The Pendulum Appliance...An Update

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Editor's Note: Due to the extraordinary popularity of the Pendulum Appliance, we have expanded this edition of *Clinical Impressions* to include this latest update from Dr. Hilgers on appliance improvements. For a comprehensive look at the diagnostic criteria for the Pendulum Appliance as well as its fabrication and use, please refer to Dr. Hilgers' article "The Pendulum Appliance for Class II Non-Compliance Therapy," *Journal of Clinical Orthodontics*, Vol. XXVI, No. 11: 706-714, November 1992.

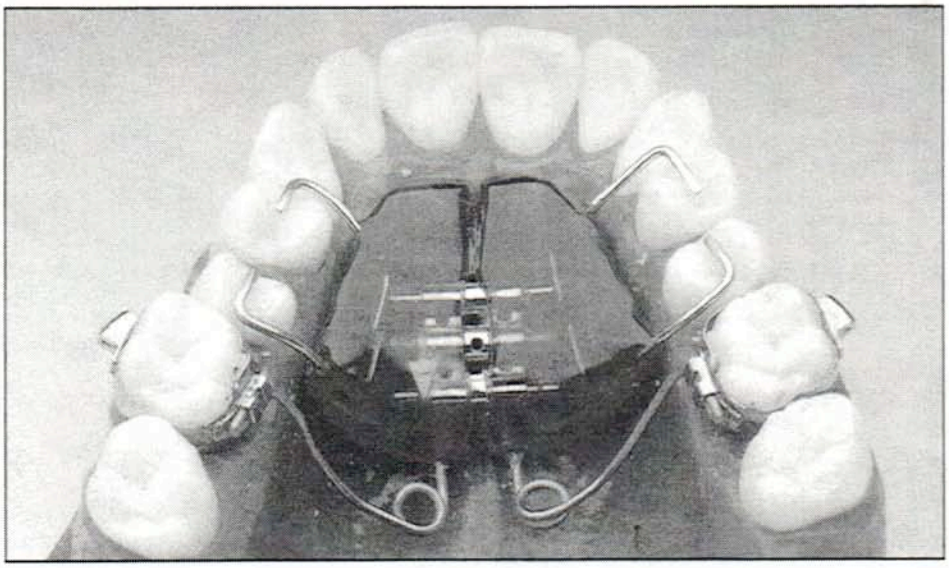

Figure 1
Updated design of Pendulum Appliance with expander (Pendex). Note 6-8 mm distal vertical shelf on Nance button from which lowered and curved Pendulum springs extend. Flattened retention rests are in the occlusal fossae of four anterior teeth. No horizontal adjustment loops are shown, as jackscrew effects desired expansion.

Since the introduction of the Pendulum Appliance over a year ago, it has proven to be an incredibly efficient and predictable source of non-compliant Class II correction. Subtle changes in the Pendulum Appliance have greatly improved patient comfort, eased appliance placement and activation, simplified design, enhanced stability and improved overall response. In this update, I'd like to highlight these changes for you.

1. Appliance design.

(A) In the original appliance, the pendulum springs were mounted in the center of the Nance appliance. This created a great deal of tongue irritation. The springs are now inserted into a 6 to 8 mm shelf on the distal of the large Nance button. They curve in the direction of the palatal vault so that the entire spring is virtually below the level of the acrylic. Whenever the patient's tongue touches the appliance in speech or swallowing, it contacts only the acrylic, greatly improving patient comfort. This also makes polishing of the acrylic Nance button easier (Figure 1).

(B) An expansion screw is incorporated in any case where some arch form or expansion is necessary (most Class II malocclusions); this is then referred to as a Pendex Appliance (Pendulum with expansion). This negates the need for a horizontal adjustment loop in the Pendulum spring, as expansion of the molars is handled by activation of the jackscrew, and further simplifies the

spring and enhances patient comfort.

(C) Whenever torque control on the molars is not necessary and an outward tipping of these teeth is desirable (again, most Class IIs), the distal extentions of these springs are not recurved into the molar lingual sheath. Rather, the .032 TMA wire is simply bent at a right angle to fit very loosely into the lingual sheath. This greatly improves ease of spring placement and readjustment and also helps avoid breakage at this critical point on the spring.

(D) The appliance is practically always bonded in place with four rests. In previous appliance designs, a banded first bicuspid was used as the sole retention of the Nance button. As the Pendulum springs

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Dr. Hilgers

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have a tendency to lift the back of the Nance button, there was often undesirable tipping of the bicuspid and tissue impingement at the anterior border of the appliance. Occlusal bonding of the appliance on both permanent and deciduous teeth has proved to be very stable and greatly simplifies appliance placement (Figures 2 A, B).

