therapy and have been diagnosed with sleep-related breathing disorders. When indicated, an effective treatment for these conditions can be accomplished by correcting malocclusions with the use of clear aligners throughout both active and retention phase treatment, as well as by addressing the individual's breathing disorders with a dental sleep appliance that fits over the clear aligners. With the use of this process, the patient avoids having to complete orthodontic treatment prior to treating his or her sleep disorder, which can be a potentially life-threatening condition.

EDUCATIONAL OBJECTIVES

The goal of this continuing education (CE) activity is to provide readers with an understanding of how to incorporate clear aligner therapy into their practice, in order to address the needs of patients diagnosed with sleep-related breathing disorders who require orthodontic intervention. Upon completion of this activity, the reader should be able to:

1. Review appropriate screening protocols.
2. Identify the correlation between malocclusions and airway deficiencies.
3. Understand how to provide patients with comprehensive treatment options to address sleep-related breathing disorders.
4. Discuss the appropriate use of clear aligners for combination cases utilizing the Aligner Sleep Appliance.
5. Recognize the benefits of incorporating 3D technology into the development of comprehensive treatment plans.

ABOUT THE AUTHORS



Payam Ataii, DMD, MBA, is an award-winning graduate of Tufts Dental School in Boston, Massachusetts, who has treated more than 1000 patients with clear aligner systems at his private practice in Laguna Hills, California. As a winner of the Case Shootout and past Invisalign faculty member for more than 10 years, Dr. Ataii was awarded the North America Align Educator of the Year in 2017 and also received the 2017 Contributor of the Year Award. He has trained dentists and their team members nationally and internationally, helping dental offices reap the benefits of modern technology for their patients. As an author, Dr. Ataii has been a contributor to both national and international peer-reviewed dental journal publications, as well as to mainstream press and television.

Over the years, he has presented lectures to thousands of his peers, sharing the results of his research and his innovative practice-growth techniques.

Dr. Ataii has developed and continues to develop solutions for improving and simplifying the ways in which dentistry is delivered to patients. As a patent holder, he continues to innovate and invent dental and health solutions. He also serves on multiple company boards and is a recognized key opinion leader. Dr. Ataii is a strong believer in the advantages of clear aligners and oral sleep appliances both as monotherapy and as combination therapy for improved overall health.



Sal Rodas, MBA, is the chief product officer for SleepArchTx and the executive director for the Foundation for Airway Health. He is a published author, speaker, and dental and medical technology evaluator. Mr. Rodas has presented hundreds of CE courses to dental and medical professionals, both nationally and internationally, in the areas of sleep medicine, airway management, 3D technology, and practice growth. Mr. Rodas has more than 15 years of professional senior-level executive experience. Throughout his career, he has worked with leading companies in the medical and dental sleep industry on innovative solutions, with the objective being to help practices grow. His most recent assignment was as the chief strategic officer of a sleep diagnostics company.

Prior to this, Mr. Rodas led operations, sales, marketing, and service efforts as the COO for Space Maintainers Lab—an international organization with offices in the United States and abroad that serve the needs of dentists and orthodontists worldwide. At Space Maintainers Lab, Mr. Rodas presided over the SMILE Foundation—the educational division of the company—organizing seminars nationwide with leading lecturers in the dental community. Mr. Rodas earned his MBA degree from Babson College in Wellesley, Massachusetts; holds a Bachelor of Information Technology degree; and has served as a U.S. Marine.

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Clear Aligners and Sleep Disorders

The role of clear aligner therapy in addressing the needs of patients with sleep-related breathing disorders

Introduction

In October 2017, the American Dental Association (ADA) adopted and published an 11-point policy statement that, in summary, encourages all dental practitioners to actively screen for patients with sleep-related breathing disorders and, when indicated, treat patients diagnosed with these conditions with oral appliances.¹ The ADA's policy could have not come at a better time, since the Centers for Disease Control and Prevention considers sleep disorders "a public health epidemic,"² based on the estimated 50 to 70 million Americans who chronically experience sleep-related disorders and remain largely undiagnosed.³

Adults in the United States are interested in their sleeping habits. According to a recent research study cosponsored by the National Sleep Foundation and the Consumer Electronics Association, 22% of online consumers indicate that they own or use some form of sleep technology.⁴

Beyond consumer utilization of sleep-monitoring devices, patients who have been diagnosed with obstructive sleep apnea (OSA) are generally prescribed a continuous positive airway pressure (CPAP) machine. The CPAP device is designed to deliver air through the patient's nose and/or mouth, in order to splint the airway open, thus preventing the person from experiencing apneic events during sleep. Although the CPAP is considered the gold standard of therapy for patients with sleep apnea, CPAP tolerance is quite low, with studies reporting 30% to 60% compliance rates.^{5,6}

Given the alarming number of individuals with sleep disorders, the increased consumer awareness of the problem, and the large number of patients who cannot tolerate CPAP therapy, dental practices are experiencing a demand from their patients to address their sleeping disorders with the use of an oral appliance.

