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The EMA Appliance: a cost-effective system for creating sleep appliances

By Terence Whitty

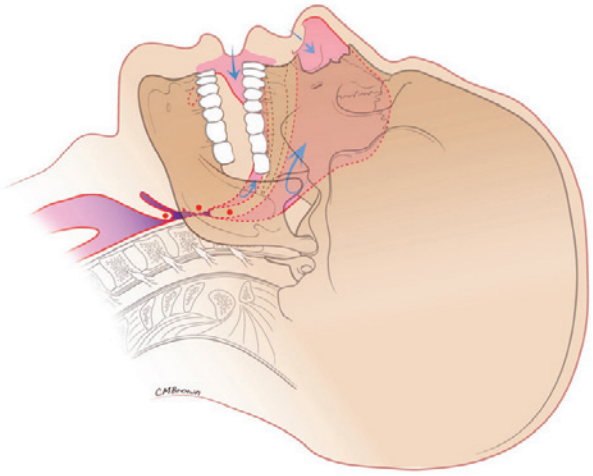

Figure 1. Closed airway obstructed by soft tissues.

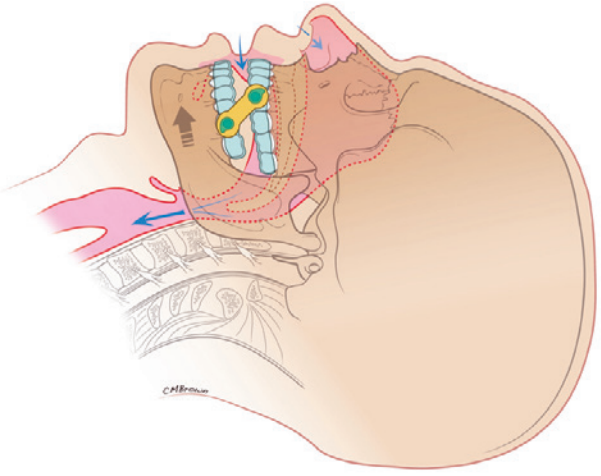

Figure 2. EMA appliance facilitates an open free flowing airway.

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

OSA is caused by narrowing or complete closure of the upper airway while we sleep. 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 (apnoeas) or becomes diminished (hypopnoeas), is used to categorise the level of OSA as either mild, moderate or severe. This is based on what we term the apnoea-hypopnoea index (AHI). The higher the score, the greater the number of times per hour that sleep is interrupted and the greater the risk of compromising our overall systemic health.

Treatments for OSA include weight loss, surgery, mechanical maintenance of the airway using continuous positive airway pressure (CPAP) or, as most commonly seen in the dental space, the use of oral appliances such as mandibular advancement devices (MAD).

There are a plethora of mandibular advancement devices on the market and all claim superior features over competitors. The reality is that there is no such thing as the perfect MAD as what is good for one person may not be ideal for another. Regardless, the role of MADs is not in question within the treatment of sleep-disordered breathing, however, their proper use often needs clarification. Considerable scientific literature supports the basic function of the MAD, being to move the mandible forward to a position that gives a volumetric increase in the patient's airway during sleep. There is also growing evidence for a horizontal opening that enhances this forward positioning of the mandible.

EMA appliance

The Myerson Elastic Mandibular Advancement (EMA) appliance is a simple, patient-friendly oral appliance created for the non-invasive treatment of snoring and OSA. The design is brilliantly simple, extremely stable and allows for adjustability through interchangeable elastic straps.

The EMA, which is a custom-made device, can be made from conventional dental impressions or intraoral scans of the patient and basically resembles and fits like an orthodontic retainer. The primary treatment mechanism of opening the bite and

Figure 3. EMA Appliance.

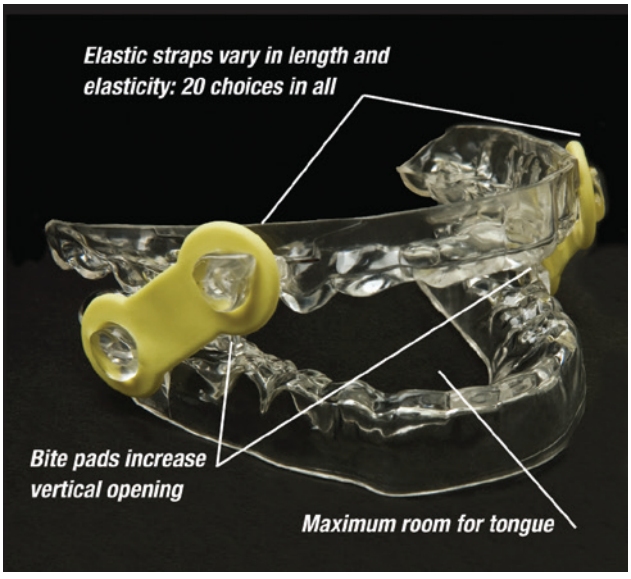

Figure 4. EMA Appliance key features.

