AOA Appliances, etc.

ALLESEE ORTHODONTIC APPLIANCES/PRO LAB

VOLUME 6, NUMBER 2, 2002

DISTAL JET ENHANCED

by William (Bill) C. Machata, DDS

For more than six years I've watched the continual growth of the Distal Jet as the molar distalizer of choice in many offices and gathered invaluable information about the appliance. My ongoing contacts and access to relevant information, including feedback from clinicians, have become international in scope. The coinventors of the Distal Jet appliance – a clinical orthodontist and a certified orthodontic lab technician – have also added immeasurably to my knowledge and understanding of both the philosophical and technical underpinnings of all Jet appliances. This long-standing involvement with the project kept me focused on redesigning key appliance components and evaluating several clinical management protocols.

Over time the practitioner commentaries relating clinical experiences with the Distal Jet have formed a common chorus of concerns, which were (1) the nagging frustration of not being able to adequately and easily visualize access to the screw head, (2) the frequent stripping of the parts (set screw, lock and/or activation wrench), and (3) the sometimes questionable activation issues (which screw and when). These concerns prompted us to redesign the lock and screw mechanism. This new mechanism is a one-piece MIM cast part comprised of an elongated horizontal section for spring compression with a vertical section that houses the locking screw. This configuration addresses the reported comments and suggestions and provides key advantages over the original design **(Figure 1)**.

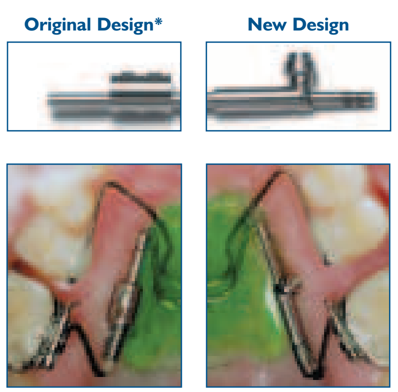

Figure 1. With only one screw instead of two and the increased screw-head size, this new design makes intraoral access much easier.

ADVANTAGES OF THE NEW DESIGN

- The single-screw design (one set screw on each side) eliminates the uncertainty of which screw to tighten and when to tighten it.
- The increased screw-head size greatly increases visualization and access and minimizes the potential for stripping the parts.
- The substantially reduced size of the overall configuration of the new locking mechanism presents a much smoother, less-bulky profile for increased patient comfort and hygiene as well as facilitating appliance construction.
- The long horizontal section acts to guide and support the bayonet wire during the distalization process, providing more precise molar control.
- The orientation of the new locking mechanism advantageously positions the locking screw to the anterior, and the vertical segment lifts the screw head to the occlusal. Both features further enhance visualization and access.

continued on following page

Dr. William C. Machata received his dental and orthodontic training from Marquette University. After completing his orthodontic residency in 1973, Dr. Machata was in private practice until he joined American Orthodontics Corporation in 1988 where he presently serves as director of clinical applications. He can be reached at drmac@americanortho.com.

THINKING APPLIANCES

It seems like just a few months ago that our first edition of AOA Appliances, etc. went to press, and here we are rolling out the eighth edition. AOA/Pro could not have developed such a publication without the support of our customers, and we thank you. If you'd like to view past issues of the publication, visit our Web site at www.ormco.com/aoa.

We sincerely appreciate the ideas for articles and the many wonderful "pearls" that have been brought forward to be shared with the orthodontic community. If you have topics you'd like to share with the profession, give us a call at the laboratory or stop by our booth at your constituent meeting this fall. Max Hall, Paula Allen-Noble, Liz Henrich or I will be there and look forward to discussing your ideas and sharing the latest AOA/Pro products and services with you and your staff.

Again, we thank you for your patronage and hope you enjoy this issue of AOA Appliances, etc.

David Allesee, General Manager
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*U.S. Patent #5,785,520, Micerium SRL

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- The vertical segment is also a functional tie-back that allows the appliance to be delivered pre-activated from the lab. This means that after the appliance is cemented, the clinician only needs to remove the tie-back wire to initiate distalization. No spring compression or screw tightening is required at the initial appointment.
- The vertical segment creates an off-center weight distribution that causes it to automatically roll toward the palatal midline if the activation wrench is accidentally disengaged while loosening or tightening the screw. You can then lift it off the Nance button easily with a scaler or other appropriate instrument and hold it in place while reengaging the activation wrench.