Obstructive Sleep Apnea

Patients with sleep-related breathing disorders will present to the dental practice with possible signs and

symptoms that may include bed partner reports of snoring, patients waking up gasping for air, nocturnal bruxism, or excessive daytime sleepiness. In more severe cases, these signs and symptoms may be indicative of OSA—a potentially life-threatening condition.⁷

Patients who have been diagnosed with OSA will experience at least 5 episodes per hour, in which the airway blocks oxygen from entering their body for 10 seconds or longer, per episode.⁸

According to the American Sleep Apnea Association and several peer-reviewed articles, untreated sleep apnea is associated with various medical comorbidities, including "high blood pressure and other cardiovascular disease, memory problems, weight gain, impotence, and headaches."⁹⁻¹³

Malocclusions and Sleep Apnea

Known dental comorbidities associated with sleep apnea have been established through the refereed literature. Some of these include Class I and Class II malocclusion, narrow arches, high-vaulted palates, overjet discrepancies, mouth breathing, and retruded mandibles, among others.¹⁴⁻¹⁶

The significance of this research is the fact that most patients who present to a dental practice to correct crowding in their mouth should be also evaluated for possible sleep disorders. The malocclusion may be causing the patient's tongue to fall back while he or she sleeps, causing apneic events to occur that may lead to damaging and disruptive sleep patterns or to the more serious OSA.

Screening for Sleep Disorders

To implement a successful sleep-screening protocol within a dental practice, practitioners should incorporate the use of validated screening tools, such as the Epworth Sleepiness Scale and/or a sleep disorder assessment questionnaire, which seeks to elicit responses from the patient that may establish his or her risk for a potential sleep disorder (Figure 1). All patients should undergo a physical examination by their practitioner in order to document known signs of a sleep disorder (Table 1).¹⁷⁻¹⁹



TABLE 1. Physical evaluation for sleep disorders ¹⁷⁻¹⁹
Narrow arches, high-vaulted palate
Tooth crowding
Occlusal wear (bruxing, grinding and/or abfractions)
Signs of gastroesophageal reflux disease (GERD)
Tongue-tie (ankyloglossia)
Elongated uvula
Edentulism
Overjet discrepancies
Retrognathia or micrognathia
Body mass index (BMI) greater than 30 kg/m ²
Neck size (>17 inches for men; >16 inches for women)
Class II malocclusion

In addition, dental practitioners should strongly consider the use of cone beam computed tomography (CBCT) to evaluate the entire upper airway, the temporomandibular joints, and the craniofacial complex in order to determine factors that may be contributing to a patient’s sleep disorder. Published research confirms that CBCT is considered an ideal tool for appropriately evaluating the entire upper airway.^{20,21} Analysis of the CBCT should include a detailed review of the nasal cavity in order to establish whether the patient is experiencing nasopharyngeal complications that prevent him or her from breathing properly and that encourage mouth breathing (Figure 2).

Combination Therapy Case

The following case highlights the use of a comprehensive approach to patient evaluation, screening for sleep disorders, and a treatment plan designed to address the various factors that were impacting the patient’s airway and

SLEEP DISORDER ASSESSMENT

Full Name _____

Phone _____ E-mail Address _____

Date of Birth _____ Gender _____

Has anyone told you that you stop breathing while asleep?	Y	N
Have you ever been involved in any type of accident because you nodded off or fell asleep?	Y	N
Have you ever nodded off or fallen asleep while driving?	Y	N
Have you woken up suddenly gasping for air, heart racing or with shortness of breath?	Y	N
Do you grind your teeth?	Y	N
Do you snore or has someone ever told you that you snore?	Y	N
Does anyone in your family have a history of snoring or sleep apnea?	Y	N
Do you feel tired or sleepy throughout the day?	Y	N
Does it take you less than 10 minutes to fall asleep?	Y	N
Does it take you more than 20 minutes to fall asleep?	Y	N
Once you fall asleep, do you have trouble staying asleep?	Y	N
Do you find it difficult to manage your weight?	Y	N
Do you suffer from headaches during the morning or during the night?	Y	N

