The Mini-Distalizing Appliance: The Third Dimension in Maxillary Expansion

JAMES J. HILGERS, DDS, MS
STEPHEN G. TRACEY, DDS, MS

Since its introduction more than a decade ago, the Pendulum* appliance has undergone numerous changes that have greatly improved patient comfort, ease of placement, stability, and overall treatment response. The Mini-Distalizing Appliance** (MDA) is the most recent version in this family of molar distalizers (Fig. 1). A hybrid appliance that incorporates the best features of both the Pendulum and the Compact RPE,** it is an excellent choice to expand the maxilla, distalize upper molars, create room for erupting cuspids, and unlock the anterior occlusion. It is truly a three-dimensional appliance.

The MDA's small, rigid design affords exceptional patient comfort without compromising effectiveness. Because it is a toothborne appliance with no palatal coverage, the problems of tissue impingement and access for hygiene are greatly reduced or eliminated.

*Ormco/"A" Company, 1717 W. Collins Ave., Orange, CA 92867.

**AOA/Pro Laboratories, P.O. Box 725, Sturtevant, WI 53177. A new version of the Compact RPE, called the Quick Expansion Device (QED), will be marketed by Ormco.

Dr. Hilgers

Dr. Tracey

Dr. Hilgers is a Contributing Editor of the *Journal of Clinical Orthodontics* and in the private practice of orthodontics at 26302 La Paz Road #202, Mission Viejo, CA 92691; e-mail: hilgersj@hilgersortho.com. Dr. Tracey is in the private practice of orthodontics in Upland, CA. Both authors are consultants for Ormco.

Appliance Fabrication

The core appliance is the Compact RPE, a simple spindle expansion screw that is unique in several ways. Its threaded screw will allow a full 11mm of expansion. An .080" stainless steel wire is brazed to the base of the spindle, and an axial crimp incorporated during the manufacturing process secures activation of the appliance. Two .036" × .072" lingual sheaths with locking niches are laser-welded to the base of the cylinder (Fig. 2).

Bands with brackets are fitted to the first bicuspids, and bands with lingual sheaths and

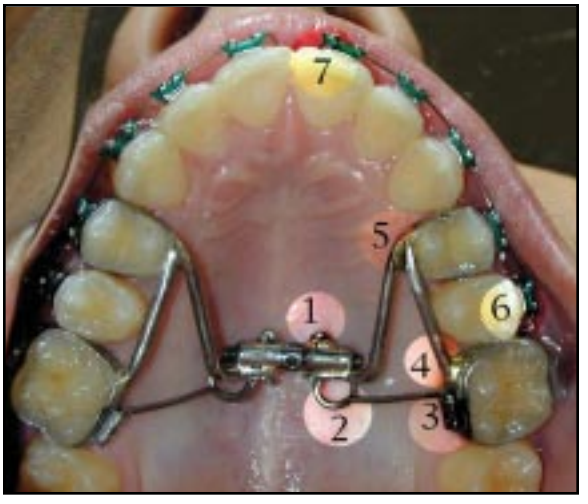

Fig. 1 Ideal MDA at placement, showing: Compact RPE (1) with .036" lingual sheaths laser-welded to palatal side of appliance; .032" TMA Pendulum springs (2) swaged into lingual sheaths, preactivated, and engaged in .036" lingual sheaths attached to molar bands (3); .045" stabilizing wire (4) soldered to mesial aspect of molars, extending forward and soldered to bicuspid bands (5); and sectional wire extending from second bicuspid (6) to midline (7).

Fig. 2 Preformed .032" TMA springs recurved and swaged into lingual sheaths welded to base of Compact RPE. Fragile TMA wire is not pinched completely closed, avoiding fracture and improving retention in larger .036" sheaths.

Fig. 3 MDA on cast before cementation, with helices of Pendulum springs canting upward and base of appliance kept at least 5mm away from palate to avoid tissue irritation.

buccal tubes to the upper first molars. An upper impression is taken and poured in Type I soft white plaster with the bands secured in place.

A heavy-gauge three-prong plier*** is used to bend the .080" wires attached to the Compact RPE into a "V" shape. The wires are then extended forward to the lingual of the first bicuspid bands and soldered to the bands. Two .045" stabilizing wires are extended from the bicuspids to the molars to add rigidity, simplifying the placement of the MDA as a single unit and improving overall expansion while rendering the preactivated distalizing springs passive during the expansion phase. This completes fabrication of the base appliance, which is then polished.

