

# Airway Management in Restorative Dentistry

Approaches to sleep apnea continue to evolve

Janene Mecca

A young woman visits her dentist because her veneers keep falling off. During the initial evaluation, the dentist realizes that she also suffers from sleep apnea and temporomandibular joint dysfunction (TMD). A hodgepodge of restorative work performed over the years has closed her vertical dimension and greatly reduced her airway space. After a full-mouth restoration to reopen her vertical dimension, the patient's sleep, energy, facial esthetics, weight, and overall health drastically improved; after 5 years, her menstrual cycle even returned.

Cases like this illustrate that the problem of obstructive sleep apnea (OSA) still looms large in the United States and can be addressed by restorative interventions. According to the American Sleep Apnea Association, 22 million Americans are estimated to be suffering from OSA, leaving them at risk for conditions like cardiovascular problems, obesity, type 2 diabetes, depression, etc. Although the continuous positive airway pressure (CPAP) machine is still the gold standard for the medical treatment of apnea, dental interventions are, for now at least, considered the next best thing. In recent years, the fabrication of nightguards, splints, and other oral appliances has been seen as a source of financial opportunity for many dentists and laboratories. However, the way that dentistry approaches the issue of sleep is evolving, specifically, into a field known as airway management.

"Dentistry has this wonderful opportunity to start discovering people with airflow obstructions early," says Jeffrey S. Rouse, DDS, a member of Spear Education's resident faculty, an adjunct assistant professor of prosthodontics at the University of Texas Health Science Center, and a private practitioner in San Antonio, Texas, and Seattle, Washington.

"When we start to see malocclusion, it can indicate a limited ability to breathe through the nose. That is where everything begins. You must be able to breathe through your nose in order to function in a healthy state during your lifetime."

Whether or not your laboratory fabricates oral appliances to treat bruxism or OSA, all dental technicians should be aware of emerging theories, lines of treatment, and even ways to prevent airway obstruction in the mouth. Because dental technicians work so closely with impressions and models and may see the symptoms of OSA on the teeth, they can provide clinicians with valuable information regarding airway management.

As the awareness of airflow issues in dentistry increases, it will become crucial that dentists know how to recognize and address them. "The success of your treatment can depend on the risk factors that patients have," says Tracey Nguyen, DDS, owner of Lansdowne Dental Care in Leesburg, Virginia. "If you ignore that, your dentistry will fail at some point." Another factor is liability. "In the future, dentists will not be able to do a restorative case without looking at the patient's airway," says Michael Gelb, DDS, MS, owner of The Gelb Center, New York, New York. "Well, they could, but they would risk a lawsuit."

## **The Causes, Signs, and Symptoms of Airway Obstruction**

Many dental professionals interested in airway management agree that the lack of enough intraoral space for the tongue can contribute greatly to a patient's apnea. "It comes down to how massive the tongue is within that space," Nguyen says. "It will either fit comfortably inside your teeth, or it will fall to the back of your throat or outside of your mouth. If it doesn't fit comfortably away from the airway, the tongue will push the jaw and everything forward, including teeth Nos. 8 and 9, and can eventually damage restorations there. I had an apnic patient whose implants in sites No. 8 and No. 9 snapped off at the base, not due to restorative problems, but because of a functional issue caused by not enough intraoral volume," she explains. "I later found out that this patient had severe sleep apnea and was using a CPAP machine, but his apnea was not under control. I restored Nos. 8 and 9 again, but now I'm managing his airway with oral appliance therapy in addition to the CPAP machine."

How occlusal problems develop in humans is a topic of debate in the medical/dental community, specifically centering on genetics versus environment. "When I started, dentists assumed we were working against genetics all of the time," Rouse says. More recently, scientists have noted how perfect human teeth were centuries and millennia ago. The theories as to why malocclusion has developed run the gamut from the advent of agriculture changing our diet, to the decline in breastfeeding, to changes in resting oral posture.<sup>1-3</sup> It could very well be a combination of such factors that are affecting the outcomes of our genes. "Over time, we're recognizing that the environment can alter the genetic pathway pretty significantly," Rouse says. "The less we find that the cause is genetic, the greater the opportunity we have to dramatically improve patients' conditions for quite some time."

Both the American Dental Association and the American College of Prosthodontics have urged dentists to learn more about their patients' medical histories and any current health issues or symptoms, especially as they may relate to OSA.<sup>4,5</sup> That is the first step. Unfortunately, early characterizations of the typical OSA patient as a middle-aged, obese man have contributed to a degree of tunnel vision by medical doctors and dentists alike.