Note: Over for medical assessment questions

Patient Signature: _____

Figure 1. Example of sleep disorder assessment questionnaire

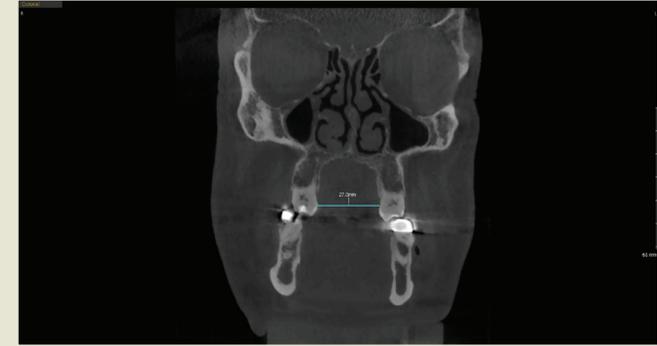


Figure 2. Initial CBCT - Coronal view: nasal and oral cavity analysis

were contributing to her diagnosed sleep disorder. **Initial Examination:** The patient reported that her last dental visit was more than three years ago. At this exam, her chief complaint was the “black lines and sensitivity on my gum line” (Figure 3).

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Figure 3. Gingival recession and overjet discrepancy



Figure 4. Posterior abfractions



Figure 5. Incisal trauma

Extraoral Examination: The patient presents with no sign of palpable head and neck issues. She has minor symptoms of angular cheilitis and complaints of occasional dry mouth at the corner of her lips. The patient also has a thin upper vermilion border when she smiles.

Intraoral Examination: General examination of her cheeks, hard palate, and tongue all appear within normal limits. The patient has multiple missing teeth on the upper and lower arches, with visible lingual decay and gingival recession on fixed abutment restorations at the margins of teeth numbers 6 and 11. Probing with a dental explorer reveals soft dentin on abutment tooth number 8. Vitality exam shows tooth number 5 with percussion sensitivity along with thermal hot sensitivity. The patient has a history of root canal treatment on teeth numbers 5, 11, and 28 that was performed more than 15 years ago. Her gingival and periodontal examination reveals generalized abfraction on the lower anteriors, bicuspid, and molars with generalized recession (Figure 4). There is no bleeding upon probing, and generalized 3-mm pocket depths were found on examination. The patient has upper overjet on the fixed restoration from cuspid to cuspid of 3 mm on the fixed bridge, with lower anterior tooth crowding and overlapping of lower incisors less than 4 mm. Her lower anterior overjet measures approximately 2 mm, with poor anterior cuspid guidance showing incisal trauma (Figure 5).

Radiographic and CBCT Analysis: A full-mouth X-ray shows radiolucency at margins of restorations along the



Figure 6. Initial full-mouth X-ray

anterior fixed bridge of abutments teeth numbers 6, 8, and 11. Periapical X-ray on tooth number 5 does not show/reveal any apical lucency (Figure 6); however, review of the CBCT scan shows mid-root and apical radiolucency on

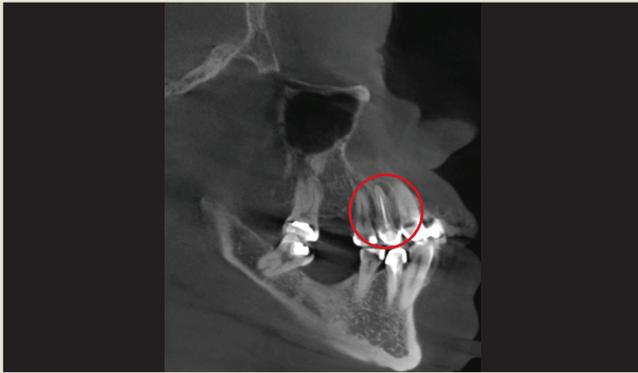


Figure 7. CBCT view of apical radiolucency on tooth #5 circled in red

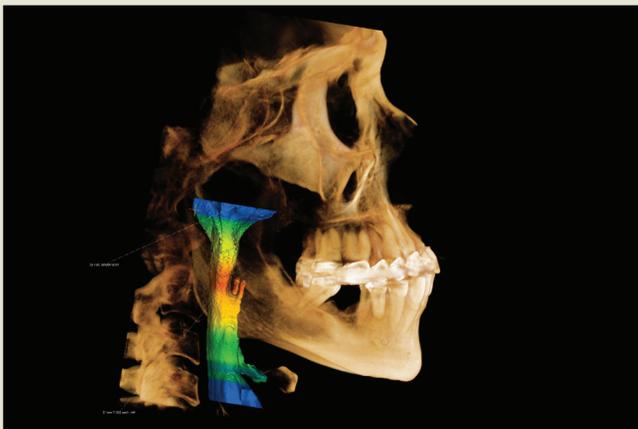


Figure 8. CBCT analysis of the compromised upper airway

tooth number 5 (Figure 7). The patient reports experiencing transient pain from time to time and thought it was from the prior resin filling on tooth number 4, which was done approximately 3+ years ago by a previous dentist. Radiograph shows tooth number 5 with short-filled root canal treatment of a few millimeters. Review of the upper airway CBCT scan reveals a comprised oropharynx, indicative of airway deficiencies contributing to the patient's sleep disorder (Figure 8).

