

AOA appliances, etc.

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In this issue of AOAppliances we are offering two clinicians' view on the versatility and design options for the Damon Retention Splint. Many of you that utilize the Damon technique already know of the properties this Splint offers for retention, but it is also well regarded as a simple and effective remedy for snoring. The durability and simplicity of design is easily understood by patients and our descriptive Rx forms make ordering the appropriate design convenient.

Dr. Sarah Shoaf offers an effective solution to making the appliance comfortable and effective as a snoring deterrent and Dr. Tom Pitts has provided us with detailed information on his protocol, as well as, tips on taking the correct construction bite. It is important as you review these two great articles that you reflect on the importance of the construction bite...we find this can be the most misunderstood aspect of the requirements. Our staff is here to help and suggest, so feel free to call if you have any concerns or comments.

A secondary note: The FDA requires all appliances designed and sold for sleep apnea to meet a very stringent criteria as Class Two Medical Devices. As such AOA has spent a great deal of time and energy to provide your practice with practical and proven appliances. We feel AOA can offer your practice current and innovated appliances and this issue of our newsletter hopefully reflects our commitment.

A special thanks to the Journal of Clinical Orthodontics (Dec 2006) for allowing us to reprint modified portions of Dr Shoaf's original article on this subject.



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Oral Appliance for Sleep Apnea and Snoring

Oral appliances can be beneficial in the treatment of mild to moderate obstructive sleep apnea and simple snoring, according to the American Academy of Sleep Medicine. AOA's John Fuller pioneered a design that the author uses for her referred patients. Caution must be used to avoid diagnosing sleep disorders as a dentist. A referral should be made from a medical source following a polysomnogram (PSG) that shows only mild obstructive sleep apnea (OSA) and/or simple snoring.

Simple snoring is caused by the vibration of tissues in the posterior oropharynx during sleep. In simple snoring, there is no drop in oxygen saturation or change in cardiac rhythm (1). Snoring is considered more of a social than medical problem.

apnea is defined as the cessation of breathing for 10 seconds or more during sleep (1). It can be central (neurologically based), obstructive, or a mixture of both.

Sleep apnea can be a life-threatening medical condition. It is a known predictor of mortality in patients with coronary artery disease (2). Sleep

during OSA, inhalation creates a negative pressure that causes a portion of the airway to collapse and mechanically obstruct. There is a decrease in oxygen saturation as normal breathing ceases. Once at a critical level, the low oxygen will trigger the body to attempt to breathe, creating negative abdominal pressure and eventually a loud "snorting" sound that can be mistaken for simple snoring (1). The PSG test allows differentiation between simple snoring and sleep apnea.

The standard treatment for OSA is a Continuous Positive Airway Pressure, or CPAP machine. This forces air into the airway during exhalation, so the airway will not collapse and obstruct. Some patients are unable to tolerate CPAP due to claustrophobia or other physical problems. An oral appliance may be an alternative for these patients.

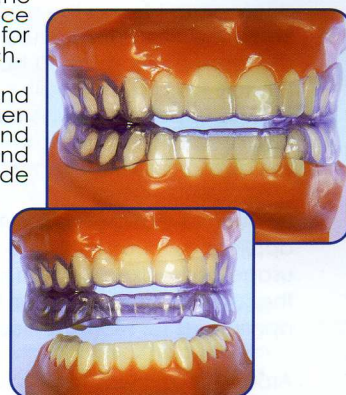
Most oral sleep appliances are mandibular repositioning splints that move the lower jaw into protrusion to allow the posterior airway to remain clear. This operates much like CPR techniques, where jutting the jaw forward opens the airway. The AOA device is a one-piece appliance that is comfortable and easy to wear, with no "moving parts" to wear out or break. Although it cannot be adjusted for additional protrusion, the simplicity of the device makes it durable and comfortable for patients.

Patients with a history of TMJ problems should not be fitted with the appliance. The extra protrusion often exacerbates TMJ muscle discomfort. Patients should also be followed over time for dental movement, which can be seen with long-term use of the appliance. Edentulous patients are unable to retain the appliance sufficiently to allow it to function. It is not recommended for patients with less than 10 periodontally sound teeth in each arch.

AOA requires poured alginate impressions of both the maxilla and mandible, with good tissue borders. A wax or PVS bite is then made in approximately 80% of maximum protrusion and approximately 3mm of opening between the maxillary and mandibular incisors. Be sure patients do not protrude asymmetrically, which could create TMJ strain in the final appliance. Reappoint patients in 3.5-4 weeks to allow laboratory construction.

Once the patient is accustomed to the appliance (approximately 4-6 weeks), a repeat PSG should be made with the appliance to confirm appliance efficacy. If the appliance is only marginally effective but well tolerated by the patient, fabrication of a new appliance with greater protrusion is recommended.