The preformed .032" TMA* Pendulum springs with recurved closed loops are swaged into the lingual sheaths at the base of the Compact RPE. The entire complex should be kept at least 5mm away from the palate to avoid impingement on the tissue (Fig. 3).

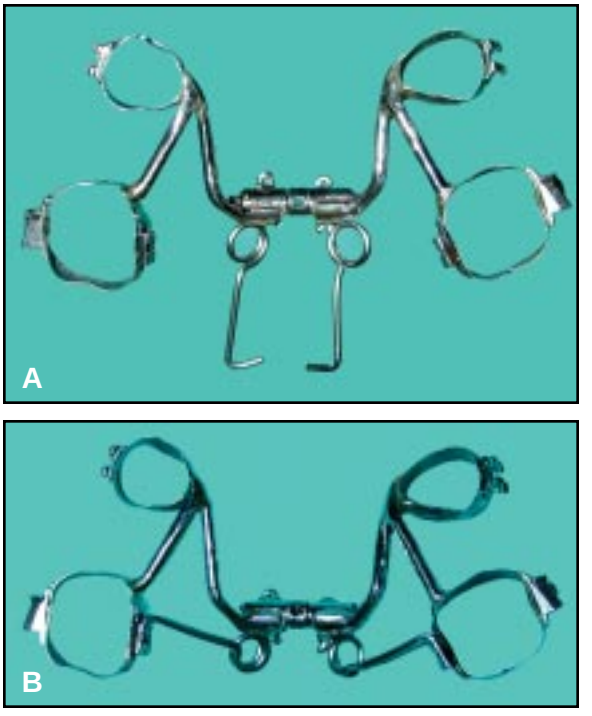

Fig. 4 A. Correct activation of Pendulum springs, parallel to midline. B. MDA ready for cementation, with preactivated Pendulum springs engaged in lingual molar sheaths. Stabilizing wires are soldered as contact joints on mesial of bands, allowing easy spring insertion.

Activation and Placement

Each Pendulum spring is activated toward the midline by holding the center of the helix

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***Part No. 0902030, OIS Orthodontics, 3890 Park Central Blvd. N., Pompano Beach, FL 33064.

with a bird-beak plier, producing about 250g of distalizing force (Fig. 4). A right-angle bend at the end of each preactivated spring produces a 5mm extension that is engaged in the lingual molar sheath.

Anchorage for molar distalization is derived from the upper dentition, requiring bracket placement at the time of appliance delivery. Sectional .014" or .016" nickel titanium archwires extending from the midline to the second bicuspids allow the maxillae to separate. If the cuspids have not erupted completely, lightly activated push-coil springs on the sectional wires can hold or increase space for them.

Expansion and Molar Distalization

The patient is instructed to turn the expansion screw twice a day and is seen again in 10 days. The upper arch should be slightly overexpanded, so that the lingual cusps of the upper arch rest on the buccal cusp tips of the lower arch. When the desired amount of expansion has been achieved, the threads of the expansion screw are coated with light-cured composite so the screw will not turn back with toothbrushing or flexing of the appliance. The sectional wires are then removed, and a continuous archwire is placed from second bicuspid to second bicuspid to further align the anterior segment and close anterior spaces while the molars are being distalized.

After completion of lateral maxillary expansion, the stabilizing wires to the upper molars are severed with a crown-cutting bur,

Fig. 5 After completion of lateral expansion, stabilizing wires are severed at molar bands with high-speed crown-cutting bur, releasing preactivated Pendulum springs. Note push-coil springs on sectional archwires to maintain space for erupting cuspids.

Fig. 6 Expansion and distalization after three months, showing overcorrection of Class I to mild Class III molar position, with buccal segments still Class II.