Sleep Screening: The results of the Sleep Disorder Assessment test show a high risk for a sleep disorder (Figure 9).

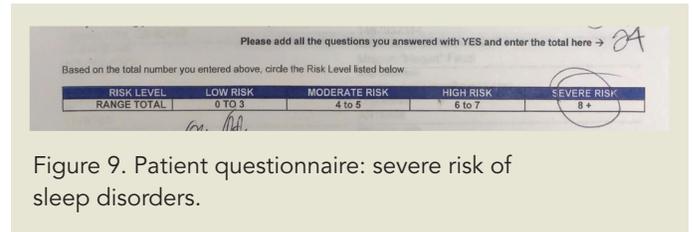


Figure 9. Patient questionnaire: severe risk of sleep disorders.

Prescription for a Sleep Study Test: Given the results of the Sleep Disorder Assessment test, the patient was prescribed an in-home sleep testing device to rule in OSA.

Results of the Sleep Study: The patient's sleep study results revealed she had an apnea-hypopnea index (AHI) of 11 events per hour. An AHI of 11 means that, on average, the patient experienced 11 events per hour, at which time she stopped breathing for 10 seconds or longer at each of these events. The patient was diagnosed with OSA by the interpreting board-certified sleep physician. Treatment recommendations by the physician included surgery, CPAP therapy, or oral appliance therapy.

Addressing the Patient's Chief Complaint

One of the patient's chief complaints was her gum sensitivity. During her clinical examination, we noted the abfractions and generalized gingival recession. The patient's signs and symptoms were consistent with chronic bruxism—a condition in which individuals will have sensitive, worn-out, and decayed teeth.²² In fact, a common side effect may be observed in the periodontal and recession of gum tissue around the collars of teeth, leading to generalized dentition exposure, as well as patient complaints about gum and tooth sensitivity. Given her sleep apnea diagnosis, the condition of her airway collapsibility, and all her other dental comorbidities, the patient was also diagnosed with nocturnal bruxism.

Nocturnal Bruxism

A growing body of research has been exploring the relationship between nocturnal bruxism and OSA.²³⁻²⁵

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Studies have suggested that bruxism is a result of the body protecting itself from airway collapsibility.²⁶⁻²⁸

Based on these findings, the standard of care is to treat the patient for a sleep-related breathing disorder with a U.S. Food and Drug Administration (FDA)-approved sleep appliance, because a night guard might be contraindicated.²⁹

This is important to note, since most clinicians today are providing patients with a night guard when they present to a dental practice with signs of bruxism. Use of an orthotic appliance, however, may cause the reflexes that keep the person's airway open to become dysfunctional. In fact, one research study reported a 4-fold increase in the frequency of respiratory events among patients who wore a night guard and experienced sleep disorders.³⁰ Therefore, caution is advised when prescribing a night guard to a patient who exhibits signs of bruxism, because an increase in respiratory events might, in turn, prevent the individual from reaching the deeper stages of sleep and thus generate a fatigued feeling throughout the day. The consequences of having a very tired person around might be a drowsy driver who gets involved in a fatal motor vehicle accident or an individual who experiences a work-related accident.

A night guard should not be suggested as a first-line therapy for nocturnal bruxers. Instead, it is recommended that patients with bruxism be screened for potential breathing disorders and that an overnight sleep study be conducted in order to determine whether that particular individual is a candidate for a sleep appliance.

Treatment Plan

Once all of the treatment options were discussed with the patient, a comprehensive treatment plan was presented that addressed her main complaint, as well as the more serious issues that were identified during her examination and the diagnosis of OSA.

The treatment plan included correction of her malocclusion, restorations, removal of the infected tooth, and tooth replacement with an implant, while treating the patient's OSA at the same time.

Case Setup and Treatment

The patient's hygiene scaling appointment was followed by a diagnostic workup with clear aligners, which involved use of the ClearCorrect aligner system to resolve the crowding in her lower teeth. The ClearCorrect Flex service was selected for this patient, because single-arch aligner treatment will be initiated on the lower arch, correcting the lower crowding and overjet to make room for the reduction of the overjet in the new fixed bridge on the upper arch (Figure 10). Because of the thin buccal bone on the patient's upper anterior ridge, along with the excessive overjet and visible marginal lingual decay throughout the metal margins of the fixed anterior bridge, a new fixed bridge using nonmetallic zirconia was recommended and subsequently accepted by the patient. By reducing her lower overjet and crowding, the upper restoration will reflect a reduction in overjet, and will achieve better aesthetics and occlusion, thus resulting in an improvement in soft-tissue coordination and the avoidance of any unwanted collision against the upper arch.