The distal stop has also undergone a seemingly minor, yet functionally significant change. The part is now formed of stainless steel with a lumen that is more closely matched to the bayonet wire. The stop has straight vertical walls that contain the spring better and will not deform under pressure or oral conditions, unlike its plastic predecessor, resulting in better and more consistent force delivery.

TREATMENT PROTOCOLS

Analysis of many case reports and shared clinical observations has been extremely helpful in developing a set of treatment protocols and clinical management strategies. Although anecdotal in nature, they have provided valuable insight into what seems to work better clinically. The following tips are suggestions that should serve as guidelines to facilitate handling the Distal Jet while optimizing its efficiency and effectiveness.

TIP #1 – Correct molar rotations before distalization. Molars whose rotations are corrected and roots properly oriented and positioned in bone before being distalized translate better with minimal or no untoward effects. You can accomplish this easily by using the design features built into the Distal Jet. Before the appliance is constructed, review and mark the patient's working model for rotational corrections where indicated. The lab fabricates the bayonet with correction bends incorporated in the double-back section that inserts into the lingual sheath. In this way, the Distal Jet functions like a transpalatal bar (TPB), effecting the required rotational correction while maintaining full control of the molars in three planes of space. The lab pre-activates the appliance but, in this instance, do not remove the stabilizing wire after cementation. Check the progress at the next appointment. After molar rotations are corrected (usually four weeks), remove the stabilizing wire to initiate distalization automatically **(Figure 2)**.

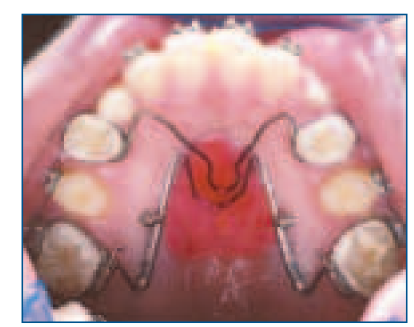

Figure 2. Newly enhanced Distal Jet activated for molar distalization.

TIP #2 – Whenever possible, use the first bicuspids as the anchor teeth. There are distinct advantages of using the first rather than the second bicuspids.

- The first bicuspids require shorter connector arms (wires) to the Nance button, which provides more rigid support, resistance to force, and anchorage stability than the second bicuspids.
- The second bicuspids benefit from the natural distal drift (driftodontics) that accompanies molar distalization, eliminating their need for active retraction and anchorage; however, if the space doesn't close completely on its own, use light tease-back mechanics to finish.

TIP #3 – After cementing the Distal Jet, grasp the occlusal and gingival walls of the sheath and squeeze down gently on the bayonet wire to secure it in the lingual sheath. This will establish a solid connection and maintain positive molar control.

TIP #4 – For patient comfort, place a large elastic separator around the bayonet-sheath interface to create a soft cushion around the area, filling any voids between the parts and smoothing any sharp corners. It also adds additional security to the connection of these parts. Check and replace the separators at each appointment.

TIP #5 – When using the activation wrench, maintain a slight downward pressure in the recess of the screw head before loosening or tightening the screw and make sure it's completely seated to minimize stripping out the parts.

TIP #6 – Do not overtighten the screw during molar distalization. Overtightening can make the Distal Jet inoperable and if the wrench is not seated completely, it can lead to stripping the parts. Tighten the screw just sufficiently enough to hold the lock in position and maintain spring compression.

TIP #7 – To convert the Distal Jet from an active appliance to a molar retainer after distalization **(Figure 3)**, tighten the screw into the lock as completely as possible. This will deform the tube of the bayonet director against the bayonet and create a rigid connection among all three components – bayonet, tube and lock. The objective at this time of the retention period is to stabilize the molars and allow the bone to reorganize around their roots.