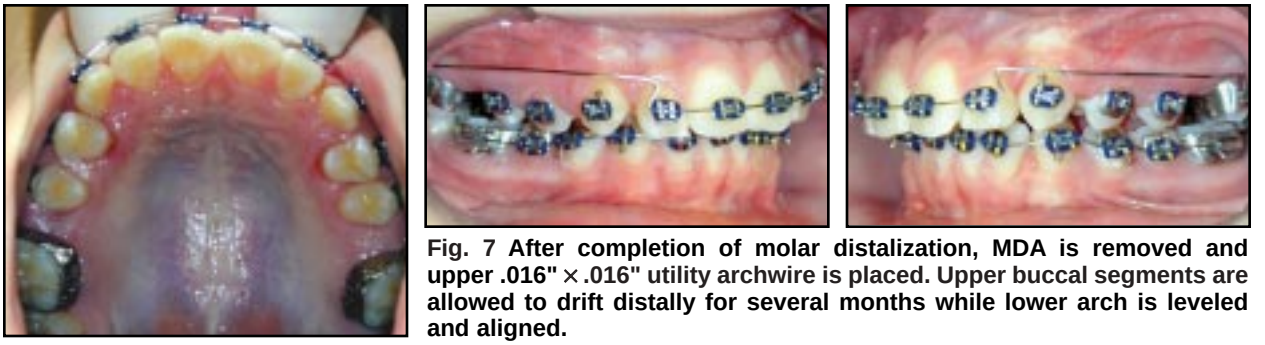

Fig. 7 After completion of molar distalization, MDA is removed and upper .016" × .016" utility archwire is placed. Upper buccal segments are allowed to drift distally for several months while lower arch is leveled and aligned.

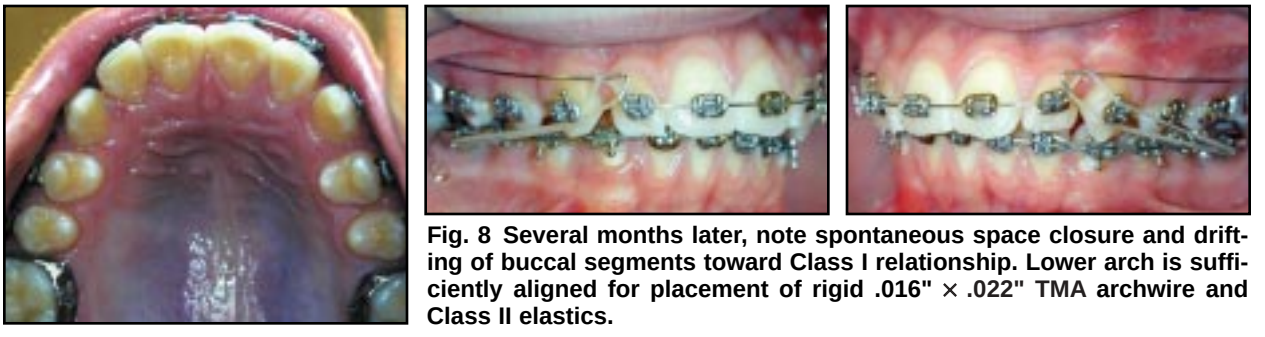

Fig. 8 Several months later, note spontaneous space closure and drifting of buccal segments toward Class I relationship. Lower arch is sufficiently aligned for placement of rigid .016" × .022" TMA archwire and Class II elastics.

thereby releasing the preactivated springs (Fig. 5). The upper molars are moved distally into an overcorrected Class I position, which usually takes two to four months (Fig. 6).

Stabilization and Drifting

The MDA is then removed, and the correction is stabilized with an upper utility arch, allowing the upper buccal segments to drift distally for several months under the forces exerted by the interseptal periodontal fibers. The posterior vertical legs of the utility arch should be stopped right against the upper molar tubes. Molar rotation is incorporated into the distal legs of the utility arch, but tipback is not usually needed.

In Class II, division 2 cases, the utility arch can be used to further advance and torque the incisors. Gable or Z-bends are incorporated into the anterior vertical steps of the utility arch for later attachment of Class II elastics. Passive drifting, which can take four to six months, results in spontaneous closure of most of the spaces without compromising molar position (Fig. 7).

To prepare the lower arch for Class II elastics, it should be bonded and aligned as soon as adequate overjet is achieved. Patience during this critical juncture will help avoid time-consuming loss of anchorage. Once Class II elastics can be worn to the upper utility arch, the residual spaces in the upper buccal segments can be closed with light elastic thread or power chain, leaving space mesial to the upper cuspids. This “active” drifting, using about 100g of force, can move the teeth some distance without excessive tipping. The essence of sectional mechanics is that it avoids the friction and anchorage loss that can occur when sliding mechanics are used along a continuous archwire. Tooth movement takes only three to six weeks, during which the patient should be seen at three-week intervals.