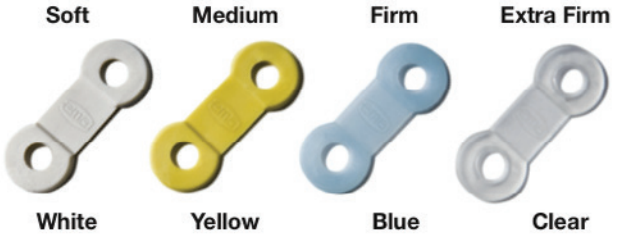

Figure 5. Elastic straps of differing rigidity are available.

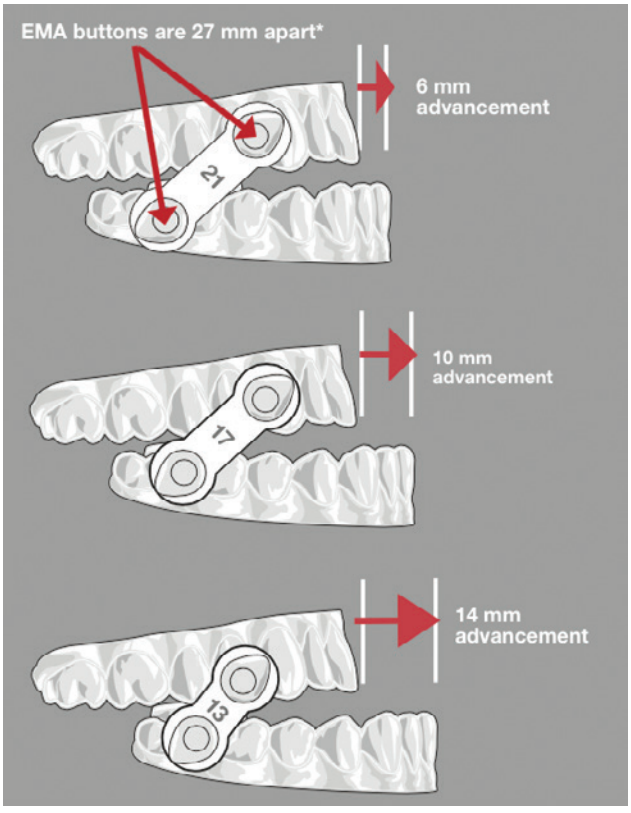

Figure 6. Titrating the EMA appliance.

gently moving the mandible forward is achieved with the use of occlusal bite pads and the combination of positioned lugs and interchangeable elastic straps that offer varying degrees of mandibular advancement. This positioning of the mandible causes a forward movement of the tongue, re-opening the air flow through the oral pharynx. The flexibility of these elastic straps provides unsurpassed lateral movement and overall TMJ comfort.

Additionally, because the straps offer varying degrees of elasticity, they allow for the jaw to move in all directions while moving the jaw forward into the desired position. This freedom of movement of the mandible significantly reduces the occurrence of temporomandibular joint dysfunction and pain associated with similar appliances currently on the market.

Adequate dental retention is essential. The EMA can only be used over intact, non-mobile teeth without periodontal involvement. Dental restorations must be secure, as any removable oral appliance can displace loose crowns, inlays, onlays or veneers. Having adequate numbers of secure teeth for retention of the EMA is particularly important in the maxillary anterior and premolar region and in the mandibular premolar and molar areas.

Working with the EMA in your lab

The EMA Appliance is an ideal solution for dental laboratories looking to offer dental practitioners a mandibular advancement solution. Kits and individual components are available to order online cost-effectively from Fabdent in Australia. The components of the kits are incorporated into the production of the appliance in your laboratory.

Impressions and bite registration

As a dental laboratory constructing an EMA appliance, it is essential to receive accurate impressions that extend to cover all surfaces of all erupted teeth, the buccal and labial vestibules of both the entire arches, at least two-thirds of the palate and the lingual surfaces of the mandibular alveolar arch. If intraoral scans are to be used, the device can either be manufactured on 3D printed models by thermoforming or milled using ACEBASE material, coloured or clear.

Figure 7. 3D Printed models direct from intra oral scans. You can also use stone models from traditional impressions. Wax out any major undercuts with high melt wax.

Figure 9. Thermoformed shells.

