DENTISTS ARE TRAINED TO SAVE TEETH

SLEEP DENTISTRY SAVES LIVES

It has been estimated that approximately 90 million people in North America suffer from insomnia, snoring or sleep apnea. Dentists see these patients on a regular basis in their practices and therefore have an opportunity to diagnose and treat these patients with oral appliances when that is determined to be the treatment of choice.

In the January 2006 issue of the medical journal, **Sleep**, the American Academy of Sleep Medicine (medical sleep specialists) issued guidelines stating that for patients with mild to moderate OSA (Obstructive Sleep Apnea), the oral appliance was the number one treatment option. These guidelines also mentioned that the oral appliance was a viable option for patients who do not respond to weight loss or have tried the CPAP device and were unable to tolerate it.

SNORING **INSOMNIA**

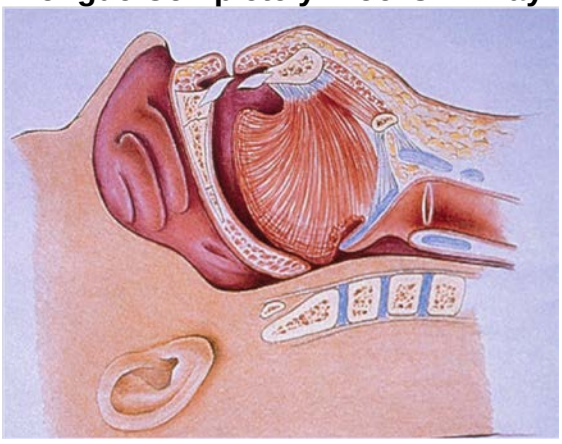
For this serious sleep disorder, there are basically three treatment options:

1. Oral appliances
2. CPAP (Continuous Positive Air Pressure)
3. Surgical intervention

The majority of patients who come to my office are either encouraged to seek a solution for their snoring problem or because they were diagnosed with sleep apnea (OSA) and were unable to wear the CPAP device. The statistics on the success of the CPAP device vary greatly according to what articles you read, but the consensus is that approximately 60 – 70% of patients are not wearing it after one year. This means there is a tremendous opportunity for dentists to try and relieve the snoring and OSA with oral appliances.

The diagnosis for OSA is made using an AHI (Apnea – Hypopnea Index). This is made during an overnight sleep study in a hospital or private sleep clinic. The sleep study is known as a PSG (polysomnogram). The number of apneic and hypopnic events are recorded as follows:

SLEEP APNEA
Tongue Completely Blocks Airway



APNEA **A *cessation of breath for 10 seconds or more***

HYPOPNEA ***The blood oxygen level decreases 4% or more***
Cessation of breath for less than 10 seconds

MILD SLEEP APNEA (OSA)	***5 – 15 events per hour***
MODERATE SLEEP APNEA (OSA)	***16 – 30 events per hour***
SEVERE SLEEP APNEA (OSA)	***More than 30 events per hour***

It is important to distinguish between mild, moderate and severe OSA. Patients that are diagnosed with severe OSA should be encouraged by the dentist and sleep specialist to wear the CPAP device since this is considered to be the gold standard for the treatment of severe OSA. The CPAP device delivers oxygen to the patient through a mask which fits over the nose, or over the nose and mouth, via an air compressor and a humidifier. The CPAP device is effective in opening the airway as the air pressure is gradually increased during the follow-up sleep

study (PSG). The air pressure successfully displaces the tongue, uvula and soft palate and allows an adequate amount of oxygen to enter the lungs.

When the patient wears the CPAP and the air pressure is correct, it is extremely effective in eliminating OSA. Patients that are happy with their CPAP devices should not be encouraged to replace them with oral appliance therapy. Oral appliances are mainly to be used for patients who cannot tolerate the CPAP device or who have mild to moderate OSA.

Patients will sometimes ask you about oral appliances that they see advertised on the internet. Most of these appliances are a “boil and bite” type and put the jaw in only one position. They cannot be adjusted and are often ineffective. The other important fact is that one device that is advertised, called “Pure Sleep”, clearly states that it is not designed to treat patients with TM dysfunction or sleep apnea. The company is correct. No one can legally treat sleep apnea unless an diagnosis has been made by a medical professional, usually a sleep specialist. Therefore, the majority of patients do not quality for these internet devices.

