

3-D imaging helps dentists ‘breath easier’ when diagnosing and treating sleep disorders

Author_Steven Olmos, DDS

_For patients, sleep apnea and airway disorders affect aspects of both sleeping and waking lives.

The American Academy of Dental Sleep Medicine (AADSM) explains that obstructive sleep apnea (OSA) occurs when the soft tissue in a person’s throat repeatedly collapses and blocks the airway during sleep. The description of this condition is disturbing to read and potentially devastating to a patient’s health:

“These partial reductions and complete pauses in breathing typically last between 10 and 30 seconds, but can persist for one minute or longer. These pauses can happen hundreds of times a night, leading to abrupt reductions in blood oxygen levels. The brain alerts the body to its lack of oxygen, causing a brief arousal from sleep that restores normal breathing.

The result is a fragmented quality of sleep that often leads to excessive daytime sleepiness. Most people with OSA snore loudly and frequently, with

periods of silence when airflow is reduced or blocked. They then make choking, snorting or gasping sounds when their airway reopens.”¹

The discomfort that these patients face can be alleviated, but diagnosing and treating sleep disorders is no easy task. In recent years, medical professionals have been working with dental specialists to pinpoint and treat these disorders. For me, 3-D imaging is a large part of the success of the treatment plans for this type of patient.

The Practice Parameters of the AASM on the recommended treatment for OSA published in 2005 state that: “Oral appliances (OAs) are indicated for use in patients with mild to moderate OSA who prefer them to continuous positive airway pressure (CPAP) therapy, or who do not respond to, or who fail treatment attempts with CPAP.”

It continues: “Oral appliances should be fitted

Fig. 1_ Total airway volume pre-treatment.

Fig. 2_ Total airway volume with airway appliance. (Images/Provided by Dr. Steven Olmos)

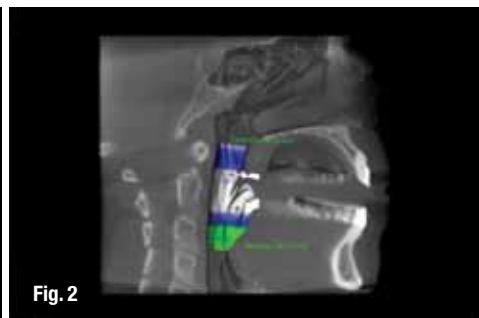
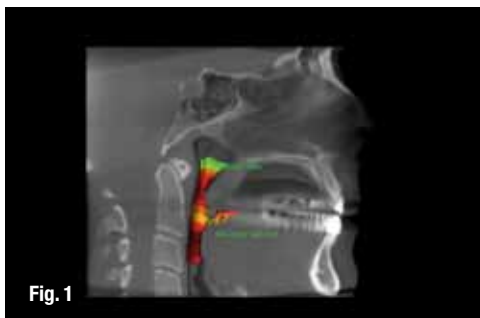
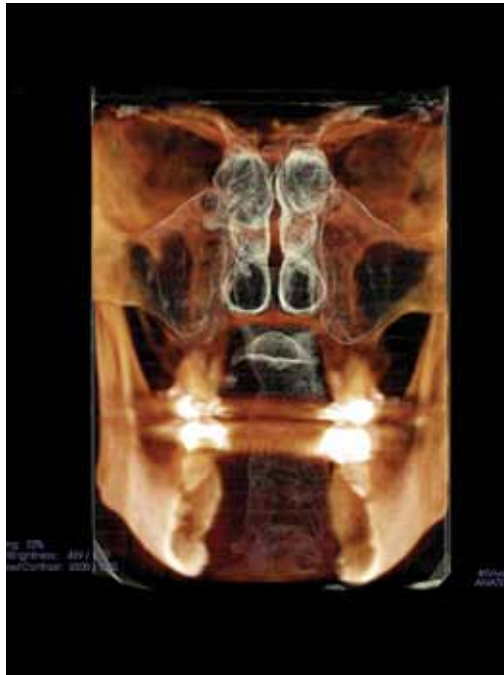


Fig. 3_ Clear inferior turbinates and soft tissue hypertrophy middle turbinates (colored area)



There are many causes of breathing disorders, such as impacted nasal passages from a deviated septum, a skeletal morphology problem, or hypertrophy of the turbinates that limit nasal airflow, resulting in a sinus filled with thick mucous. Without a CBCT scan, these may go undetected.

A non-draining sinus can lead to polyps, and then to mouth breathing that results in jaw and joint-related problems, tongue scalloping or tori, facial pain, and worn and broken teeth. For some of these patients, the problems can be alleviated by oral appliances.