Lower-arch aligner treatment was initiated and programmed using the ClearComm software, to achieve



Figure 10. Lower occlusal view



0.1 mm of sequential interproximal reduction in the lower anterior arch at aligner stages 1 and 3 from cuspid to cuspid (Figures 11 and 12). By correcting the lower malocclusions and gaining better anterior coupling, the final upper fixed restorations can be placed in less of an overjet. The ClearComm software was used in order to be able to explain visually to the patient the intended treatment goal and to complete the case with an ideal incisal occlusion of 1-mm overjet and overbite with the new bridge (Figures 13 and 14).

The treatment of the upper arch included extraction of tooth number 5 and removal of the fixed bridge on teeth numbers 6 through 11, with control of any caries. A single retention clear aligner, customized with a virtual upper molar for tooth number 3, was ordered for the upper arch, to be worn by the patient during lower-arch tooth movements over the provisional crowns. Therefore, while the patient's lower-arch malocclusion is being treated with clear aligners, her upper arch will undergo extraction,



Figure 11. IPR staging with virtual molar pontics



Figure 12. Location of 0.1-mm IPR

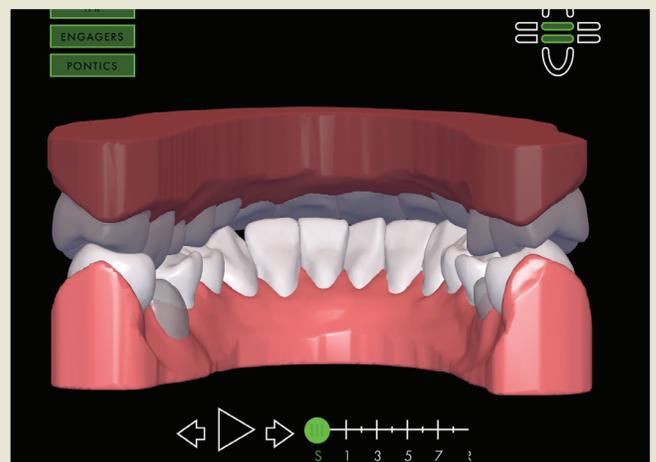


Figure 13. Initial posterior view

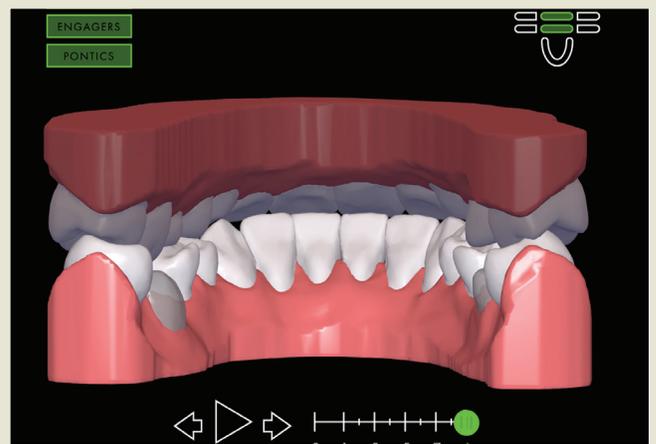
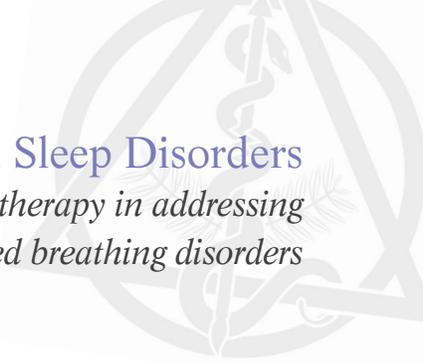


Figure 14. Final posterior view



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Figure 15. Radiograph of extracted tooth #5 with bone

