The role of the dental team in the management of the patient with sleep apnea

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The evolution of the dental hygienist’s role in the assessment of a client’s oral health from a singular approach to a collaborative multidisciplinary approach is evident in the treatment of clients with sleep disorders. Knowledge of the variations in sleep disorders, medications, treatment needed, as well as the various appliances will be vital to the dental health-care providers. Pagel (2012) says that by 2015, 40 percent of the U.S. population will have some form of sleep disorder; 18 million Americans have sleep apnea, which affects all ages, both sexes and may be genetic. The most prevalent form occurs in 4 percent of middle-aged men and 2 percent of middle-aged women.1 As with all medical conditions, early detection and baseline data will aid in monitoring changes in the patient’s health and providing useful information in treatment planning and intervention. Sleep apnea in the past has been viewed as most typically related to snoring; however, there are different types of sleep apnea disorder. The most prevalent and known is obstructive sleep apnea syndrome. Another type, central sleep apnea, is less common. A third type, complex sleep apnea, combines both the obstructive and central types.

What is obstructive sleep apnea syndrome? Obstructive sleep apnea syndrome (OSAS) is a common, but underrecognized syndrome. Another type, central sleep apnea, is less common. A third type, complex sleep apnea, combines both the obstructive and central types.

Obstructive sleep apnea syndrome is caused by the brain failing to signal the breathing-control muscles to work. Central sleep apnea is caused by the brain failing to signal the breathing-control muscles to work. Central sleep apnea is caused by the brain failing to signal the breathing-control muscles to work. Central sleep apnea is caused by the brain failing to signal the breathing-control muscles to work. Central sleep apnea is caused by the brain failing to signal the breathing-control muscles to work. Central sleep apnea is caused by the brain failing to signal the breathing-control muscles to work.

What is complex sleep apnea? Complex sleep apnea is a combination of obstructive sleep apnea and central sleep apnea. Some patients with obstructive sleep apnea develop central sleep apnea while on treatment with continuous positive airway pressure (CPAP).2 This article focuses on obstructive sleep apnea and how it relates to the oral cavity. 

Cause of obstructive sleep apnea syndrome

Tongue muscles, soft palate and uvula relax and/or sag (Fig. 2), causing snoring, difficult breathing and breathing cessation. Obesity, alcohol consumption and sleep medications can exacerbate the condition. Snoring and gasping for air causes the person to wake several times a night, preventing the person from getting the proper sleep needed to function. Sleep apnea is often present in people who are overweight, have physical abnormalities such as a deviated septum or have other abnormalities of the nose or throat. The sleeper tries to breathe, creating a tighter seal, which decreases oxygen flow to the brain. The sleeper awakens gasping for air.

Effects and oral effects

Studies on sleep apnea are fairly new, and diagnostic evidence is evolving. Snoring is one of the symptoms of obstructive sleep apnea syndrome; however, not all individuals who snore necessarily have OSAS. Friedlander states, “Even when the airway is patent, there are respiratory events that occur. These events are often quiet and can easily be overlooked.”

Signs and symptoms of OSAS while sleeping include drooling, xerostomia, restless behavior, sleepwalking, frequent urination and significant daytime sleepiness. Patients may experience decreased concentration, difficulty concentrating, fatigue and insomnia. Other signs can include gastrointestinal reflux disease (GERD), irritability and sleepiness throughout the day. Coughlin states, “If OSAS continues to be untreated or it is never diagnosed, the sleeping disorder may elevate blood pressure and contribute to potential for mortality increases.”

What to look for

Maggiolo says, “The population with OSAS is a heterogeneous group, and there is a wide range of physical attributes. Not all patients with OSAS have all of these physical features.” The most common orofacial characteristics encountered include a retrusive mandible, narrow palate, large neck circumference, long soft palate (which leads to dentists being unable to visualize the entire length of the uvula when the patient’s mouth is open wide), tonsillar hypertrophy, deviated nasal septum and relative macrognathia.