Oral appliances are an excellent alternative for patients with mild OSA or simple snoring, but should be monitored by a physician to avoid medical complications due to the apnea.



(1) Ivanhoe, JR & Attanasio, R.: Sleep disorders and oral devices. Dent. Clin. N. Am. 45:733-758, 2001.

(2) Milleron, O; Pilliere, R.; Foucher, A; de Roquefeuil, F.; Aegerter, P.; Jondeau, G.; Raffestia, B.G.; & Dubourg, O.: Benefits of obstructive sleep apnea treatment in coronary artery disease: A long-term follow-up study. Eur. Heart J. 25: 728-734, 2004.

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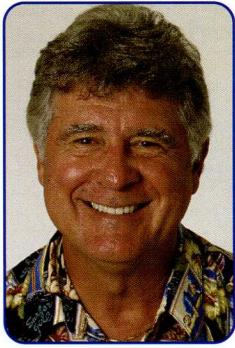
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The Damon Retention Splint

The "Functional Retainer"

"Muscle Training" Splint - Why, What and How (Post Treatment Joy)



Tom Pitts, DDS, MSD.

The muscle training splint (MT splint) is a bimaxillary connected night time appliance, used in place of standard removable retainers. To give some history of how I moved in the direction of the Muscle Training Functional Retainer, I will return to the infancy of my orthodontic career.

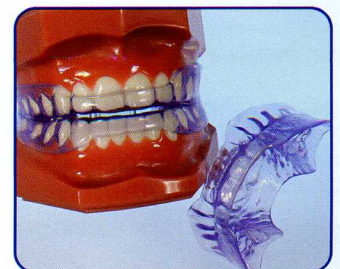
I left the University of Washington Orthodontic Residency in 1970 to begin my private practice in Reno, Nevada. One of my earliest patients treated with removable functional appliances was a young person with condylar agenesis. There was no functional appliance therapy taught at the University of Washington during my tenure there, so I worked with Dr. Harvold at the University of California Orthodontic Department in San Francisco. I used an Activator-type appliance to do some special positioning of the mandible and differential eruption of some teeth on the affected side. I was pleasantly surprised at the change in symmetry of the maxillary teeth as well as the balancing of the transverse cant of the incisal plane. Growth was also witnessed at the condylar site even though mandibular surgery was eventually accomplished. In that same time period I met Dr. Karl Nishimura, who practiced in Tustin, California and used activators and other functional appliances to very good use. Another early patient of mine whom I used functional appliances on was my oldest son Arnie. He was eight years old and had a brachyfacial Class II malocclusion with 10mm of overjet, but with a healthy chin. His upper lip to nose (nasolabial angle) was already obtuse, therefore retraction of the upper incisors was not desired. I had been trained at the University of Washington to treat all Class II's early with a cervical headgear. As I studied functional appliances I decided to treat Arnie's Class II with an activator functional appliance and the result was very positive. With these functional appliances I was quite impressed with Class II correction and differential eruption. I also noticed that the nasolabial angle was maintained.



During the mid 1970's my use and subsequent experience with functional appliances increased substantially. I was extremely excited to observe that by posturing the mandible forward, people who were stricken prior with TMD symptoms were resolving. It was at that time that I began to experiment with mandibular opening and A-P positioning for TMD patients, especially with distalized condyles as evidenced by tomography. I was also taking the Roth course and ensuing quarterly study club meetings. Dr. Roth was treating TMD patients with what he called at that time a "superior repositioning splint" which was full coverage on the maxillary arch and had anterior guidance and pin-point mandibular buccal cusp contact. Long story short, after wearing the Roth type splints full time the patient's occlusion would become more Class II and open in the anterior as he would keep relining these splints. Dr. Roth's explanation at that time was that the condyle was "seating". Each time the patient would come in for their appointment he would check for a CR-CO slide with the splint and relines as

necessary. Eventually after months of full time wear, the "slide" would seem to stabilize and most were considered Class II surgical cases at this point. As I performed this Roth-type splint therapy on my own patients I became disenchanted and with my experience with this functional appliance design, I decided to switch directions. On two of these adult TMD pain patients that had worn the full time "superior repositioning splint", I decided to use a full time forward posturing functional appliance (fixed Herbst). After 11 months we were overcorrected to a Class III dental relationship and I couldn't manipulate their mandible distally. There were no flare-ups in TMD symptoms during this time as well. With full appliances I was able to get good occlusion with quieted TMD symptoms. Since then I have treated hundreds of TMD patients with mandibular posturing, but the question remained: how do I retain this correction?