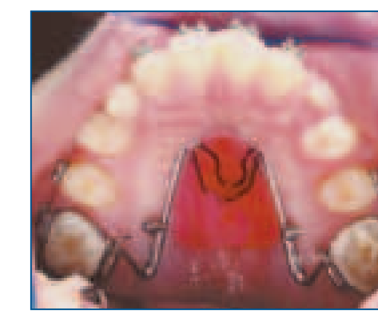

Figure 3. Distal Jet converted into a Nance molar holding appliance.

CONCLUSION

The purpose of introducing change in any established, accepted device can have only one rationale: simplification and/or improved efficiency and effectiveness of an appliance and its clinical application. With these new enhancements, the diameters of the three independent components (lock, spring, and stop) that comprise the force delivery unit of the Distal Jet have been coordinated to transition seamlessly and smoothly from one component to the other. The net effect is a uniform, clean and compact unit that further enhances the functional capability of the appliance.

For a reprint of Dr. Aldo Carano and Mr. Mauro Testa's JCO article, The Distal Jet for Upper Molar Distalization, Vol. XXX, No. 7, 1996, call AOA/Pro in Sturtevant, Wisconsin, at (800) 262-5221 or (262) 886-1050 or call the Enfield, Connecticut, facility at (800) 826-2224 or (860) 741-3745.

REMOVABLE SPLINT HERBST TREATMENT OF ANTERIOR DISC DISLOCATION

by Eugene H. Williamson, D.D.S., M.S.

Over the years there has been a lot of interest in anterior displacement of temporomandibular joint discs.[1-3] In this condition, the disc is usually anterior and medial or lateral to its normal position with respect to the mandibular condyle, and the medial and lateral ligaments that attach the disc to the condyle are usually stretched or ruptured and thus allow independent disc movement. As the mandible translates and rotates in the opening movement, the anterior dislocation may be reduced as the condyle slips onto the disc, causing a clicking noise at the joint. Patients with this condition often complain of pain and discomfort and require treatment.

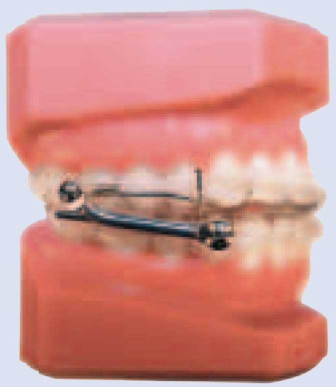

Figure 1. For asymmetric advancement, you can add a shim (not shown) to the Herbst mechanism.

In 90% of these types of cases, repositioning the mandible in the reduced position with a splint mechanism until repair/regeneration occurs has been proven effective.[4] Acrylic splint appliances have been the most popular method for accomplishing this task. However, some patients seem to have difficulty posturing their mandible in a forward position unless strictly guided by an appliance such as the removable acrylic splint Herbst (**Figures 1 and 2**).

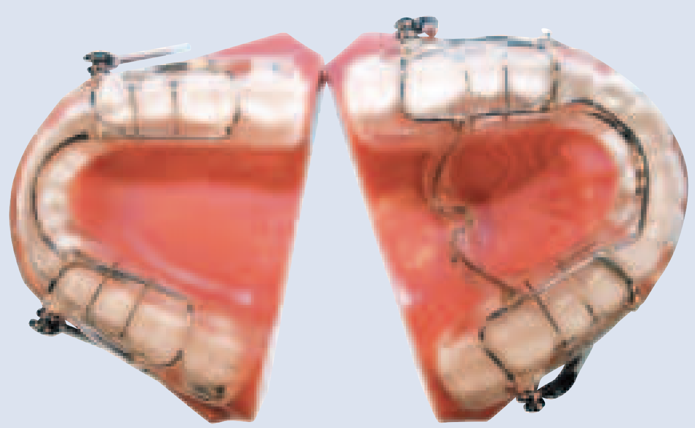

Figure 2. To open the bite posteriorly and unload the joints, you can add acrylic pivots (not shown) in the mandibular canine area on the occlusal surface of the lower member of the Herbst.

With the special features of the removable acrylic splint Herbst, you can make one side longer by adding a shim when asymmetric advancement is needed. Also, you can open the bite posteriorly and unload the joints by adding auto-cure acrylic cone-shaped pivots in the mandibular canine area on the occlusal surface of the lower member of the Herbst. And during sleep, the splint Herbst holds the reduced mandibular position stable.