Following retraction of the buccal segments, the upper utility arch is removed and a

continuous, light round .014" or .016" nickel titanium, flexible rectangular .017" × .017" copper nickel titanium, or .016" × .022" Force 9* archwire is placed for leveling and alignment. Three to six months of these transition wires will stabilize the rapid movement that has occurred, establish proper archform, and help lock in a solid Class I occlusion (Fig. 8). No attempt should be made to close the spaces mesial to the cuspids until this process is completed.

Incisor Retraction and Finishing

The last major phase of treatment involves retraction, intrusion, and torquing (if necessary) of the upper incisors. An .016" × .022" TMA asymmetrical T-loop closing archwire is usually used to close anterior spaces (Fig. 9). This reverse-curve wire has loops between the incisors and cuspids that can be adjusted to the specific bite-opening and space-closure needs of each case (Fig. 10). It can also torque the upper incisors while maintaining a proper overbite-overjet relationship, thus avoiding incisal trauma.

Finishing and detailing are carried out once a Class I occlusion has been achieved. A lower rigid .016" × .022" TMA ideal archwire and an upper flexible round or rectangular archwire are used in conjunction with vertical triangle, anterior-vertical, or zig-zag seating elastics. The upper incisors are strongly re-engaged to establish anterior guidance, while Class II elastics are avoided, if possible, to help establish an accurate centric relation.

Retention usually involves a lower 3-3 bonded wire, an upper 2-2 bonded splint,**** and an overlay clear retainer worn only at night.

Case Report

A 11-year-old female presented with an end-on Class II, division 2 malocclusion (Fig. 11). She had a brachyfacial growth and muscular pattern, and the upper and lower incisors were in linguoversion. The upper second molars were still erupting, with "E" space available in both arches. Incisal trauma had compromised the tissue labial to the lower incisors.

The patient's blocked-out upper cuspids

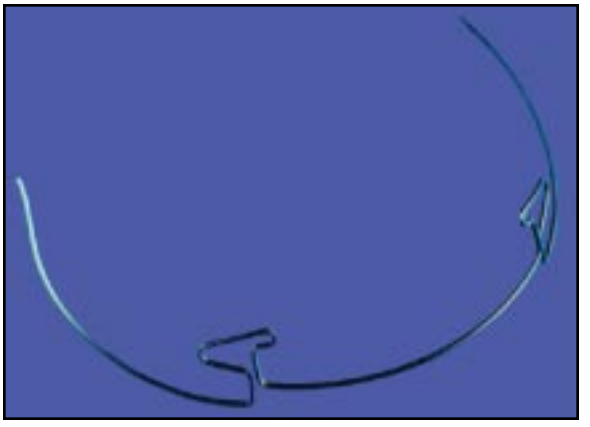

Fig. 9 Preformed .016" × .022" TMA asymmetrical T-loop archwire.

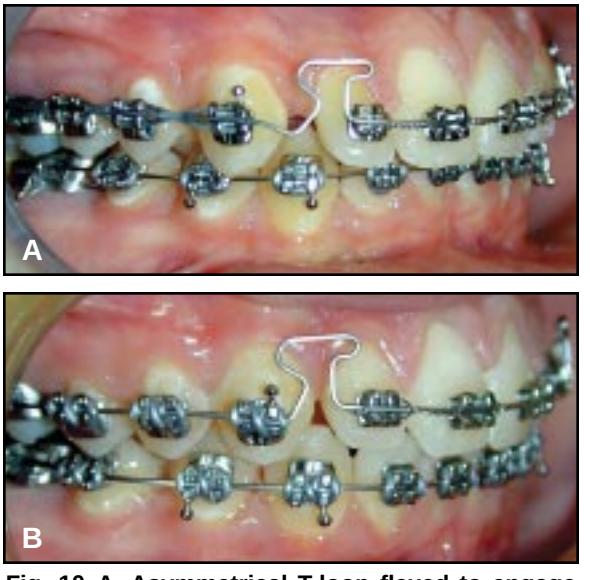

Fig. 10 A. Asymmetrical T-loop flexed to engage elongated and protrusive upper incisors. B. After six weeks of space closure and bite opening.

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****Bond-a-Braid, Reliance Orthodontic Products, P.O. Box 678, Itasca, IL 60143.

Fig. 11 11-year-old female patient with end-on Class II, division 2 malocclusion before treatment.