"That's really the low-hanging fruit," Rouse says. "The real issue is where that person came from. How did he or she get to that point?' In most people, a slow evolution of airflow-limited breathing events breaks the system down over time. The symptoms will vary depending on where the patient is in this evolution."

Upper airway resistance (UAR) is perhaps one stage of that progression. Although an OSA diagnosis requires at least five recorded events during which a patient stops breathing for 10 seconds each, a person with UAR may stop breathing for only 3 to 5 seconds at a time but do it many times each night. "New studies document how destructive the occurrence of multiple minor sleep fragmentations can be," Nguyen says. "Upper airway restriction may be triggering sympathetic activity like bruxing, TMD, chronic fatigue, or even fibromyalgia. By dismissing these issues in our young, 'healthy-looking' patients because they don't fit the OSA patient stereotype, we're keeping ourselves from seeing the bigger picture and helping more people."

## **Do No Harm:How to Avoid Impeding the Airway**

"Dentistry as a whole can have an impact on the airway that is either

positive or negative," Rouse says. Dentists need to be aware of the consequences of what they put into or remove from their patients' mouths. Creating conditions that lead to a restricted airway can be just as easy as further restricting the airway of a patient who already suffers from OSA.

First and foremost, considering the airway as the primary concern when treatment planning is critical. "Today, every treatment planning decision should start with the question: Does this patient have an airway issue?" Rouse says. Gelb agrees: "Airway-first treatment planning trumps everything." Having that critical piece of knowledge will help inform the entire treatment plan and approach of the dentist and restorative team. To address this, many dentists are adding questions about sleep apnea or snoring to their patient questionnaires.

Although there has been little study of such treatments on a large scale, all dental professionals concerned with airway issues can agree that the size of the intraoral space matters. "Narrowing the arch or constricting the arch is a major flaw," says Paul Federico, MDT, owner of Federico Dental Lab in Staten Island, New York. This is especially important when fabricating prosthetics and to avoid overcontouring.

"In the past, I had patients complain that their dentures were too big or that they felt like their dentures were choking them," Rouse says. "What they were actually saying was that the way the denture was designed was really impinging on their airway. Now, we need to consider the vertical dimension, the intraoral volume, and how adding acrylic or other material could impinge on this volume."

Loss of intraoral space can happen in other ways as well. One dental treatment coming under scrutiny is the routine extraction of bicuspids

and orthodontic retraction of the arches, which definitely narrows the upper archway. Some dentists are quite vocal about the damage that such treatment causes by restricting intraoral volume and thereby impinging on the airway. Orthodontist William Hang, DDS, MSD, owner of Face Focused, a private practice in Agoura Hills, California, is one such practitioner. For more than 20 years, he has specialized in correcting what he calls the "Extraction Retraction Regret Syndrome" by reopening spaces where permanent teeth had been removed for orthodontics and restoring those spaces with implants. This approach, he says, is a way to provide facial balance and treat sympathetic conditions like TMD, restricted airway, OSA, chronic pain, etc.<sup>6</sup>

Like Hang, Victor Avis, DDS, owner of The Avis Al-terna-tive in Staten Island, New York, takes this approach (ie, reopening extraction spaces to create tongue space, improve airway, and relieve constricted bites) for some of his own patients.

"There aren't many of us doing this—dozens rather than hundreds," he says. "However, we see how reopening those spaces is having a tremendous impact on the quality of patients' lives and airway health. Widening the arches 16 mm to create tongue space and overjet can make such a difference in pain patterns."

Although the dental establishment may largely still be committed to extraction/retraction-based orthodontics, it is possible that such practices may wane on their own due to the availability of newer methods and technologies. "Tray-based orthodontics, such as Invisalign, actually do a fairly good job of expanding the arches," explains Richard A. Sousa, DDS, a dentist and dental technologist who owns East Hills Dental Associates in Roslyn Heights, New York. "In traditional orthodontics, using wires and rubber bands makes it easier

to constrict the arch, which can result in less space for the tongue. Now, tray-based orthodontics can expand the arches more easily and help maintain or improve the airway. I see orthodontics rapidly moving in that direction." If this occurs, and if restrictive orthodontics is at least a factor, it's possible that the prevalence of OSA and airway issues may prove to be a generational problem-mainly affecting the age group that had retractive orthodontics-that will fade as orthodontic approaches change.

