

The Banded Herbst Appliance

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According to an unpublished survey of orthodontic laboratories, the Herbst* appliance has become one of the most popular mechanisms for the correction of Class II malocclusions.¹ This is undoubtedly due to orthodontists' desire to find a technique that requires a minimum of both patient cooperation and clinical chairtime.

The Class II correction afforded by the Herbst appliance occurs through a combination of skeletal and dental changes brought about by forward repositioning of the mandible.²⁻⁷ The Herbst has proven useful in correcting Class II molar relationships, midline discrepancies, and excessive overjet and overbite.^{2,6,8} It also provides excellent anchorage for closure of extraction sites or spaces from congenitally missing posterior teeth.

In 1910, Emil Herbst was already repositioning mandibles forward with inclined planes, but he observed that most patients avoided the stress of holding the jaw forward simply by opening their mouths slightly.⁹ He subsequently developed the Herbst appliance, which advanced the mandible while allowing the simultaneous correction of overjet, overbite, and midline. This anterior correction was intended to provide a template for the later development of the posterior occlusion, which would ultimately secure and maintain the correction.

When Pancherz reintroduced the Herbst appliance in the 1970s,¹⁰ he showed a design that used orthodontic bands to secure the appliance to the molars. Pancherz used thick, custom-made bands, however, and clinicians who tried conventional orthodontic bands soon found that they tended to split from the stress placed on them. This led many to try other means of securing the appliance. Bonded acrylic splints proved too difficult to remove and carried the risk of enamel decalcification.^{5,6,11} The stainless steel crowns proposed by Langford¹² saved the Herbst from abandonment in the United States, and several

clinicians subsequently suggested creative modifications of this design.¹³⁻¹⁷

Although stainless steel crowns are currently the most popular means of retaining the appliance, they have a few disadvantages:

- They do not adapt closely to the teeth.
- They open the bite too much and interfere with chewing.
- They impinge on the gingiva.
- They are difficult to remove.

To overcome these problems, I have begun attaching the Herbst to bands made from a thicker metal—.010"*** instead of the usual .007". Construction and delivery of the banded Herbst appliance are outlined in this article.

Clinical Preparation

Facial and lingual cleats should be prewelded to the bands to serve as guides for accurately positioning the bands in the alginate impression (Fig. 1). The bands are then fitted to the maxillary and mandibular molars.

Before the wax bite is registered, I have the patient practice in front of a mirror (Fig. 2). The patient will typically bite with the incisors edge-to-edge. If a skeletal midline discrepancy exists, the patient should be encouraged to align the midlines while the wax bite is taken (Fig. 3). If there is a dental midline discrepancy, its correction can be completed after the Herbst is removed and full brackets are placed. If the pretreatment overjet is 6mm or more, I take the bite registration short of the edge-to-edge position and then advance the mandible in gradual increments.

Alginate impressions are made of the arches, and the bands are cemented in place in the

*Registered trademark of Dentaurum, Inc., 10 Pheasant Run, Newtown, PA 18940.

**TP Orthodontics, Inc., 100 Center Plaza, LaPorte, IN 46350.



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alginate with super glue (Fig. 4). The impressions should be poured with dental stone as soon as possible. A laboratory prescription is filled out, including any special features the clinician may need in the Herbst construction (Fig. 5). The prescription, the wax bite, and the plaster casts containing the bands are forwarded to the laboratory.

Brackets are bonded to the maxillary incisors at this appointment, and a sectional wire is placed to align those teeth before the Herbst is delivered at the next appointment. This is particularly helpful with Class II, division 2 patients whose incisors need alignment and advance-

ment. The molars should be separated about a week before delivery of the appliance to provide adequate band space.

Laboratory Construction

Although the .010" bands are less likely to split than conventional bands, .051" reinforcing wires should be soldered to the distal occlusal margins of the mandibular bands to give them even more bulk and strength (Fig. 6). The



Fig. 1 Cleats bent out prior to taking impression or wax bite.