2. Appliance Fabrication.
I have found that it is not necessary to have a precise fit of the spring into the lingual sheath and that the appliance can be fabricated on a model without having the first molars even banded (or an impression of them). The laboratory can estimate the position of the lingual sheath quite accurately given the length and resilience of the TMA spring. I take the impression for the Pendulum Appliance at the time of initial records. Separators are placed and the molar bands cemented along with the Pendulum Appliance at the subsequent appointment. This aggressive approach greatly reduces the number of patient appointments necessary.

3. Appliance Placement.
The Pendulum springs are activated with a 90° bend in the center of the helices (so that they are then parallel to the mid-sagittal plane). Each distal extension of the spring is then fitted into the molar lingual sheaths using a Weingart plier. The appliance will be thrust forward of the palatal vault at this time. The occlusal surfaces of the anchor teeth have been previously etched. The appliance is pushed up against the palatal vault with finger pressure and bonded in place using a CR syringe to exude the bonding medium, followed by a mixture of the sealants to smooth the surface. The appliance is held in place for two minutes and then released.

4. Appliance Activation/Intra-Oral.
I have previously reactivated the Pendulum springs intra-orally to improve activity. This is cumbersome and can be somewhat uncomfortable for the patient. Over time, I have discovered that this reactivation is simply not necessary. If the appliance is preactivated and placed as I have described above, one needs only watch as the appliance expresses itself over a two to three month period. After the first three week period, I will instruct the patient to begin activation of the mid-palatal jackscrew. It is activated one turn every three days. Six-eight activations are ample in most Class II malocclusions (Figures 3 A, B, C, D).

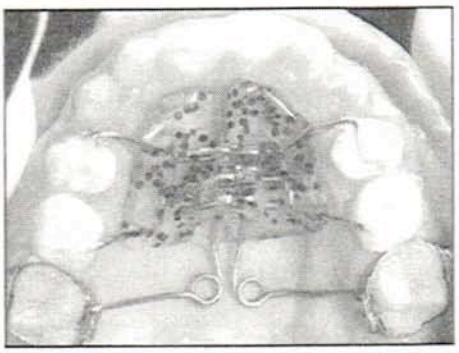

Figure 2A

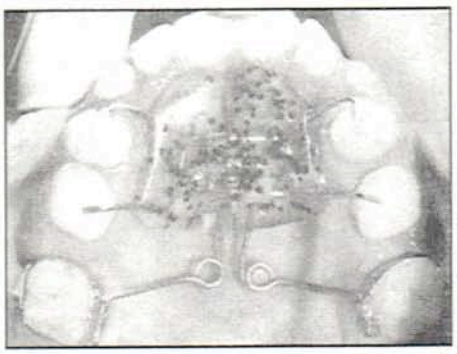

Figure 2B

Figures 2 A, B
New Pendex Appliance at initial placement (A) and after 8 weeks (B). Mid-palatal jackscrew was activated 5 times. Note the occlusal finger rests bonded into the distal fossae of the upper deciduous molars in this late mixed dentition case. Appliance is ready for removal.

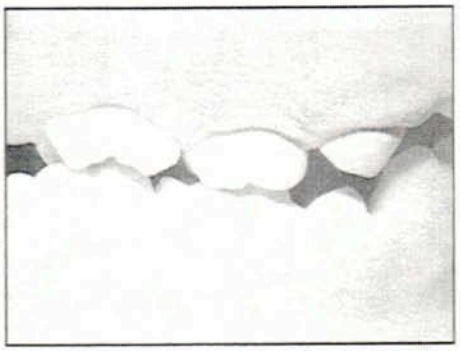

Figure 3A

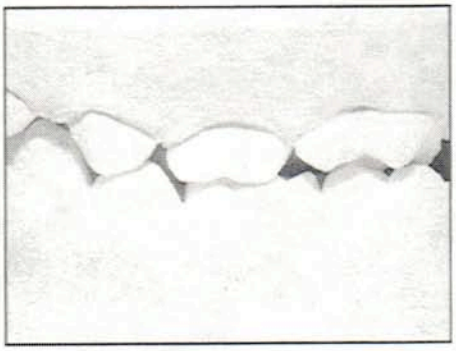

Figure 3B

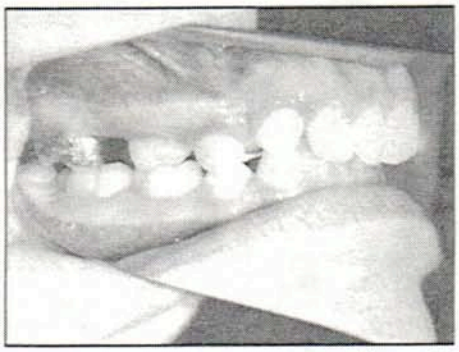

Figure 3C

Figure 3D

Figures 3 A, B, C, D
Buccal segment views of previously shown Pendex Appliance demonstrating the Class II correction in 8 weeks. Approximately 11 mm of space was created in the upper arch in this period of time. Approximately 80% of the space gain is distal movement of the upper molars, while 20% is forward movement of the buccal segments and settling of the Nance button.