After my patients are properly educated, they are not interested in any appliance that will not solve their serious health issue, which is obstructive sleep apnea. My patients who have tried these appliances tell me that they are not nearly as comfortable as the custom oral appliances fabricated for them at our office.

The diagnosis of OSA can only be made by medical practitioners such as sleep specialists or E.N.T. specialists. Dentists have one of the solutions for treating this medical disorder but must learn to work with their medical colleagues to make the system work for the benefit of the patients. OSA is an extremely prevalent disorder with some serious health consequences.

Some facts that health care professionals need to be aware of include the following:

Co-Morbidity Correlations with Obstructive Sleep Apnea

- Hypertension 40 – 50%
- Coronary heart disease 34%
- Congestive heart failure 34%
- Diabetes 65%
- Erectile dysfunction 50%
- Renal disease 50%
- Fibromyalgia 80%
- Nocturnal strokes 84%

There is also a high correlation between patients who have GERD (gastroesophageal reflux)[1] and OSA. With regard to diabetes, excessive apneic events affect the production of insulin which encourages the onset of type 2

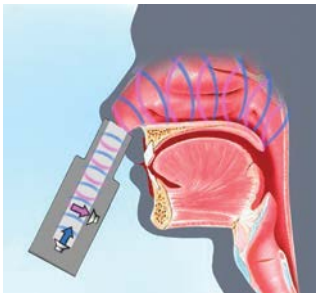
diabetes[2]. These apneic events also affect the permeability of the endothelial lining of the arteries. This increases the buildup of plaque in the arteries and the chance of cardiovascular complications, such as a heart attack. The weakening of the walls of the arteries increases the susceptibility of rupturing of these vessels which occurs during strokes [3,4].

Obstructive sleep apnea is an extremely dangerous health risk. Six out of ten patients over age 40 snore and two out of six have OSA. The other rather alarming fact is that 85% of patients with OSA have been undiagnosed[5]. This means that massive numbers of patients have the problem but are totally unaware of the dangers they are facing in the future if they are not diagnosed and do not receive proper treatment. Studies have indicated that a patient with severe OSA, left untreated, will die 8 – 10 years earlier than a patient without OSA. The fact is that patients with severe sleep apnea are definitely at risk to die prematurely and spend many years in poor health with cardiovascular disease, GERD, type 2 diabetes and possibly strokes.

To assist practitioners in the diagnosis of OSA, we need to focus on airway obstruction in three areas: nasal, oropharyngeal and hypopharyngeal.

1. Nasal Obstruction

Prior to treatment, clinicians must determine whether or not there are any nasal obstructions which would interfere with the patient's ability to breathe through their nose. If the patient is a chronic mouth breather, the patient should be referred to an E.N.T. specialist to check for a deviated septum, enlarged turbinates, polyps or other nasal obstructions. A determination must be made whether or not the nasal mucosa is swollen due to allergies which might cause a nasal obstruction[6].



RHINOMETER

In our office, we have a diagnostic device known as a rhinometer which is an initial screening device to determine if there is a nasal obstruction in either nostril. The rhinometer is an accurate, non-invasive device which evaluates the potential obstruction by sending sound waves up the nose and any obstructions are recorded on a computer.

This evaluation of the nasal cavity is also important if the sleep specialist decides to use the CPAP device to force air through the nose. Obviously, if there is a nasal obstruction, the pressure would have to be much higher on the CPAP device. The acceptance of the CPAP treatment is better when the pressure is lower. Therefore, an evaluation of a patient's airway is an important prerequisite to a successful oral appliance or CPAP therapy[7].

PRE-TREATMENT
ENLARGED TURBINATES
AHI 76 SEVERE OSA

RESSECTION INFERIOR TURBINATES
AHI 32 50% IMPROVEMENT AHI

2. Oropharyngeal Obstructions

Prior to the fabrication of the oral appliance or CPAP therapy, an evaluation must be done of the oral cavity to check for obstructions. The areas of concern would be enlarged tonsils or adenoids, large tongue, enlarged uvula, large mandibular tori, excess tissue in the area of the soft palate. Patients with narrow maxillary arches and high palates could also be more susceptible to snoring and OSA. Oropharyngeal obstructions must be surgically corrected prior to oral appliance or CPAP therapy.