Fig. 3 With skeletal midline deviation, patient should center midline if possible for bite registration.



Fig. 2 Construction bite practiced in front of mirror.



Fig. 4 Bands glued into impression by clinician.

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HERBST APPLIANCE / Rx

<input type="checkbox"/> PHONE ME REGARDING THIS CASE <input type="checkbox"/> SPECIAL INSTRUCTIONS ON FILE <input type="checkbox"/> NEW ACCOUNT <input type="checkbox"/> ADDRESS CHANGE	SEND ADDITIONAL <input type="checkbox"/> RX SHEETS <input type="checkbox"/> MAILING LABELS
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Doctor Michael B. Rogers, D.D.S.
 Address 3545 Wheeler Road
 City Augusta State GA Zip 30909
 Telephone 706-733-1182 Fax 706-738-1514
 Patient Name John Door
 Date Shipped 6/28/01
 Date Needed 7/23/01

SPECIALTY APPLIANCES

ORTHODONTIC LABORATORY SERVICES

ACRYLIC HERBST DESIGNS		ACCESSORIES	
<input type="checkbox"/> ACRYLIC SPLINT HERBST		<input type="checkbox"/> Archwire Tubes .018 .022	
<input type="checkbox"/> SLEEP DISORDER HERBST		<input type="checkbox"/> Upper <input type="checkbox"/> Lower	
	Upper Lower	<input type="checkbox"/> Acrylic Coverage - 2nd Molars	
<input type="checkbox"/> Labial Bow	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> Acrylic Cap - Upper Anteriors	
<input type="checkbox"/> Ball Clasps	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> Add Palatal Acrylic	
<input type="checkbox"/> Arrow Clasps	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> Bonded Acrylic Design	
<input type="checkbox"/> Expansion Screw	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> Add Debonding Screws *	

METAL HERBST DESIGNS	ACCESSORIES	CROWNS and BANDS
SPECIALTY DESIGNS Upper Lower <input checked="" type="checkbox"/> BANDED HERBST <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> CROWN HERBST <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> BANDED / CROWN COMBINATION <input type="checkbox"/> METAL UPPER / ACRYLIC LOWER DISCHINGER DESIGNS <input type="checkbox"/> ORIGINAL CROWN HERBST <input type="checkbox"/> CANTILEVER HERBST <input type="checkbox"/> DISCHINGER OTHER (diagram) SMITH DESIGNS <input type="checkbox"/> TYPE I <input type="checkbox"/> TYPE II <input type="checkbox"/> TYPE III HILGERS DESIGN <input type="checkbox"/> BAND / CROWN HERBST MAYES DESIGN <input type="checkbox"/> CANTILEVER HERBST	<input type="checkbox"/> Expansion Screw <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Ball Clasps <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Lingual Arch <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Upper HG Tubes <input type="checkbox"/> .045 <input type="checkbox"/> .061 <input checked="" type="checkbox"/> Upper AW Tubes <input type="checkbox"/> .018 <input checked="" type="checkbox"/> .022 <input type="checkbox"/> Lower AW Tubes <input type="checkbox"/> .018 <input type="checkbox"/> .022 <input type="checkbox"/> Occlusal <input type="checkbox"/> Center <input type="checkbox"/> Gingival <input type="checkbox"/> Optional Large Head Screws <input type="checkbox"/> Optional Lower Offset Arms <input type="checkbox"/> Send Shims _____ mm	<input type="checkbox"/> Specialty Appliances Provide and Fit Crowns/Bands - per diagram below <input type="checkbox"/> Crowns/Bands Enclosed with Case Specialty Seat - per diagram below <input type="checkbox"/> Add - Crown Debonding Holes <input type="checkbox"/> Add - Crown Vent Hole CIRCLE CROWNS TO BE SEATED R $\frac{6 \quad 5/e \quad 4/d}{6 \quad 5/e \quad 4/d}$ $\frac{d/4 \quad e/5 \quad 6}{d/4 \quad e/5 \quad 6}$ L CIRCLE BANDS TO BE SEATED R $\frac{6 \quad 5/e \quad 4/d}{6 \quad 5/e \quad 4/d}$ $\frac{d/4 \quad e/5 \quad 6}{d/4 \quad e/5 \quad 6}$ L