Naturally I wanted these patients to have a forward posturing of the mandible at night so in the early 1980's I began placing the early version of the hard muscle training splint for these people to posture forward at night. I experimented with 1mm and 2mm material connected together on the buccal segments with acrylic (I was using maxillary and mandibular fixed lingual retention with these). I was pleasantly relieved to see very good stability in occlusion and no acute TMD flare-ups. I therefore began to use these night time posturing splints for retention in not only my TMD cases but in my Class II cases as well. As I used these bimaxillary connected appliances, I found the most difficult issue was getting a comfortable fit because of the hard material connected together. I had tried a softer silicone-like material (positioner type) early on and found that the tooth positions didn't hold as well and the patients didn't respond as well to them. The occlusion that tended toward an openbite wanted to open as well with the soft materials. I experimented with blocking out the undercuts for the hard material using more and more undercut blocking material. The more I blocked out the more comfortable it seemed to be for the patient, and thus they adapted to wearing the appliance much more readily. With the looser fit, the comfort factor was getting better.



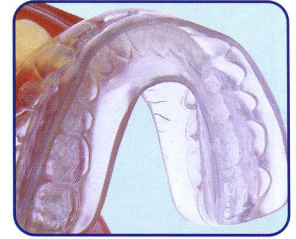
By the mid 1990's my good friend, Dr. Dwight Damon, went beyond what I was doing with the appliance. He began using these retention appliances for openbites and Class III patients as well as for TMD and Class II patients. This progression made a lot of sense with the usage of the fixed Damon passive self-ligation system. The tongue was reacting in such a positive way to this fixed appliance system and the facial muscles seemed to balance much better than with traditionally ligated brackets. So now in 2007 we are using these appliances for most malocclusions. Relapse with this appliance is truly minimized.

Around 2002, I was talking with Dave Allesee from AOA labs and he told me about a new dual hardness material that was soft on one side and hard on the other. We started using this material with the soft side against the teeth for these connected one-piece splints. Now we finally had something very comfortable for the patient. This is the material of choice now and makes retention much more predictable and comfortable for the patient. I still use block out material on the maxillary and mandibular arches. With these splints, TMD is minimized, bite relationships are maintained (deep bite and open bite corrections), and as an added bonus the pharyngeal airway is opened more at night. I have worn one of these with the soft liner for a couple of years and it is very comfortable. This is truly a "functional" retainer.

Let's now go through our debond procedures and methodology to make these splints:

- 1) Appointment before debond place maxillary fixed lingual (lateral to lateral) bonding every tooth. Use white gold chain - reliance. Take impression for mandibular fixed lower 3-3 retainer.
- 2) Debond appointment
 - a) Mandibular fixed lingual (cuspid to cuspid) bonding just the cuspids
 - b) Maxillary and Mandibular alginate impressions for same day insert maxillary and mandibular clear 0.0040 suckdown retainer
 - c) Maxillary and Mandibular Polyvinyl Siloxane Impressions, with accurate pink wax bite
- 3) Three weeks later insert dual hardness muscle training splint

Dual hardness material...
Inner surface is elastic



How do we position the bite for this one piece orthotic?

Wax bites - must not cover the incisors. Need a full view to capture the exact midline position and opening position and AP position.

Class I openbite or deepbite

Vertical Opening in anterior teeth 7mm

AP = edge to edge or have mandibular incisors slightly distal to maxillary anteriors

Class II Div. 1, Div 2 open or closed bite

Vertical opening 7mm

AP edge to edge

Class III

Vertical 5-7mm

AP - slightly forward of centric hinge

Apnea Patients

Vertical 9mm

AP - increased forward positioning (too increase airway)

Extension of borders is to the gingival margins

Typical bite opening with seated splint



AOA will do minor resets for some teeth if you want further eruption. I have not tried resetting teeth for rotations. I am not using this appliance as a positioner of teeth, but as a retainer, muscle balancing mandibular posturing appliance with great effectiveness. My objective is to finish the occlusion with the fixed appliances so I don't have any settling.

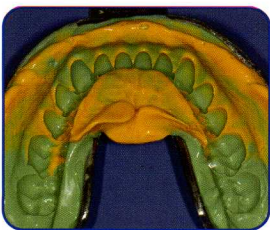
The wax registration is very critical. I do not delegate this to anyone. I take all wax bites for this appliance construction myself.

When I used to construct these in my own lab with the single hardness material, many times I had to cut the upper and lower apart and reposition the lower to the upper in the mouth using Triad Gel. Since using AOA Labs and dual hardness, I have not found it necessary to separate even one of these dual hardness appliances. These orthotic appliances are only worn at night. Inform your patients with forward positioning of the appliance they will feel more pressure in the morning on upper incisors, but this dissipates within 5 minutes. Adjust occlusion after three months of night time wear.