ENLARGED TONSILS
GRADE 4

LARGE UVULA

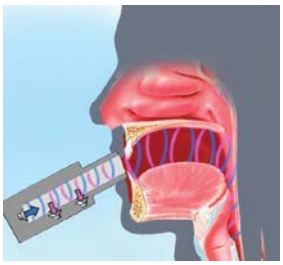
ENLARGED TONGUE

3. Hypopharyngeal Obstructions

Oral appliances are most effective when there are no nasal or oropharyngeal obstructions and the problem is behind the tongue in the area of the throat. Class II skeletal patients with retrognathic mandibles are the patients that are more likely to have hypopharyngeal obstructions. Their lower jaws are already retruded which subsequently cause their tongues to be retruded. This is particularly serious when the patient sleeps on their back. The tongue falls back further and blocks the airway. If the tongue partially blocks the airway, the patient snores. If it completely blocks the airway for 10 seconds or more, for more than 6 times an hour, the patient is diagnosed with OSA. The main function of the oral appliance is to move the lower jaw forward, increase the posterior vertical dimension and, subsequently, move the tongue forward and open up the pharyngeal airway.

RETROGNATHIC MANDIBLE

The pharyngometer is a diagnostic device which is utilized in our office to diagnose the size of the airway during the daytime as well as nighttime. It is utilized at the initial appointment to check the patient's normal airway (daytime) and the collapsed airway (nighttime). To assess the size of the collapsed airway at night, the patient is instructed to exhale all the air from their lungs and a measurement of the airway is taken. The normal size of a collapsed airway is 2.0 cm^8. Patients with OSA always have a much smaller collapsed airway. Bite registrations in different positions are taken to try and see how large the airway may be increased. Our office uses a system called Airway Metrics which gives a number of plastic bite gigs to help measure the size of the airway in different positions. Various bite registrations are taken including some which may be end to end and open 6 mm, 1 mm. protrusive and open 4 mm, end to end and open 4 mm, etc. By moving the mandible forward at different vertical heights, we determine if the oral appliance will open the airway in that position significantly. In most cases, when a bite registration reveals that the airway opens significantly when the oral appliance is fabricated in that position, the treatment is usually successful.



PHARYNGOMETER

The results using different bite registrations are not always successful if the patient has a physiologically narrow airway or has excessive swelling in the area of the uvula and soft palate due to excessive snoring or smoking. The pharyngometer helps to give the clinician a starting position to fabricate the oral appliance. It is important to select a position that is comfortable for the patient. It is advisable then to use an oral appliance such as a Somnodent, EMA, Modified Herbst or TAP Appliance that can be adjusted to move the mandible slowly forward to reduce the snoring and OSA[9].

As mentioned previously, airway obstructions in the nasal and oropharyngeal (mouth) areas must be eliminated prior to the fabrication of the oral appliance. When oral appliances are utilized in these cases, they are highly effective. Our success rate with oral appliance therapy is over 90%. I routinely evaluate my patients' nasal airways (rhinometer), oropharyngeal and hypopharyngeal airways (pharyngometer) prior to treatment. If you cannot properly diagnose the problem, your treatment will be less successful.

Patients much prefer to wear an oral appliance rather than the CPAP device. However, for severe OSA, the CPAP is the treatment of choice. If a patient is unable to wear the CPAP and they have severe OSA, or if they have mild to moderate OSA, the oral appliance is the treatment of choice.

I recently spoke with a sleep specialist in Nevada who estimated that 18 to 30% of the population is suffering from mild, moderate or severe OSA. Whether you live in the U.S. with a population of 350 million or in Canada with a population of 38 million, this means there are a large number of patients who are suffering from these sleep disorders who desperately need treatment.

If you start helping these patients achieve a higher level of health and extend their lifespan, you will feel better about your practice and yourself. We are presently treating approximately 10 – 15 patients per month at $3,000 per case. Obviously, this can positively affect your income while you are helping patients become healthier. In Canada, most insurance companies will pay for the CPAP device but will not pay for oral appliances. In the U.S., many medical plans will pay for both CPAP and oral appliances.