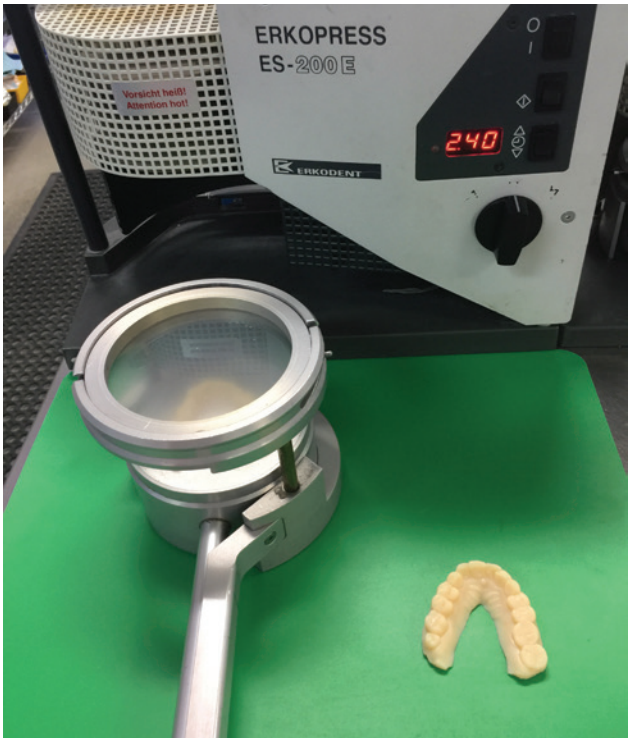

Figure 8. Thermoform dual laminate material over the model. Here we're using a 3mm Erkoloc Pro from Erkodent.

Figure 10. Trim and finish thermoformed shells. Take careful note to round off all peripheries well.

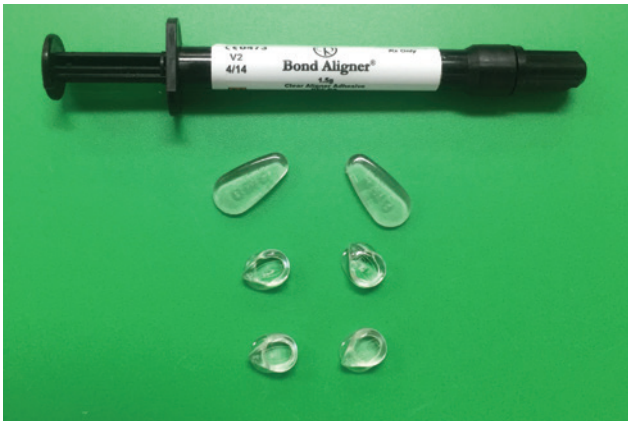

Figure 11. Four buttons and two pads make up the kit to attach. A light cured composite adhesive is used to bond the components.

Figure 12. Placing the lower bite pads.

Figure 13. Lower bite pads in place.

Figure 14. Upper button placement is between canine and first premolar.

Figure 15. Upper buttons in place.

Figure 16a. Lower button positioning. From the bite, measure 19-21 mm and place button. Here we're using a portable curing light for the initial set.

Figure 16b. Cure all parts with a quality curing unit such as the Heraeus HiLite shown here.

Figure 17. Lower buttons in place.

Figure 18. Use a quality light curing unit otherwise the composite will not cure correctly to the shells and will peel off.

A good bite registration is essential and will simplify and minimise appliance adjustments for the clinician at the insertion and follow-up appointments. Dealing with this should be at 75% protrusion with an 8-10mm posterior opening.

Figures 7 to 23 detail the procedure for construction of an EMA appliance step-by-step.

For more information on the EMA appliance, parts or training for accreditation, contact Fabdent on 1300-878-336 or buy kits and components online at www.fabdent.com.au or click the QR code.

Figure 19. The elastic strap is fitted to the button. If you like, warm the strap in warm water to facilitate fitting.

Figure 20. Strap fitted to upper and lower buttons.

Figure 21. Finished appliance.

Figure 22. Finished appliance.

Figures 23 and 24. Blue straps fitted to final appliance. Refer to Figure 5 demonstrating different rigidity of straps.

About the author

Terence Whitty is a well known dental technology key opinion leader and lectures nationally and internationally on a variety of dental technology and material science subjects. He is the founder and owner of Fabdent, a busy dental laboratory in Sydney specialising in high tech dental supply and manufacturing. Using the latest advances in intra and extra oral scanning, CAD/CAM including milling, grinding and 3D printing technologies, most specialties are covered including orthodontics, fixed and removable prosthetics, computer implant planning and guidance, TMD, oral maxillofacial, sleep and paediatrics. His articles appear in various international journals. Terence can be contacted on 1300-878-336 or see www.fabdent.com.au