TWENTY-PATIENT STUDY

To study the effectiveness of the removable acrylic splint Herbst therapy, I selected 20 consecutive adult patients that I successfully treated with a splint Herbst appliance. Of these 20, there were 15 females and 5 males, 14 were 25 years of age or older, and with an age range from 18 to 39, the mean age was 29.8 years. Following splint Herbst therapy, all patients wore a superior repositioning splint to allow mandibular seating superiorly on the posterior slope of the eminence. These appliances were worn and adjusted until the mandible was stable and no longer changing position. This technique also determined the success or failure of repositioning therapy. If the disc dislocated when the patient was placed on the superior repositioning splint following the splint Herbst therapy and the patient returned to a painful state, treatment would have been considered unsuccessful and the patient would have been offered the choice of arthroplasty or returning to anterior repositioning using the Herbst. The average treatment time with the splint Herbst was 8.1 months with a range of 5 to 12 months. After following the subjects from 16 to 36 months after superior repositioning splint therapy, I found that all remained stable.

METHOD OF MEASUREMENTS

I assessed the effects of the splint Herbst appliance on facial morphology with the following measurements on pre- and posttreatment lateral cephalograms (**Figure 3**).

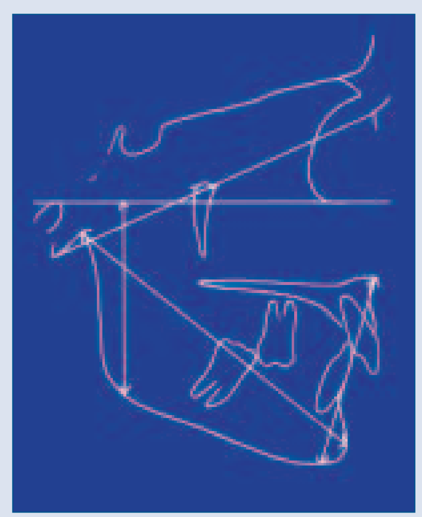

Figure 3. Typical cephalogram

- Articulare-pogonion – measured in millimeters.
- Posterior facial height – measured as a perpendicular from Frankfort horizontal to gonion. (A mandibular tracing was made and used on pre- and post-radiographs in order to standardize landmark identification.)
- Anterior facial height – measured from ANS to menton in millimeters.
- Lower incisor change – measured using the lower incisor-mandibular plane angle.
- Maxillary incisor change – measured by superimposing on ANS-PNS.

Dr. Eugene Williamson received his DDS and MS from Ohio State University and has a private orthodontic practice in Evans, Georgia, where he also teaches in-office courses and conducts research. He is a clinical associate professor of both orthodontics and plastic surgery (craniofacial anomalies), and he lectures internationally. He is past chairman of orthodontics at the Medical College of Georgia, Augusta. He was the editor and publisher of Facial Orthopedics and Temporomandibular Arthrology and has published research papers on TMD and muscle function. Dr. Williamson developed a technique using the diagnostic mounted model equilibration in making treatment decisions. He is a member of the SSO and AAO and is a Diplomate of the ABO.

MEASUREMENT RESULTS

Nineteen patients showed no change in the lower incisor-mandibular plane angle and one patient displayed a proclination of 3°. There was no change in maxillary incisors. The patients' pre- and posttreatment lateral cephalogram measurements were as follows:

	Average Increase	Standard Deviation	Range
Articulare-Pogonion	2.1 mm	1.4 mm	0.0 to 5.0 mm
Posterior Facial Height	1.8 mm	1.1 mm	0.0 to 4.0 mm
Anterior Facial Height	1.7 mm	1.6 mm	0.0 to +5.0 mm

DISCUSSION

The old axiom that mandibular length cannot be altered following the cessation of growth is not supported by this study since there was an average increase of 2.1 mm in articulare-pogonion. However, it must be remembered that all the subjects of this study had some degree of temporomandibular joint disc displacement.

McNamara, Hinton and Hoffman[5] and later, Schneiderman and Carlson[6] have demonstrated condylar cartilage proliferation in adult monkeys wearing functional-type appliances. McNamara's study showed that some monkeys responded with proliferation and some did not. Animals that responded favorably had more cellular cartilage and intact fibrous connective tissue on the articulating surface of the condyle. Schneiderman and Carlson demonstrated more consistent results in their work. In neither investigation was there evidence of pathosis. Rather, there was evidence of condylar adaptability in postadolescent animals.