* Debonding Screws Great Lakes Orthodontics Herbst is a registered trademark of Orthodontics 4-08

SPECIAL INSTRUCTIONS _____

Fig. 5 Typical laboratory prescription.

mandibular bands are connected with an .051" lingual arch. In addition, .025" wires are soldered to the mesial occlusal margins of the mandibular and maxillary bands, and .045" reinforcing wires are soldered to the distal occlusal margins of the maxillary bands. Finally, .022" x .028" tubes are soldered to an .045" stainless steel wire mesial to the maxillary molar pivots, permitting archwires to be used for alignment and control of the maxillary anterior segment.

This design does not require occlusal rests on the second molars, because the support wire soldered to the distal surfaces of the maxillary bands prevents overeruption of the second molars. Although some have tried to use a cantilever Herbst design with bands, they have

reported excessive breakage.

Appliance Delivery

When the initial band fitting, wax-bite registration, impressions, and seating of the bands into the impressions have been done correctly, appliance delivery becomes a predictable 30-minute appointment. The appliance is tried in the mouth before cementation, with the rods and tubes inspected for proper length and to make sure they do not impinge on the ascending rami, which are now advanced (Fig. 7). The .051" mandibular lingual arch should lie no more than .5mm from the mandibular incisors. Excess length of the rods and tubes can be indicated with

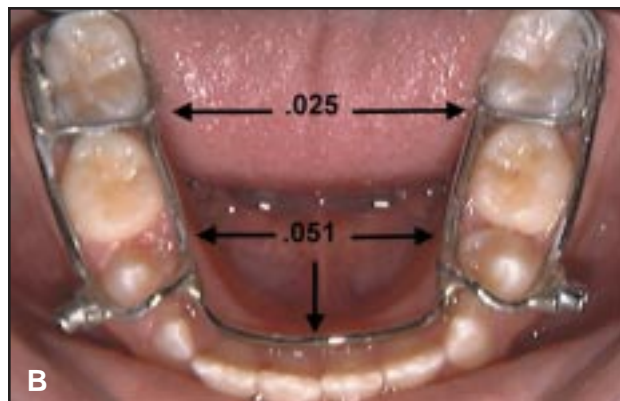


Fig. 6 A. Maxillary banded Herbst appliance. B. Mandibular banded Herbst appliance.

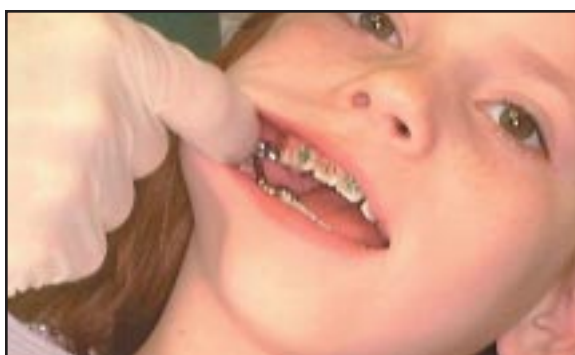


Fig. 7 Appliance checked to make sure pivot clears ascending ramus of mandible.



Fig. 8 Habit appliance.