Fig. 12 A. Earlier version of MDA used in this patient. Note distalization of upper molars in three months, saving "E" space. B. Second deciduous molars bonded early in treatment to increase anchorage.

and the need for three-dimensional development of the upper arch made this case ideal for MDA therapy (Fig. 12). Distalization of the upper molars with the MDA conserved "E" space. The second deciduous molars were bonded early in treatment to enhance anchorage.

After three months with a utility arch as the sole source of maxillary anchorage, the buccal segments (both the permanent and the remaining deciduous teeth) had drifted distally, and the

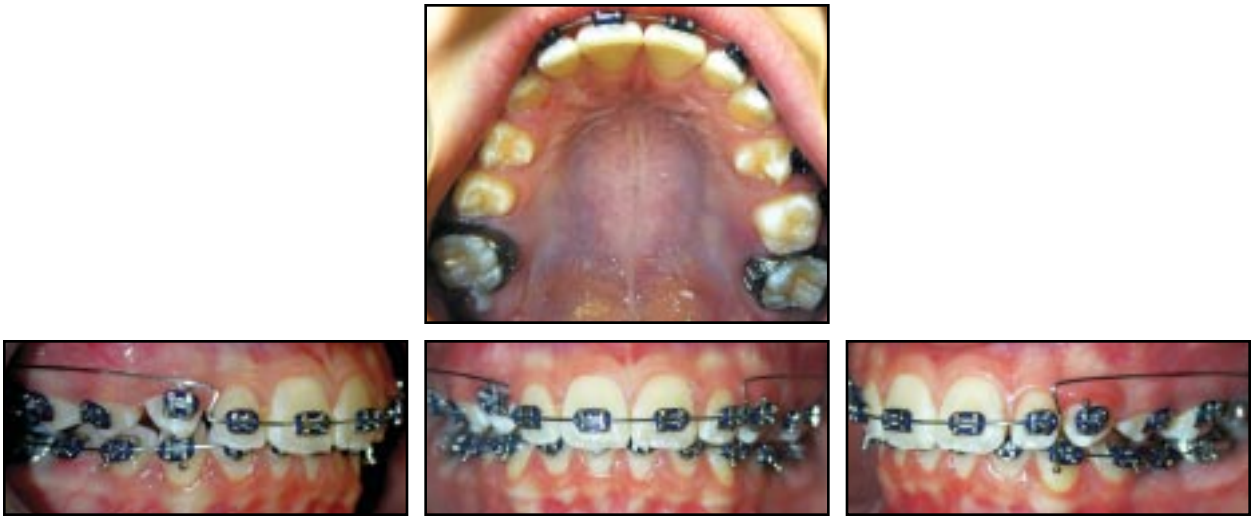

Fig. 13 After three months with utility arch as sole source of maxillary anchorage, buccal segments have drifted distally; blocked-out upper cuspids have completely erupted, and leveling and alignment of lower arch have been initiated.

Fig. 14 Six weeks later, residual spaces in upper buccal segments are closed with "active" drifting, using light elastomeric chain from upper molars to cuspids.

blocked-out upper cuspids had completely erupted (Fig. 13). Leveling and alignment of the lower arch were begun.

Once Class II elastics could be worn to the upper utility arch, the residual spaces in the upper buccal segments were closed with "active" drifting, using light elastomeric chain from the upper molars to the cuspids (Fig. 14). Leveling and alignment of the upper arch was finished in four months with .016" nickel titanium and .016" × .022" Force 9 archwires (Fig. 15). An asymmetrical T-loop archwire was then placed to cor-

Fig. 15 Leveling and alignment of upper arch finished in four months with braided .016" × .022" Force 9 archwire, leaving spaces mesial to cuspids.

Fig. 16 Deep anterior overbite corrected and remaining spaces closed in three months with asymmetrical T-loop archwire.

Fig. 17 Final idealization and detailing in five months with lower rigid archwire and upper flexible archwire.

rect the deep anterior overbite and close the wide spaces remaining mesial to the upper cuspids (Fig. 16).

