The EMA First Step appliance

By Terry Whitty

Sleep aponea, in its simplest definition, is when a patient stops breathing during sleep. This can be as a result of Central Sleep Aponea (CSA), a neurological condition whereby the brain temporarily stops sending signals to the muscles that control breathing, or more commonly, from Obstructive Sleep Aponea (OSA).

OSA is caused by a narrowing or complete closure of our upper airway while we sleep and this obstruction to our breathing rapidly depletes the supply of oxygen to our body. This in turn forces our body to "wake up" - termed an arousal - in order to recommence breathing.

The number of times per hour that our breathing ceases (aponeas) or becomes diminished (hyponeas), is used to categorise the level of OSA as either mild, moderate or high based on what is termed the apnea-hypopnea index (AHI). The higher the score, the greater the number of times per hour that sleep has been interrupted and the greater the risk of compromising our overall systemic health.

The symptoms of OSA can include daytime sleepiness, fatigue, frequent napping, headaches, poor memory and attention, irritability and insomnia and the long term affects can be very serious. Snoring is also often a symptom of OSA, but it is also possible to have OSA and not snore; and vice versa.

Obstructive Sleep Aponea may be a risk factor for the development of other medical conditions including high blood pressure (hypertension), heart failure, heart rhythm disturbances, atherosclerotic heart disease, pulmonary hypertension and insulin resistance.

In other words, sleep apnoea is a serious medical condition that requires proper diagnosis by a medical practitioner, typically through a sleep study (using a polysomnogram), in order to determine the type and severity of the problem before a treatment strategy is developed.

Treatments for OSA include weight loss, surgery, mechanical maintenance of the airway using continuous positive airway pressure (CPAP) during sleep and the use of oral appliances.

Acceptance of the efficacy of oral appliances in the treatment of OSA has increased significantly in recent times. This has been as a result of research conducted by the sleep medicine community showing that whilst an appliance may not be as effective as CPAP, considered to be the gold standard of treatment, patient compliance is significantly higher (i.e. patients are more likely to wear an oral appliance during sleep than a CPAP mask connected to the mechanical pumping device).

Figure 1. The EMA First Step appliance.

Figure 2. The EMA First Step kit includes all materials and parts to construct the appliance including complete instructions.

The number and variety of oral appliances to treat snoring and sleep aponea has seemingly exploded in the past few years. A type termed mandibular advancement splints (MAS) or mandibular repositioning appliances (MRA) are the most common prescribed for OSA.

This type of appliance moves the lower jaw forward slightly, which tightens the soft tissue and muscles of the upper airway to prevent obstruction of the airway during sleep. The tightening created by the device also prevents the tissues of the upper airway from vibrating as air passes over them - the most common cause of loud snoring.

The price for an MAS/MRA varies from $25 to $2500 so you could imagine they also vary in quality and effectiveness. All have their advantages and disadvantages and it seems every other week someone is patenting something new.

Figure 3. Position the upper lugs between the canine and first bicuspid. Use the blue sticky wax included.

Figure 4. Using the included jig mark the position for the lower lugs.

Figure 5. Position the lower lugs using the blue sticky wax included.

Figure 6. Upper and lower models with lugs in place.

EMA First Step appliance

The EMA First Step appliance is a new and unique appliance that is not only a mandibular advancement splint but also acts as a clinical diagnostic aid. It's a simple device with two flexible splints connected by flexible straps that hold the mandible forward in the desired position.

The advantages of the EMA first Step appliance include:

1. Low profile and comfortable to wear;
2. Fits the upper and lower jaw snugly;
3. Able to be adjusted in 1mm increments easily by the patient;
4. Vertical and lateral excursion; and
5. Inexpensive and easy to construct.

The EMA First Step appliance has some unique clinical and diagnostic advantages as well including the ability to:

1. Test a patient's tolerance to an MAS;
2. Measure correct mandible repositioning (This is very useful especially if another MAS is to be subsequently constructed);
3. Easily test if an MAS is suitable for the patient in treating OSA; and
4. Test for Bruxing or other undesirable nocturnal habits that may contraindicate use of an MAS.

The EMA First Step appliance is easy to fabricate and comes in kit form with all parts needed for construction included. Construction time is approximately 15 minutes and it can easily be done in the dental laboratory or a dental practice.

A vacuum- or pressure-forming machine is all that is required to assist in its construction. Figure 1-13 are a step-by-step guide to the construction of the EMA First Step appliance.

Figure 7. Use a vacuum- or pressure-forming machine to form the material over the model and lugs. The material will form well over the lugs due to the nature of the proprietary thermoforming plastic.

Figure 8. Trim with scissors.