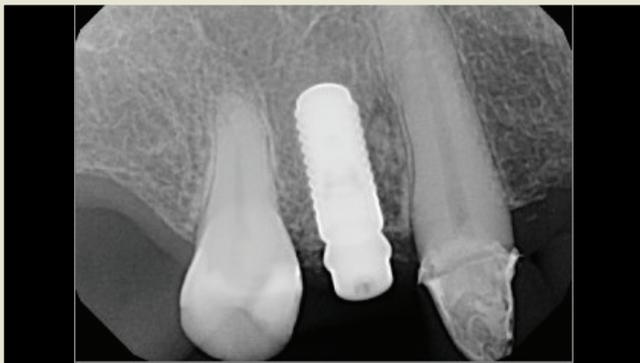


Figure 16. Screw-retained abutment and crown 3 months post-implant placement



Figure 17. Radiograph of implant placement post healing

bone graft, membrane placement, and implant using the Straumann Bone Level Tapered Implant Ø 4.1-mm RC SLActive, followed by a screw-retained abutment with a zirconia crown over the course of 6 months (Figures 15-17). The space created by the missing tooth will be filled with tooth-colored temporary material within the clear aligners in order to satisfy the patient smile line while, at the same time, healing will be occurring prior to implant placement (Figure 18).

As the patient progresses through her treatment, the anterior coupling is improving, and she notices better pronunciation and speech phonetics—both improvements that she finds pleasing. From an anterior view, a noticeable improvement to the lower anterior overjet and soft tissue has



Figure 18. Clear aligner worn during healing of tooth #5 for esthetics



Figure 19. Anterior overjet view mid-treatment

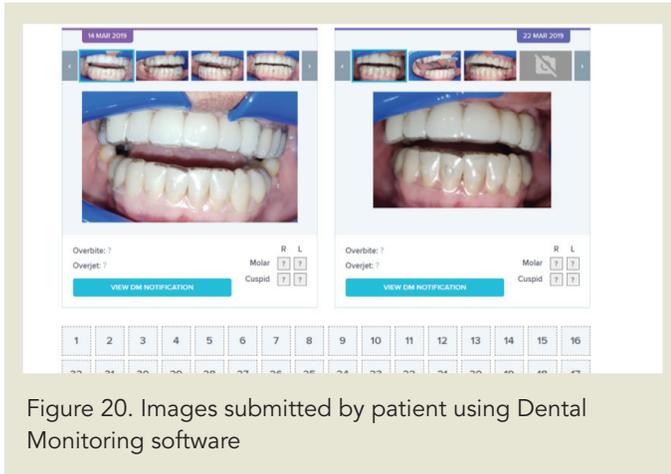


Figure 20. Images submitted by patient using Dental Monitoring software

been achieved, with the patient gaining better incisal occlusion so she can begin the final fixed restoration phase (Figure 19).

The patient was instructed on the use of Dental Monitoring, an artificial intelligence–based application that permits patients to document the orthodontic changes from their phone while allowing the clinician to review, monitor, and guide the patient through clear aligner changes (Figure 20).

Aligner treatment was initiated to also assist with the delivery of the Aligner Sleep Appliance (ASA). The ASA is a sleep appliance that uniquely retrofits over the clear aligners to allow for the orthodontic movements to occur while maintaining the airway patent during the orthodontic treatment phase. Once the malocclusion has been corrected and the patient enters the retentive stage, the ASA will continue



Figure 21. Aligner Sleep Appliance worn by patient

to fit over the retainers for long-term patient management related to her sleep disorders (Figure 21).

Treatment Status

The patient is currently at the retentive stage of her clear aligner therapy. She reports feeling rested and full of energy since she began wearing the ASA. The patient is also pleased with the cosmetic results of her smile.

The patient will continue to wear the ASA over the retainers for long-term care management.

Conclusions

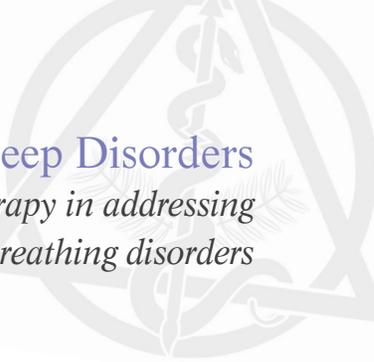
This article highlights the benefits of incorporating a successful sleep medicine screening protocol in order to identify patients who may be experiencing sleep-related breathing disorders.

Knowing the association of malocclusions and other dentofacial comorbidities with sleep disorders will help dental clinicians develop comprehensive treatment plans that will achieve the most successful patient outcomes.

The case presented in this article shows how correction of the malocclusion results in an improvement in the intraoral cavity space. This benefit, in turn, allows the tongue to fit properly within the arches, reducing the chances that the tongue will collapse and block the airway at night. The ASA worn during the clear aligner therapy and retentive stage also keeps the tongue from further collapsing during sleep. The net result is a reduction in the patient's sleep apnea, improved oxygenation, decreased sleep disturbances, and improved quality of life.