The information captured by a CBCT continues to assist me even after appliance placement. I check every patient to make sure that the temporomandibular joint is orthopedically stable and to see that the jaw is not dislocated in the attempt to open the patient's airway. I screen the placement of these appliances with CBCT because the scan can focus in on the temporomandibular joints. The TMJ visualization tool serves as a virtual study model.

If the patient needs surgical alteration by an ENT, I can send the data electronically on CD or in print form, so that the surgeon can benefit from the scan as well.

The following case illustrates how a CBCT helped me to give the patient a chance at a more comfortable, healthy life. The female patient arrived with no real symptoms of a sleep disorder. She was referred by her dentist with a constantly changing bite, ear pain, tinnitus, jaw-joint noises, buzzing, and ringing in the ears.

To combat these symptoms, she had been taking medications, such as Pepcid for heartburn (a co-morbid symptom of OSA). Her teeth were crowded and worn, and her jaw was inflamed. She had scalloping of the tongue, which is 70 percent predictive for OSA because the tongue pushes against the lingual surfaces of the lower teeth trying to maintain an airway.

Her pain could have been referred from a number of hidden anatomical issues that were involved with the breathing process, particularly — the Sternal Chronic Muscle (SEM) or the muscles that attach to the Styloid Process.

Jaw and airway tests done in conjunction with CBCT imaging showed that what was first thought to be nasal problems was really soft tissue swelling that was blocking the airway. From that scan, she happily discovered that surgery was not needed. The problem could be corrected by an appliance that she could wear at night to treat her while she took further steps to investigate her apnea.

In 8 to 10 weeks, all of her chief complaints were resolved by nighttime appliances of my design. After implementing the new appliance, a follow-up scan showed a significant increase in the total volume and minimum constriction of her airway, with her hypop-

_about the author cone beam



Steven Olmos has been in private practice for more than 30 years with the last 20 years devoted to research and treatment of craniofacial pain, TMD and sleep disordered breathing. He obtained his DDS from USC School of Dentistry and has continued his education with more than 4,000 hours dedicated to research and treatment in the fields of mandibular orthopedic dysfunction and sleep disordered breathing. Olmos is the founder of TMJ & Sleep Therapy Centres International with 13 licensed centres worldwide dedicated exclusively to the diagnosis and treatment of these disorders. His protocols are an assimilation of his knowledge base, which is reflected by certifications in all philosophies of treatment both medical and dental. Olmos is an adjunct professor at the University of Tennessee School of Dentistry and he and has been honored for his contributions to dentistry with fellowship in the Academy of Dentistry International.

by qualified dental personnel who are trained and experienced in the overall care of oral health, the temporomandibular joint, dental occlusion, and associated oral structures."²

AADSM research shows that, "More than 18 million Americans have sleep apnea, and many are not receiving treatment."³ For such patients, there is hope. After a board-certified sleep medicine physician first provides a diagnosis and suggestions for an effective treatment approach, dental specialists can help to treat sleep and airway disorders with innovative ways to provide treatment, such as oral appliance therapy or surgery.

Before embarking on any treatment for airway related conditions, the clinician must be armed with detailed information—and CBCT imaging provides just that. While working with these types of patients, I have seen that airways, craniofacial pain and jaw problems are often related. Maintaining three points of patency—in the nasal airway, the soft palate, and the oropharynx or base of tongue, is essential to proper treatment.

These three points can be seen on a 3-D scan. My CBCT, (i-CAT®, Imaging Sciences International), comes equipped with Tx STUDIO™ software that has a tracing tool for analyzing airway anatomy. This tool makes it possible to measure total airway volume and maximum constriction. The constriction values of the airway volume can be automatically color-coded for more apparent diagnosis.

This is also very helpful for patient education because when patients see the 3D images of their own airway, their exact condition and need to treat it become very apparent.

nea index (HI), reduced from 19.5 to 1.4 – anything less than 5 on this scale, used to assess the severity of OSA, is considered normal.

We established stability, resolved her complaints, and did not further change the occlusion. In great part due to CBCT imaging, we treated her apnea and were able to avoid surgery.

Before I implemented i-CAT imaging in my office, I did not have enough details from other imaging methods to view the locations of the obstructions and the areas that needed correction. Because some patients have multiple overlapping conditions, without the information from a CBCT, it is possible to be unaware of why patients' conditions are not improving. This can lead to frustration for both the doctor and patient.

That is why a 3-D scan is so important for screening both before and after treatment. The importance of understanding anatomical relationships in sleep and breathing problems will make a 3-D scan the standard of care for diagnosis and treatment of sleep and airway problems.

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