Both Avis and Hang are proponents of the theories and practices of orthotropics, developed by John Mew, BDS (Lond). Mew's approach, which posits that poor resting oral posture is a major cause of malocclusion, has been a controversial topic in dentistry for more than 35 years. Correct resting oral posture involves breathing through the nose with the mouth closed, the tongue resting on the roof of the mouth, and the teeth touching. The essence of the argument is that the impact of the musculature and soft tissues on oral and facial development, the airway, and restorations cannot be overemphasized.

Avis has no doubt. "A full-mouth reconstruction can go into the mouth perfectly, but it does not remain pristine because it has forces working on it," he says. "Restorations break down and fail because they exist in a dynamic environment. Dysfunctional muscle activity affects teeth and restorations on a chronic basis. Therefore, it is critically important to understand the root cause of muscle dysfunction and incorrect oral posture and retrain both if we are to optimally manage the forces on teeth, implants, and dental restorations."

To this end, it is no surprise that Avis employs a full-time myofunctional therapist at his practice. "There needs to be more consideration of the soft tissues, anatomy, and airway and their

influence on occlusion, contacts, parafunctional habits, caries, and attrition," Avis says. He recommends that dentists who work more with the hard surfaces in the mouth educate themselves on facial musculature. The same, he says, goes for myofunctional therapists, who should learn more about the teeth and skeletal issues. "We all work in the same dynamic environment: the mouth," he says. "We need to learn more about each other's specialties in order to understand the bigger picture of what we're doing in the mouth and how we can best help our patients."

## **Management of Existing Airway Issues**

According to both the medical and dental communities, CPAP is always the first approach to treating OSA because its efficacy is well-documented.<sup>5,7</sup> Nonetheless, many patients cannot tolerate using a CPAP machine, and this treatment is notorious for its lack of compliance. Because this problem may very well start in the mouth, dentistry offers an alternative method that treats OSA more directly.

The use of oral appliances, or splints, to help treat OSA has experienced a boom over the last decade. Recently taking the lead as the most recommended dental approach, sleep appliances focus on opening the airway by repositioning the mandible. There are five major types of splints that offer a variety of protrusion, vertical dimension, and guidance. Selecting which appliance will work best for each type of patient can be problematic, with dentists often guessing at what might improve airflow. "Studies indicate that 50% of nightguards have been shown to close the airway and worsen snoring and apnea," Gelb says. Nguyen adds that "there are so many kinds of appliances, and each one has a different effect on where the joints are and where the



airway is. Some people with a high-angle mandible cannot tolerate an open vertical dimension because we are actually closing that angle and the airway."

Other dentists recognize this problem as well. "Opening someone's vertical dimension absolutely impacts their airway, so it would be nice to know if that impact is negative or positive before we begin restoration," Rouse says. With that in mind, Rouse worked with Frank Spear, DDS, MSD, and Gregory Kinzer, DDS, MSD, to develop a process they call the Seattle Protocol. "Scientific support exists for each type of splint," Rouse says, "but not everyone can use the same kind." By utilizing provisional splints with different variations of vertical dimension and protrusion, this process reduces the amount of time, money, and work invested in finding the ideal treatment approach for each person.

Although the Seattle Protocol focuses on finding the correct kind of splint, for Rouse, that is not the end of the road. "Ultimately, a splint is a bandage. We never leave the patient in a splint," he says. Rather, the patient's choice of splint helps the dental team consider what kind of further treatment could help the patient acquire the benefits of the splint permanently. The Seattle Protocol is not a means to fabricate the perfect bandage; it is a diagnostic tool that ideally, will help the dentist develop ways to resolve the patient's problem rather than continue to manage it. "We provide a resolution strategy to the patient afterward," Rouse says, "which may include elements such as myofunctional therapy; orthodontic arch widening; ear, nose, and throat surgery; restorative dentistry; weight loss; diet change; etc."

## **Here to Stay**

One thing that can be assured is that airway management in dentistry is not going away, and it will likely play a bigger and bigger role in the future.

"This is not a fad," Rouse asserts. "I started looking at this issue years ago, and it continues to become apparent through research that what we're saying is correct. It has almost become incontrovertible: This is a real problem and we can do something about it. Some dentists want it to go away; they want to continue practicing 'comfortable' dentistry, and this new approach makes them uncomfortable. But this is not going away."

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