By incorporating CBCT into the patient intake workflow, clinicians will be able to identify dental issues that are difficult to see with traditional 2D technology. CBCT is also the most ideal tool for properly evaluating the condition of the entire upper airway and the adjunct structures.

Performing a comprehensive review and analysis of the dental and medical data collected from the patient will yield better revenue opportunities for the practice while, at the same time, achieving the best patient outcomes.



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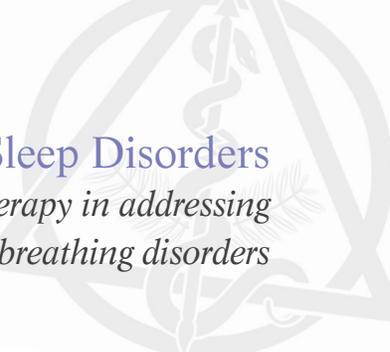
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- When did the American Dental Association (ADA) adopt and publish a policy statement on the role played by dentists in addressing sleep-related breathing disorders?**
 - October 2007
 - February 2007
 - October 2017
 - February 2017
- Which of the following statements best summarizes the ADA policy on sleep disorders?**
 - The ADA encourages dental practitioners to diagnose and treat patients with sleep disorders using appropriate diagnostic equipment.
 - The ADA encourages dental practitioners to diagnose and treat patients with sleep disorders using oral appliances.
 - The ADA encourages dental practitioners to screen and treat patients with sleep disorders using appropriate diagnostic equipment.
 - The ADA encourages dental practitioners to screen and treat patients with sleep disorders using oral appliances.
- Sleep disorders are considered an epidemic by the Centers for Disease Control and Prevention.**
 - True
 - False
- What of the following statements about sleep disorders in the United States is true?**
 - Compared with the rest of the world, the United States has the largest number of informed persons on the dangers of sleep disorders.
 - Millions of individuals in the United States have sleep disorders that remain undiagnosed.
 - Compared with the rest of the world, millions of people in the United States have been treated for sleep disorders.
 - The United States contains the largest number of persons who have been diagnosed with sleep disorders.
- What does CPAP mean?**
 - Continuous positive airway pressure
 - Continuous positional appliance protocol
 - Continuous prognathic airway pressure
 - Concurrent positive airway pressure
- Which of the following statements best describes CPAP?**
 - CPAP is considered the gold standard of treatment for sleep disorders, and most patients prefer this therapy over other options.
 - CPAP is considered the gold standard of treatment for sleep disorders, but most patients do not tolerate CPAP therapy.
 - CPAP is considered an alternative treatment for sleep disorders in those patients who do not wish to proceed with surgery.
 - CPAP is considered an alternative treatment for sleep disorders in those patients who do not wish to proceed with oral appliance therapy.
- What are some signs and symptoms of obstructive sleep apnea?**
 - Snoring and waking up gasping for air
 - Bruxism
 - Excessive daytime sleepiness
 - All of the above
- Which of the following best describes OSA?**
 - The result of nasopharyngeal collapsibility of the lower airway
 - The result of velopharyngeal collapsibility of the lower airway
 - A potentially life-threatening condition
 - A benign condition
- To be diagnosed with OSA, at least how many times per hour does a patient need to stop breathing for 10 seconds or longer?**
 - 3
 - 5
 - 10
 - 20
- Which of the following statements best describes OSA and medical comorbidities?**
 - Cardiovascular disease, impotence, and weight gain are some medical comorbidities associated with sleep disorders.
 - High blood pressure, memory problems and headaches are some medical comorbidities associated with sleep disorders.
 - None of the medical comorbidities listed above are associated with sleep disorders.
 - All of the medical comorbidities listed above are associated with sleep disorders.
- Malocclusion is a sign of a potential sleep disorder.**
 - True
 - False
- Which of the following statements best describes the neck size considerations for possible sleep disorders?**
 - Neck size >15 inches for men and >14 inches for women
 - Neck size >16 inches for men and >17 inches for women
 - Neck size >17 inches for men and >15 inches for women
 - None of the above
- Which of the following lists include some known dental signs of sleep disorders?**
 - Edentulism, tooth crowding, and narrow arches
 - Thrush, tooth crowding, and narrow arches
 - Edentulism, tooth crowding, and thrush
 - Edentulism, thrush, and narrow arches
- Which of the following statements best describes malocclusion and sleep disorders?**
 - Class III malocclusions may prevent the tongue from resting properly at the roof of the mouth, causing the tongue to fall back and block the airway.
 - Crowded teeth may prevent the tongue from resting properly at the roof of the mouth, causing tongue to fall back and block the airway.
 - All of the above statements are correct.
 - None of the above statements are correct.
- To screen patients for sleep disorders, practices should do which of the following?**
 - Refer the patient to his or her primary care provider for further evaluation
 - Refer the patient to a sleep specialist for further evaluation
 - Incorporate screening devices to evaluate all patients
 - Incorporate the use of sleep questionnaires to screen all patients