Potential outcomes of non-treatment

Patients with OSAS have interrupted sleep patterns because the obstruction of airflow causes prolonged interruptions in their breathing while they sleep (up to 40 seconds). Because the condition can lead to a reduction in oxygen in the blood stream, a host of medical complications can occur. Individuals with obstructive sleep apnea can experience worsening snoring, which can be caused by vibration of the partially collapsed soft palate as air passes. Respiratory events, which can deter certain stages of non-REM and REM sleep, contribute to sleep fragmentation and unrefreshing sleep.3 Because of the lack of sleep, an OSAS sufferer may have difficulty concentrating and staying awake during the day. When sufferers sleep on their back, gravity pulls the jaw and tongue down and back. This causes the mouth to open and the tongue to drop back into the airway, narrowing the air passage.

Treatment

Oral devices and surgical intervention are the procedures used to treat OSAS. An oral appliance (Fig. 4) is a small acrylic device that fits over the upper and lower teeth or tongue (similar to an orthodontic retainer or mouth guard). This device slightly advances the lower jaw or tongue, which moves the base of the tongue forward and opens the airway. This improves breathing and reduces snoring and apnea. The appliance is fabricated and customized for each patient by a dentist experienced in the treatment of snoring and sleep apnea. The appliances are comfortable and well tolerated by patients. Appliances are easy to place and remove, easy to clean and are convenient for travel.

Non-surgical treatments are available, including positional therapy

The two main categories of oral appliances currently in use are the mandibular advancement devices (MAD) and the tongue retaining devices (TBD). The mandibular advancement device, made of acrylic materials, are custom fabricated for each patient. The impression for the acrylic devices can be made in the dental office for lab fabrication. The devices fit comfortably over the upper and lower teeth, positioning the lower jaw slightly forward, advancing the tongue and soft tissues of the throat to open the airway. Some of the “repositioners are designed to hold the mandible
Dentists and hygienists should be familiar with the medications being used by such patients, should be included in the medical history in the patient's chart. This will ensure the dental team is aware of any changes in the oral cavity and is able to make appropriate course of treatment plans, including restorative treatment, when necessary.

Surgical treatments
Surgery is usually done in severe cases of OSAS or as an alternate or last-resort procedure. The main surgical treatments offered for OSAS often target the anatomical areas of the posterior mandible. The mandible is expected to occur. Treatment is designed to enlarge the posterior opening to a minimum when sleeping. The degree of vertical and horizontal changes that occur. One of the most common effects therapeutic treatment needs to be suspended in these patients, should be included in the medical history in the patient's chart. This will ensure the dental team is aware of any changes in the oral cavity and is able to make appropriate course of treatment plans, including restorative treatment, when necessary.

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Introduction
With the widespread use of the rotary NiTi instruments, matched taper gutta-percha (GP) cones (of greater tapers) were developed to make root canal obturation techniques easier, more predictable and improve quality. Nowadays many manufacturers commercialise matched taper GP cones for use to be used with a specific instrumentation technique. As a consequence, not only the single cone tapered regaining popularity due to the fact that single matched cone could now produce a satisfactory three-dimensional fill; also warn vertical techniques gained advantages from the use of a matched master cone, by reducing the risk of voids or gaps inside the filled endodontic space.

However, the greater amount and variability in design and dimensions of commercially available NiTi instruments and GP cones of greater tapers can easily cause confusion among practitioners, especially if they use instruments and cones of different brands. If selected gutta-percha cones do not precisely match the used NiTi instruments, the whole concept fails. Furthermore, if the cones do not reach the desired working length and/or don’t fill the apical preparation precisely.

In order to appreciate how matched GP cones should work, clinicians need to understand the differences in sizes, tapers, designs and manufacturing processes of these products. Even if these factors are usually taken into account when a manufacturer produces matched GP cones to be used with a specific instrumentation technique, the goal of the present paper is to discuss all these variables and give clinicians a better understanding of the possible clinical problems they may encounter in the cone fitting and practical solutions to solve them.