I strongly believe that it is the responsibility of the medical and dental profession to identify patients who have airway obstructions leading to snoring and sleep

apnea. The two main signs of obstructive sleep apnea (OSA) are snoring and excessive daytime sleepiness. To assist dentists in determining the level of sleepiness, Dr. Murray Johns, Epworth Hospital in Melbourne, Australia, introduced the Epworth Sleepiness Scale in 1991. I have enclosed a copy for your information. I recommend that any patient who snores should complete this questionnaire. It is also advisable to have the bed partner complete the form as well. Our experience has been that many patients, particularly males, underestimate the extent of their daytime sleepiness and the report from the bed partner is usually more accurate.

The Epworth Sleepiness Scale is extremely helpful in determining the extent of the daytime sleepiness which is one of the main symptoms of obstructive sleep apnea (OSA). This scale determines how likely the patient is to fall asleep in certain situations. A zero means they would never doze off, one means a slight chance of dozing, two means a moderate chance of dozing, and three means a high chance of dozing in various situations. The number of patients with daytime sleepiness, especially those over age 50, will be astounding.

I had one dentist in my sleep course, involved in a group practice, go back to his office and give the Epworth Sleepiness Scale to all patients who snored. Remember, snoring is one of the main symptoms of obstructive sleep apnea. Within three weeks, he had 50 patients who scored high on the Epworth Sleepiness Scale and who were therefore candidates for oral appliances or the CPAP device. It is important to educate the staff including receptionists, dental assistants and hygienists regarding the diagnosis and treatment of these patients. I find the hygienists are particularly important in conveying the information to patients and asking them to complete the Epworth Sleepiness Scale.

For any patient that has an Epworth Sleepiness Scale higher than 8, it is recommended to seek medical attention in terms of a sleep study in order to diagnose the presence or absence of OSA[10]. Patients who snore but do not have OSA may be treated by the dentist with an oral appliance. Prior to the fabrication of the oral appliance, the dentist must receive a report from a sleep specialist, stating that the patient does not have sleep apnea. When the patient only snores and does not have sleep apnea, no follow-up sleep study is necessary. If the patient is diagnosed with mild to moderate OSA and the sleep specialist and patient agree, the dentist can then fabricate an oral appliance.

After the oral appliance has been adjusted over several months, the patient must have a follow-up sleep study (PSG) to confirm the efficacy of the appliance. It is imperative that the dentist establish a good working relationship with a sleep specialist in the sleep lab if they want to be successful in the field of sleep dentistry.

I advise all dentists who are interested in expanding their practice to educate themselves and their staff as a first essential step. They must contact a sleep specialist to diagnose these patients with a sleep study prior to treatment and then afterwards to confirm the efficacy of the oral appliance. Most sleep specialists will welcome the opportunity to work with competent dentists. Once a good relationship has been established, this will result in referrals for patients with mild sleep apnea and who cannot tolerate their CPAP device.

Another excellent diagnostic device that I have found to be very useful in my sleep practice is the Embletta 100, a home sleep study. Patients much prefer this home sleep study compared to the hospital sleep study (polysomnogram). The Embletta 100 cannot be used to diagnose OSA, but it is useful during the titration or adjustment period for the oral appliance. Most oral appliances are not 100% effective when they are first inserted. The uvula and soft palate tissues can be quite swollen due to snoring and/or smoking. As the swelling subsides, the appliance is slowly adjusted to move the mandible and tongue further forward, sometimes taking 2 – 4 months.

During the titration period, it is often advisable to test the efficacy of the oral appliance with the home sleep study (Embletta 100). The advantages of this device are that it is extremely comfortable, accurate and the patient feels that they get a more normal sleep since they are sleeping in their own bed. The cost is reasonable as the value of the disposables for this home sleep study is only five dollars. Therefore, patients can be given several economical and convenient sleep studies to ensure that the oral appliance is effective in eliminating the snoring and OSA.