Clear Aligners and Sleep Disorders

The role of clear aligner therapy in addressing the needs of patients with sleep-related breathing disorders

CE QUIZ

- 16. What is the role played by cone beam computed tomography (CBCT) technology in patients with sleep disorders?**
- Diagnosis of patients with sleep disorders.
 - Evaluation of the upper airway and adjunct structures that may contribute to sleep disorders
 - All of the above
 - None of the above
- 17. CBCT technology is not considered an ideal tool for evaluating the upper airway.**
- True
 - False
- 18. What is the role played by clear aligner therapy in patients with sleep disorders?**
- Clear aligners help patients keep their airway patent.
 - Clear aligners are only worn at night to address sleep disorders.
 - Clear aligners may correct malocclusions associated with sleep disorders.
 - Clear aligners may improve breathing in patients with COPD.
- 19. Patients can wear a sleep appliance at the same time that they wear clear aligner trays.**
- True
 - False
- 20. Sleep appliances cannot be worn over retainers once a patient has completed clear aligner therapy.**
- True
 - False
- 21. Medical services _____ for patients with sleep disorders.**
- cannot be rendered in a dental practice
 - can be billed to dental insurance by a dental practice
 - cannot be billed to dental or medical insurance by a dental practice
 - can be billed to medical insurance by a dental practice
- 22. To achieve the best treatment outcomes for patients with sleep disorders, clinicians should:**
- Diagnose patients with sleep disorders using validated testing equipment.
 - Understand the association of malocclusions and dentofacial comorbidities with sleep disorders.
 - Refer patients to qualified sleep physicians to obtain a CPAP machine because it is considered the gold standard of therapy.
 - Prescribe sleep appliances to patients who are at risk for a sleep disorder.
- 23. Which of the following best describes some benefits of providing sleep appliance therapy?**
- Patients will continue to snore but their sleep apnea will be treated.
 - Patients will stop snoring and their sleep apnea will be treated.
 - Patients may experience a reduction in their sleep apnea, decreased sleep disturbances, and improved quality of life.
 - Patients may experience joint discomfort, but their snoring will be cured.
- 24. Clear aligner trays can be used in which of the following ways:**
- In combination with multiple therapies, such as implants and sleep appliances
 - In combination with braces to address airway deficiencies
 - To splint the airway open when it is compromised
 - To get the patient to tolerate a sleep appliance once the aligner treatment has been completed
- 25. Which of the following statements is true with respect to CBCT scans when treating patients with sleep disorders?**
- The most ideal scan includes the upper airway, the joints, and the nasal cavity.
 - The most ideal scan includes the oropharynx, the joints, and nasal cavity.
 - All of the above
 - None of the above
- 26. Which chairside intraoral physical examination should be performed for evaluation of a sleep disorder?**
- Evaluation of occlusal wear
 - Evaluation of abfractions
 - Evaluation of the uvula
 - All of the above
- 27. Patients with sleep-related breathing disorders may present to a dental practice with which of the following:**
- Nonobstructive sleep apnea
 - Nocturnal bruxism
 - Refreshed sleep
 - Higher level of daytime physical activity
- 28. What is the estimated number of Americans who chronically experience sleep-related breathing disorders?**
- 5 to 7 million
 - 50 to 70 million
 - 70 to 150 million
 - 150 to 170 million
- 29. In the combination aligner and sleep treatment case presented, the Aligner Sleep Appliance was used at which point within the treatment plan?**
- Following completion of restorative dentistry
 - Following completion of aligner treatment
 - At the initial visit, along with administration of the Sleep Disorder Assessment tool
 - In conjunction with aligner and restorative treatment following results of the sleep study
- 30. How often does a patient need to change the Aligner Sleep Appliance while undergoing orthodontic treatment?**
- Every 2 weeks
 - Every 4 weeks
 - Every 6 weeks
 - None of the above

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EDUCATIONAL OBJECTIVES

- Understand appropriate screening protocols for sleep-related breathing disorders
- Understand the correlation between malocclusions and airway deficiencies
- Understand how to provide patients comprehensive treatment options to address sleep-related breathing disorders
- Understand the proper use of clear aligners for combination cases using the Aligner Sleep Appliance
- Understand the benefits of incorporating 3D technology to develop comprehensive treatment plans

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Please evaluate this course using a scale of 3 to 1, where 3 is excellent and 1 is poor.

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