Sizes, tolerance and manufacturing of gutta-percha cones
Traditionally, GP cones are hand rolled, a manufacturing process that is not very precise and consistent. Therefore, according to ISO standards the tolerance allowed for GP cones is 0.05 mm, much bigger than the tolerance allowed for endodontic instruments produced by grinding or twisting (0.02 mm). This has always been a problem in endodontics and it explains why correct fitting of the master cones in all techniques (single-cone, lateral condensation, warm vertical condensation, System B continuous wave of obturation) is always described as a fundamental step in the procedure.

With the traditional ISO .02 tapered cone, the problem mainly related to the lack of precision of tip of the GP cones. Therefore, GP tips needed to be manually adjusted to fit the apical preparation with a good retention (“tug back”), to avoid under filling and/or overextension of cones through the apical foramen.

The same procedure was needed for non-standard gutta-percha cones with feathered tips. This is why calibrated or specific instruments to precisely cut gutta-percha cones were invented and commercialised (1). With the introduction of gutta-percha cones with greater tapers the problem is not only related to the tip sizes, but also to the taper.

Therefore, these GP cones can be divided in two categories: uniform and non-uniform taper. The first ones are usually commercialised as .04-.06 tapered cones, while the second ones are usually commercialised with a brand name related to a specific instrumentation technique (i.e. TF cones, TFA cones, etc.).

Tip sizes and tapers of NiTi instruments
Even if some instruments have a non-uniform taper, the great majority of endodontic NiTi rotary instruments have a uniform taper, and techniques are designed to create at least a .04/.06 tapered preparation.

This is why GP cones of greater tapers are usually commercialised in .04 and .06 tapers. However, NiTi instruments having the same nominal size and taper may not have the same dimensions and consequently not create an identical root canal preparation. Differences can be found between any NiTi instrument with a traditional 16 mm working length and any with a reduced working length. NiTi instruments with a shorter working length are nowadays widely used since many canals are actually not longer than 10 mm from orifice to apex; a shorter working length creates less stressfull instrumentation by reducing taper-lock and torsional stress in the biggest part of the instrument with a lower operative torque, efficiency and safety are more easily improved. Nevertheless, instruments with a shorter working length need GP cones with the same design and dimensions, if clinicians seek perfect matching between prepared canals and obturating materials.

Matching TF/TFA instruments with GP cones
The differences in dimensions previously described between K3XF and TF cones can be found between .04-.06 GP cones and TF/TFA GP cones. The first 9.10 mm are identical, but in the coronal part the .08-.06 GP cones are much wider (Fig. 2). Therefore, if clinicians try to use these cones in a 10 mm (or more) root canal prepared with TF/TFA, the GP cone probably won’t get quite enough working length, because the greatest dimensions of the cone are in the coronal part; it could be defined as “grip lock”.

This is a different problem from those experienced by dentists in the past, mainly related to the cone fitting in the apical part, and consequently needing a different approach.

Choosing a smaller tip size cone may not solve the problem, while choosing a smaller tapered cone may significantly increase the risk of intrageneric errors like under-filling and/or overextension of the cone through the apical foramen, because the tug-back in the coronal part does not allow correct apical cone filling.

Therefore the best and easiest solution is to choose TF/TFA gutta-percha cones that precisely fit the root canal preparation achieved by the TF/TFA instruments and allow ideal three-dimensional filling and good apical tug-back. In the alternative, a K3XF user could use both types of cones (the .04-.06 cones and TF/TFA) because they will both nicely fit the root canal preparation in the apical and middle thirds.

Additional clinical tips for TF/TFA users
So far, dimensions and sizes have been discussed to help clinicians to understand problems in matching instruments and cones.

However, there are also clinical ways to try to solve problems that can be encountered during these procedures. These are tips that can be useful not only with TF/TFA but with many instrumentation techniques.

Create more coronal flaring. TF/TFA are very efficient instruments and very good at lateral dissection. They are ideal instruments for all techniques that require breakdown and/or circumferential filing.

Therefore, if a GP cone does not perfectly match the root ca-