How does the patient clean these dual hardness splints? Soaking in peroxide or denture cleaner turns the soft inner liner chalky white and may lead to separation of the soft and hard material. I have found the best way to clean these is to use warm water and a toothbrush with liquid soap. Scrub, rinse appliance, rinse toothbrush and then dab with dry towel. I leave on sink hanging on the open retainer case till ready for bed. I inform patients that some people have a tendency to take them out at night when first getting used to the splint. With patience they will adapt within a week to 10 days.

Quick Start Guide for Damon Retention Splint Construction Bites

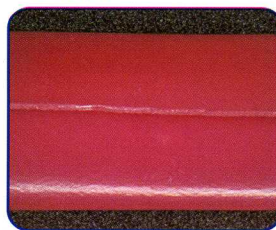
Quality Impressions are essential



Baseplate wax is folded and warmed



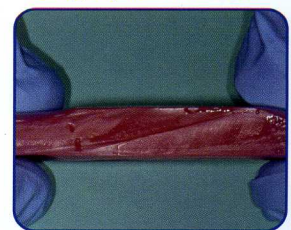
Folded and ready to trim to shape



Trim into trapezoid shape for ease of insertion



Refer to article suggestions for appropriate thickness



Warmed and ready for insertion



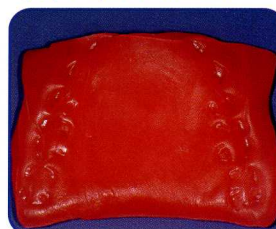
Position the upper bite onto the upper teeth



Guide the lower jaw into the desired relationship



A quality result ensuring the proper splint fabrication



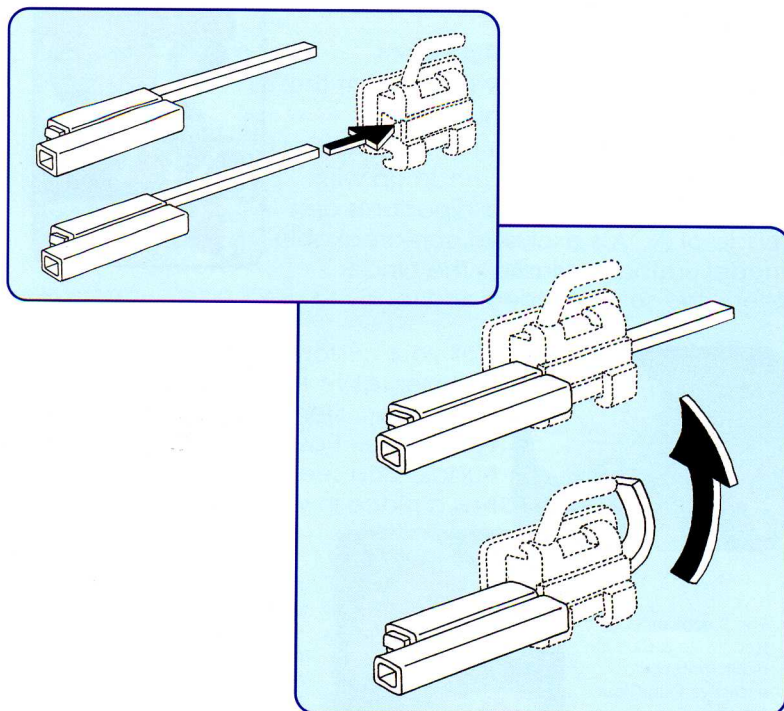
Orientating the construction models in articulator



Archwire Extender

The Damon Space Gaining Appliance (aka The D-Gainer) has been shown to be an effective, efficient and economical solution to laterally developing arches in the early through late mixed dentition. A modification of traditional 2 X 4 construction (i.e. bonding all four incisors and both molars) the D-Gainer utilizes open-coil Copper NiTi spring between the lateral incisors and molars to deliver lateral arch development over the course of the duration of this phase of treatment. As the arch develops, the wire inserted into the molar tube has traditionally been cinched to prevent its unintended dislodging during normal mastication. An AOA "extender" is thereby utilized by inserting it into the molar tube to allow the tube to be, in effect, EXTENDED. An extender added to the molar tube allows the practitioner to place a single rectangular archwire through the tube and have it NOT become dislodged during correction. The majority of cases use extenders in the maxillary arch first, then in the mandibular arch as needed. By using the "extenders" the operator is utilizing the light force-low friction concept to the ultimate degree as early treatment is now achievable in that cases which traditionally would have required extractions can now be effectively treated non-extraction. The "extenders" are an economical adjunct to treatment whereby a single rectangular arch wire can be used rather than multiple rectangular arch wires. Easy to insert, comfortable to the patient, and economical for the doctor, AOA "extenders" are a valuable adjunct to all early Damon treatment.

Alan Bagden



Available from AOA by calling our Customer Service Department at **1-800-262-5221**

(Package of 10 @ \$100.00)