Final idealization and detailing were achieved using lower rigid .016" × .022" TMA and .016" × .022" stainless steel ideal archwires and upper flexible .017" × .017" TMA, .016" × .022" TMA, and .016" nickel titanium archwires

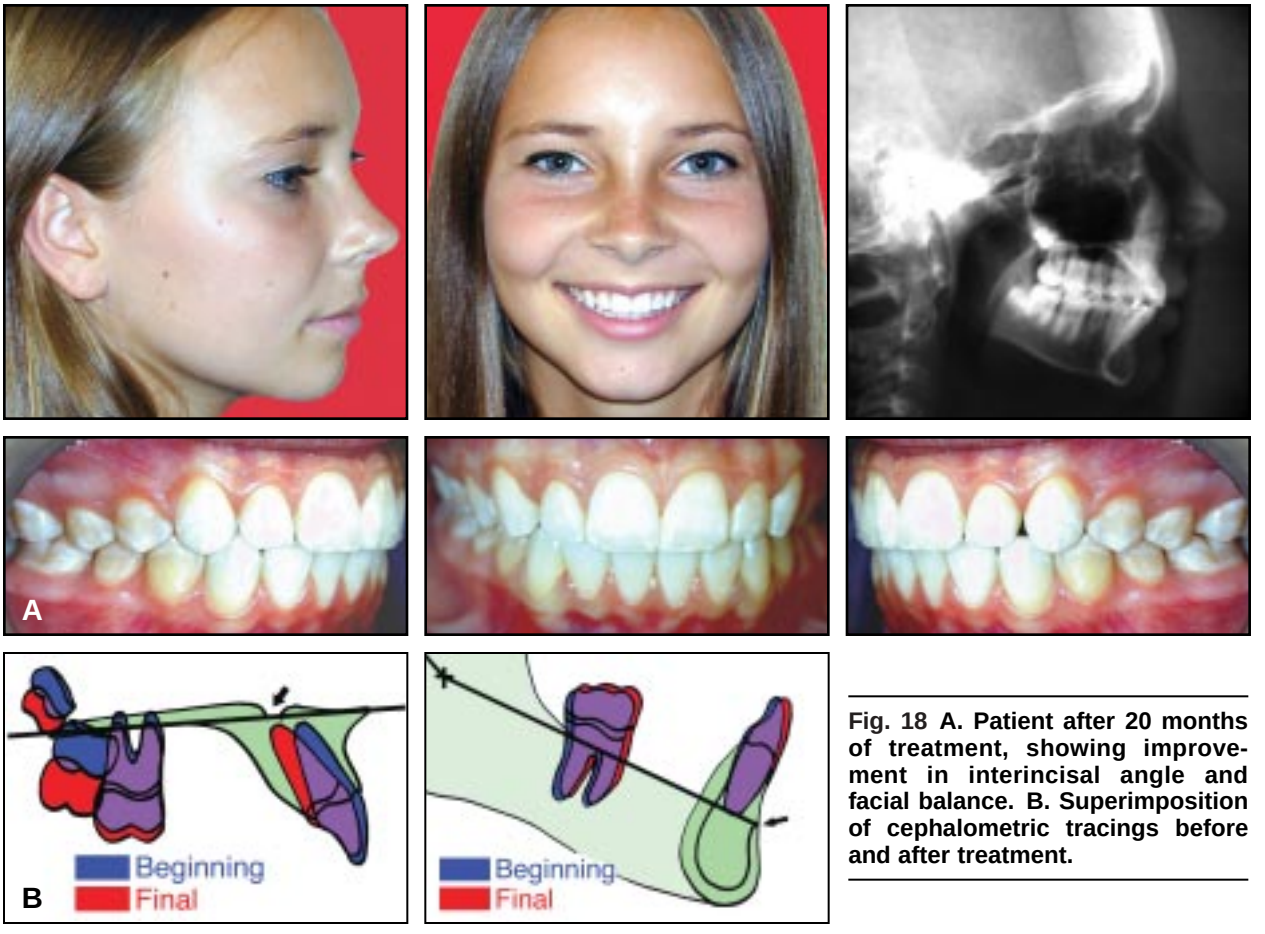

Fig. 18 A. Patient after 20 months of treatment, showing improvement in interincisal angle and facial balance. B. Superimposition of cephalometric tracings before and after treatment.

with seating elastics (Fig. 17).

After 20 months of treatment, the patient showed an improvement in the interincisal angle and excellent facial balance, all with minimal requirement for cooperation (Fig. 18).

Conclusion

Proper case selection is essential to treatment success with any appliance. The MDA should only be used in stronger muscular patterns where growth and subsequent mechanics can compensate for the transient bite opening that results from expansion and rapid molar distalization. Fortunately, about 65% of all Class II malocclusions fall into this category.

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