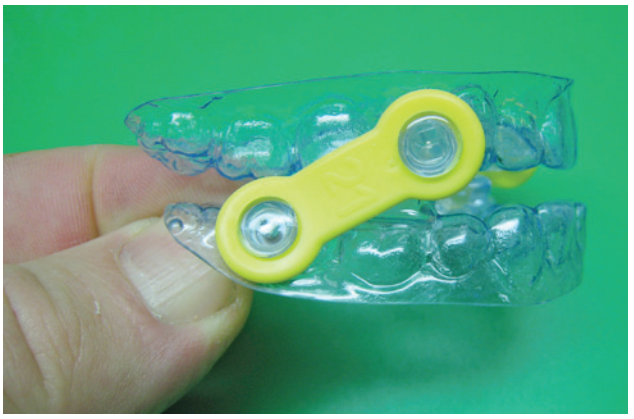

Figure 9. Attach elastic strap, right side.

Figure 10. Attach elastic strap, left side.

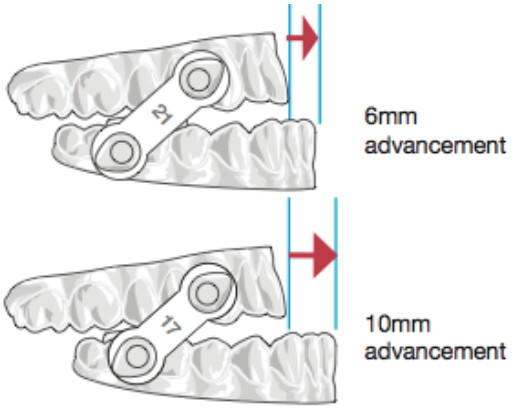

Figure 11. Changing the length of the elastic strap changes the amount of titration. A shorter strap increases advancement.

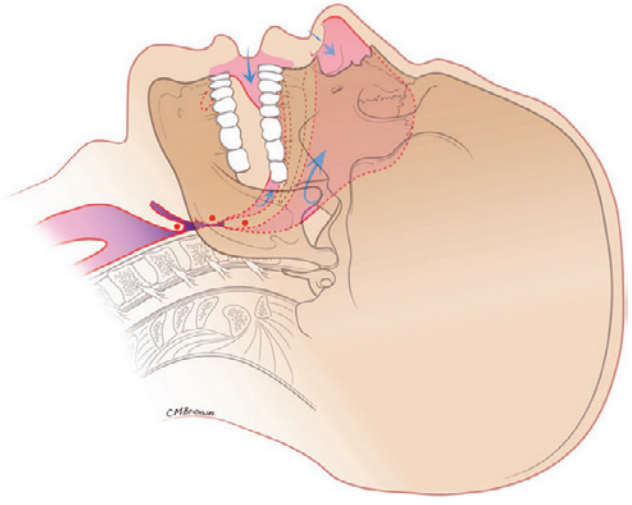

Figure 12. Airway obstructed.

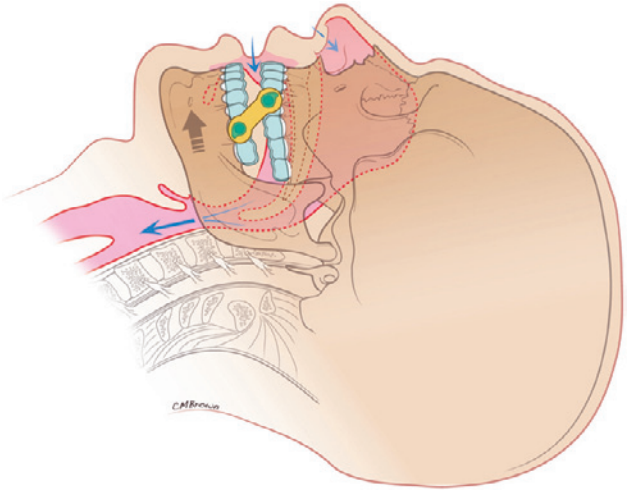

Figure 13. Airway maintained with the EMA appliance.

About the author

Terence Whitty lectures regularly nationally and internationally on a variety of dental technology and material science subjects and runs a busy laboratory in Sydney's Eastern Suburbs specialising in high tech manufacturing. Using the latest advances in intra- and extraoral scanning, CAD/CAM, 3D printing and laser welding technologies, most specialties are covered including orthodontics and fixed and removable prosthetics. He also specialises in the latest injection systems for traditional and CAD-designed removable prosthetics and various associated dental appliances including paediatric dental, maxillofacial, TMJ splint therapy and obstructive sleep apnoea. His articles also appear in various international journals.