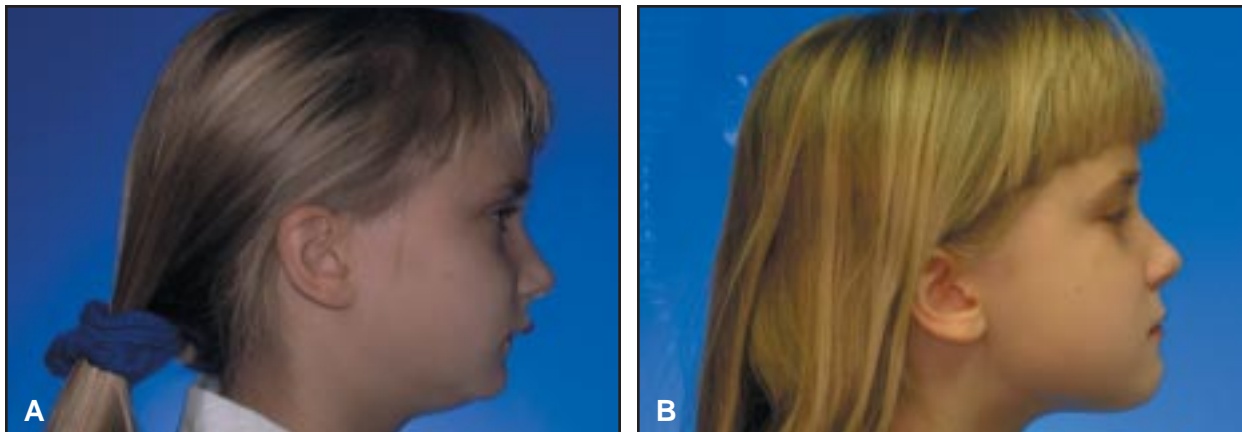


Fig. 9 A. Patient before treatment. B. Profile change immediately after Herbst insertion.

a permanent marker for subsequent cutting with a heatless stone.

Once the fit is satisfactory, the appliance is removed and dried. The screws and tubes to the maxillary pivots are then secured by placing Ceka Bond[†] on the screw threads, ensuring that the screws will not back out during treatment.

Prior to cementation, the molars are pumiced and cleaned as usual and etched with GC Ortho Conditioner,[‡] a 10% polyacrylic acid solution. Using Fuji I band cement,[‡] the maxillary molar bands are cemented to the teeth with the tubes attached to the pivots. The mandibular bands can be cemented more easily without the rods attached. Immediately after the bands are firmly seated, the excess cement should be brushed away with a disposable toothbrush. This saves considerable clean-up time and is more comfortable for the patient.

When arch development is needed, maxillary or mandibular rapid palatal expanders can be added to the Herbst appliance. The maxillary RPE should be turned once a day until the desired expansion is achieved; the mandibular screw is turned every other day. Once the expansion has been completed, the screws are secured



Fig. 10 Maxillary brackets and upper Herbst after removal as a unit.

with light-cured acrylic. Thumb cribs or tongue prongs for habit control can also be easily incorporated into this Herbst design (Fig. 8).

A big advantage of the Herbst is that patients and parents can immediately see an improvement in the facial profile, which boosts their enthusiasm and cooperation (Fig. 9). The greatest advantage I have discovered with this design, however, is its ease of removal when the Herbst phase of treatment is finished. The mandibular rods are removed first, while the upper tubes are left attached. The mandibular arch and bands are then taken out with a band-removing plier. The maxillary anterior brackets, archwire, and bands are removed as a unit, reducing the risk of the patient's swallowing a band (Fig. 10).

[†]Preat Corporation, Box 1030, Santa Ynez, CA 93460.

[‡]GC America, Inc., 3737 W. 127th St., Alsip, IL 60803.

Conclusion

No appliance is a panacea, but the advantages of this banded Herbst are significant:

- A minimum of teeth are involved—four maxillary incisor brackets, a single archwire, and four molar bands.
- Occlusal rests are unnecessary because of the crossover wire.
- The bands are easily fitted, and do not require the skill of fitting and trimming stainless steel crowns.
- A properly fitted appliance does not interfere with the occlusion.
- Try-in and cementation are quicker than with previous designs.
- Removal is fast, comfortable, and safe.

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