EMBLETTA 100
HOME SLEEP STUDY

The Embletta 100 home sleep study device is more acceptable to the medical profession and sleep specialists because it has a nasal cannula, pulse oximeter and chest and abdominal straps. Some sleep specialists in the sleep centers have utilized the Embletta 100 for patients who are unsuccessful with the polysomnogram (PSG). Some patients do not like the polysomnogram due to the odor of the electrodes, suffer from claustrophobia or who cannot sleep in a strange

bed with 16 electrodes attached to their body. Most patients feel that they get a more accurate sleep study when they sleep in their own bed with the Embletta 100 home sleep study device. In Europe, most of the studies are home sleep studies due to the significant cost savings as compared to the cost in private sleep clinics or hospital sleep clinics.

It is extremely important that you successfully titrate (adjust) the oral appliance with the Embletta 100 home sleep study device prior to sending the patient for a PSG to a private or hospital sleep clinic. This will prove to the sleep specialists and the E.N.T. specialists that oral appliances are effective in reducing snoring and obstructive sleep apnea. The Embletta 100 will help you to achieve these objectives. This will result in you having more patients referred to you by the sleep specialists and E.N.T.'s for treatment with oral appliances.

The Embletta 100 is the home sleep study that is reputed to be number one in Europe for the past eight years. It has been well researched and the results correlate very accurately with the polysomnogram at the sleep clinics.

The patient is instructed to return to the sleep center for a follow-up PSG, with the oral appliance, to confirm that the appliance is effective. Insurance companies and patients much prefer this approach. You cannot expect insurance companies to pay for three or four sleep studies. The sleep specialists are usually impressed with the results and will, therefore, be encouraged to refer more patients to your office who cannot wear the CPAP or have mild to moderate OSA and request an oral appliance.

Be advised that it is critical for the successful treatment of our patients to work closely with the medical profession. Reports must be sent to the patient's primary care physician to keep them informed of their treatment. Dentists should also inform the sleep specialists that patients with severe OSA must be referred for treatment with the CPAP or BiPAP devices.

Patients that are diagnosed with severe OSA should be encouraged to wear the CPAP device since this is the gold standard for the treatment of severe OSA. The CPAP consists of a mask which the patient wears over the nose. This mask is attached to a hose connected to an air compressor and humidifier. The CPAP is extremely effective in opening the airway as the air pressure is increased gradually during the polysomnogram (sleep study) until it successfully displaces the tongue, uvula and soft palate and allows an adequate amount of oxygen to enter the lungs. When the patient wears the CPAP and the air pressure is correct, it is extremely effective in eliminating sleep apnea.

Once the patient is diagnosed by the sleep specialist at the sleep clinic, the patient usually returns for a second sleep study when the technician determines what air pressure will be necessary to eliminate the OSA. The more serious the problem and, in some cases, the more obese the patient, the pressure must be

increased substantially to obtain the desired result. The lower the air pressure usually results in better compliance. The exception to this would be patients with severe sleep apnea who seem to benefit the most from the CPAP. These patients feel so exhausted prior to wearing the CPAP and feel so refreshed afterwards that their compliance rate is high. My observation has been that patients with mild to moderate OSA are not as compliant. This is where, I believe, the dental profession needs to become involved. If the patient is mild to moderate and there is no necessity for surgery, then the oral appliance fabricated by the dentist is the best option. The fact is that a larger number of patients who are prescribed CPAP devices, cannot tolerate them[11].

Recently in the U.S, Medicare has started to pay for patients with obstructive sleep apnea. Medicare is willing to pay for a CPAP device but they want confirmation on compliance. They do not want to pay for the device if it is not being utilized on a regular basis by the patient. The newer devices can be integrated with the telephone line and the data is analyzed by a third party to verify compliance. If there is no compliance, Medicare will not pay for the device.

MOST INDIVIDUALS 60% STOP USING CPAP OR BIPAP DEVICES AFTER 6 TO 12 MONTHS.

There are several different CPAP and BIPAP devices so patients should be encouraged to try several types until they find one that is acceptable. I am constantly amazed by the fact that patients who were diagnosed with OSA, prescribed a CPAP unit and could not tolerate the device, were never contacted again by either the sleep specialist or the DME company. Some of these patients already have co-morbid factors such as high blood pressure, cardiovascular disease, type 2 diabetes, GERD, etc. and their health continues to deteriorate. The system certainly needs to be improved for the benefit of these patients.