5. Space Maintenance/Consolidation.
After appliance removal a Quick-Nance appliance is routinely placed. If the upper arch is bracketed, there is no attempt to retract the buccal segments immediately. Elastic chain to the buccal segments along with periodontal ligament rebound can serve to cause impingement of the smaller, stabilizing Nance button. When a archwire is placed, omega stops against the molar tubes help hold the molars in their distalized locations. The buccal segment teeth are then nursed back slowly to avoid anchorage loss or tissue impingement by the Nance button (Figures 4 A, B).

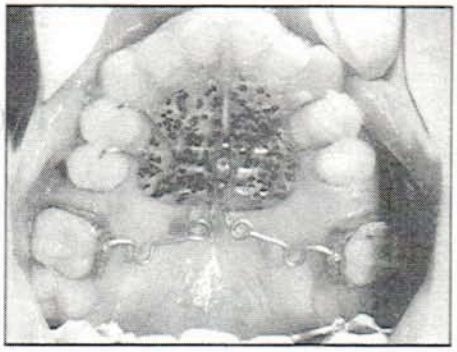

Figure 4A

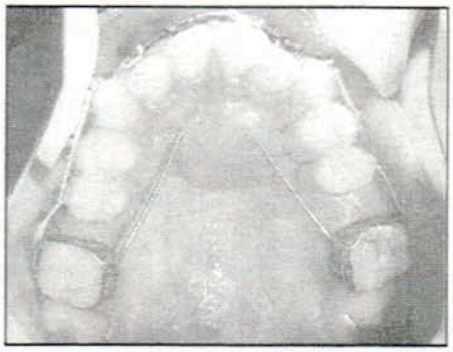

Figure 4B

Figures 4 A, B
A permanent dentition Pendex Appliance (with second molars in situ) 10 weeks after initial placement. Note horizontal adjustment loops used here to help effect disto-molar rotation (A). A Quick-Nance (Hilgers) placed immediately after Pendex removal. Archwire with omega stops at molar tubes further assists in anchoring the newly distalized positions of the molar teeth (B).

TMA .032 and .036 Wire for Lingual Applications

In addition to the Pendulum Appliance, Dr. Hilgers has developed other lingual appliances utilizing .032 and .036 TMA. They include the TMA R.P.E., the TMA Transpalatal Bar and the "W" TMA Appliance (a removable appliance designed to effect anterior arch form changes). TMA's moderate and predictable forces, formability, excellent flexibility and springback, and weldability make it the obvious choice for lingual appliances. TMA .032 and .036 sizes are available in packages of 10 14″ straight lengths. See Page D of the Center Section for order information.

The Human Element

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have a sign flashing over their heads that asks, "What's in it for me?" Every time we try to convince them of something, we should answer this question. Too often we tell patients why they should cooperate for reasons that are important to us (e.g., good dental hygiene). We need to explain the importance of "collaborating" for reasons that will be meaningful to them (e.g., being more popular at school).

- **You catch more flies with honey than vinegar**— Positive reinforcement is a much more powerful behavior modification tool than negative reinforcement. This should go without saying, but psychologists tell us that criticism is the communication vehicle of choice in our society. Often the patients that are the most difficult to work with are the ones most in need of our acceptance and support. If we can find one buccal section or one anterior tooth to compliment, we should take the opportunity to do so. Many offices have found reward programs helpful for this reason. For example, consider a version of "Batter Up." All children receive a baseball diamond to travel around at every visit. They reach one base each for on-time arrivals, good hygiene, appropriate elastic and headgear wear (or eating the right foods for patients who don't have elastics or headgear), and a happy, smiling disposition. Thus, they can earn a home-run at every visit. These home-runs add up to prizes as treatment progresses.
- **The more you resist resistance, the more resistance you get**— If patients aren't doing what you ask, this is a form of resistance. If you become critical, this is resisting their resistance and now we have two opposing forces. Rather than matching force with force, explore the resistance and find out why it exists. Find out what the patient wants and turn the conversation into a problem-solving session where you and the patient try to find a solution together.
- **Redefine your treatment goals**— There will be occasions where a patient's priorities change and are no longer in sync with yours. Constant badgering can irreparably damage the relationship (keep in mind this patient's referral potential), increase the office's stress and usually does nothing to improve cooperation. We need to have a meeting of the minds at some point where we decide, in a non-judgmental fashion, what the appropriate next steps are. This may include switching to mechanics not dependent on patient cooperation, considering surgery, accepting compromised results or terminating treatment.

Those of us who grew up in an authoritarian environment may find this notion of patient collaboration difficult to accept. Others aim for a patient partnership approach, but don't really achieve it. I would ask you to think about the way you and your staff approach "collaboration" problems and observe the interactions when they occur. My guess is that you will see a great deal more one-way instruction than two-way problem solving. If this is the case, I believe you and your practice will benefit from giving this approach a try.