Intact condylar fibrous connective tissue has also been demonstrated in human autopsy material from 40- to 50-year-old subjects. The fibrous connective tissue provides undifferentiated mesenchymal cells that may form prechondroblasts and, hence, initiate the process of remodeling.

CONCLUSION

Two possible explanations may be offered for the increased mandibular length and posterior facial height. The changes may be attributed to either condylar remodeling or replacement of the disc on the condyles, acting as a wedge between the condyle and the eminence and therefore increasing the distance from Frankfort horizontal to gonion. The latter seems to be a rational explanation, particularly in the case of a 4 mm increase in posterior facial height in one subject and a 5 mm increase in the length of articulare-pogonion in another. This posterior facial height increase is frequently observed immediately during surgical reduction of disc displacements. The result may be a posterior open bite. The etiology is usually a folded or misshaped disc due to its displacement, sometimes requiring surgical shaving of the disc.

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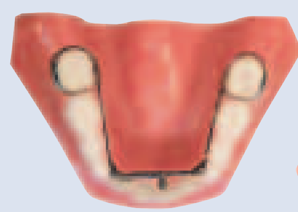

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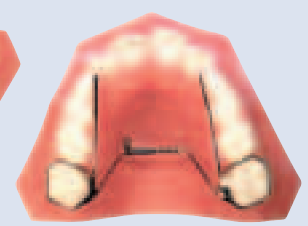

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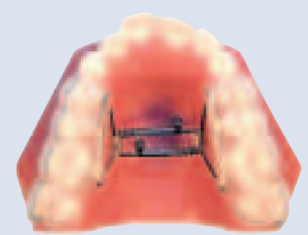

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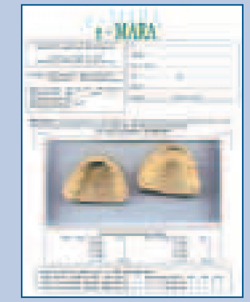

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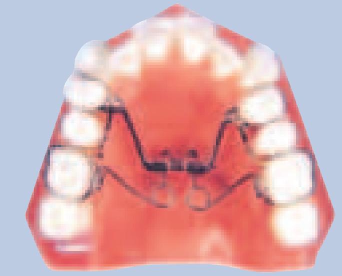

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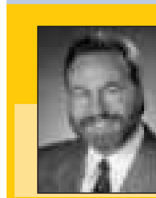

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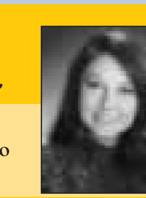

Paula and Max are always delighted to meet with you and your staff whenever possible. They are also available for presentations on a variety of laboratory and clinical topics for study club, alumni and society meetings. Give them a call to discuss a presentation or contact your Ormco representative to schedule a time to meet while they are visiting your area.

OCT.

- 5-8 **PACIFIC COAST SOC. OF ORTHO.** Monterey, CA (Max, Kevin & David)
- 16-17 San Francisco, CA (Paula)
- 18-19 **DR. TERRY DISCHINGER IN-OFFICE, COMP. HERBST TRAINING** Lake Oswego, OR (Paula & Kevin)

OCT. CONT.

- 15-16 Lubbock, TX (Max & John)
- 16-19 **SOUTHWESTERN SOC. OF ORTHO.** Houston, TX (Max & John)
- 23-27 **SOUTHERN ASSN. OF ORTHO.** Savannah, GA (Max, Paula, David & Dennis)

NOV.

- 1-4 **GREAT LAKES ASSN. OF ORTHO. & MIDDLE**
- 2-6 **ATLANTIC SOC. OF ORTHO.** Ponte Vedra Beach, FL (Max, David & Liz)
- 8-9 **DR. DWIGHT DAMON DAMON IN-OFFICE** Spokane, WA (Paula)
- 16-19 **NORTHEASTERN SOC. OF ORTHO.** New York, NY (Paula & Liz)

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- 12-13 Dallas, TX (Max)
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