Dentists and staff who are interested in pursuing their education in sleep disorder dentistry (snoring and sleep apnea) should be encouraged to take some courses. One suggestion would be to consult the website, www.rondeauseminars.com for sleep courses with experienced clinicians and lecturers offered in different

locations in Canada and the U.S. In the near future, some of these sleep disorder dentistry courses will also be conveniently available on the internet.

I would also encourage interested dentists to join the American Academy of Dental Sleep Medicine. This organization offers courses which would help practitioners accumulate new and important information on sleep disorders such as obstructive sleep apnea.

Oral appliances are usually effective in reducing OSA in mild and moderate cases of OSA, and I believe dentists should be involved in the treatment of patients who fail with the CPAP device[12]. In my opinion, the dental profession has an obligation to treat these patients. If we educate ourselves in sleep disorders, we can save and certainly prolong lives. I have treated many patients with severe OSA who could not wear the CPAP device and successfully reduced their apneic events below 5 events per hour, which is normal. This treatment certainly improves their health and prolongs their life by reducing their blood pressure and their susceptibility to heart attacks, strokes and type 2 diabetes.

Conclusion

The prevalence of obstructive sleep apnea is exceedingly high in all first world countries including the U.S. and Canada due to the obesity epidemic. An estimated 25% of males and 9% of females will develop OSA (Obstructive Sleep Apnea) in their lifetime[13]. I believe it is the obligation of the dental profession to learn how to diagnose and treat these patients. As I mentioned previously, there are only 3 ways to treat OSA, oral appliances, CPAP and surgery. While some patients may need a combination treatment, oral appliances are certainly the preferred option chosen by most patients (Non-Invasive, Reversible). The problem with the CPAP and BiPAP devices is that the compliance rate is only 60% after 1 year[14]. Therefore, literally thousands of patients are seeking alternate forms of treatment. Compounding this enormous problem is that it is estimated that 85% of the patients with OSA are undiagnosed[15].

To help with this problem the dental profession can utilize the Epworth Sleepiness Scale, the rhinometer and pharygometer and various sleep health questionnaires to identify more patients who have OSA. Once identified, the dental profession needs to refer these patients to their primary care physician and sleep specialists for overnight sleep studies to make the diagnosis. When the diagnosis is mild to moderate, the oral appliance is the first treatment option.

The compliance rate for oral appliances is much higher. In our office the compliance rate is over 95%. Many of the CPAP failure patients are not even made aware by some sleep specialists and medical doctors of the existence or the efficacy of oral appliances. The dental profession must learn to work with the medical profession to provide the best possible health serve for these severely compromised patients.

As the title of the article states “Dentists are Trained to Save Teeth: Sleep Dentistry Saves Lives”. General dentists can do both and in so doing help solve these serious health issues that affect approximately 20% of the adult population that have obstructive sleep apnea.

EPWORTH SLEEPINESS SCALE

The Epworth Sleepiness Scale (ESS) was developed and validated by Dr. Murray Johns of Melbourne, Australia. It is a simple, self-administered questionnaire and widely used by sleep professionals in quantifying the level of daytime sleepiness.

(Johns, M.W. "A new method for measuring daytime sleepiness: The Epworth Sleepiness Scale." ***Sleep*** 14 (1991): 540-545.)

NAME _____ **DATE** _____

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling 'just tired'? This refers to your usual way of life at present and in the recent past. Even if you have not done some of these things recently, try to work out how they would have affected you.

Use the following scale to choose the most appropriate number for each situation:

0 = Would never doze
1 = Slight chance of dozing
2 = Moderate chance of dozing
3 = High chance of dozing

SITUATION	**CHANCE OF DOZING**
Sitting and reading	_____
Watching television	_____
Sitting, inactive in a public place (e.g. theatre, meeting)	_____
As a passenger in a car for an hour without a break	_____
Lying down to rest in the afternoon when circumstances permit	_____
Sitting and talking to someone	_____
Sitting quietly after lunch without alcohol	_____
In a car, while stopped for a few minutes in traffic	_____
TOTAL SCORE	_____

0-7
It is unlikely that you are abnormally sleepy
8-9
You have an average amount of daytime sleepiness
10-15
You may be excessively sleepy, depending on the situation, and may want to consider seeking medical attention
16-24
You are excessively sleepy and should consider seeking medical attention

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