

The Greenfield Lingual Distalizer

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The Greenfield Molar Distalizer (GMD), introduced in March 1995,¹ is a fixed appliance with buccal and lingual pistons on each side (Fig. 1). Placing the pistons at the gingival level reduces the distance of the applied force from the

center of resistance of the molar (Fig. 2), minimizing the crown-tipping moments that are seen with other distalizers.^{2,3} Thus, the GMD produces bodily molar movement with almost no tipping (Fig. 3).



Fig. 1 Original Greenfield Molar Distalizer (GMD), with parallel buccal and lingual pistons banded to first premolars and first permanent molars.

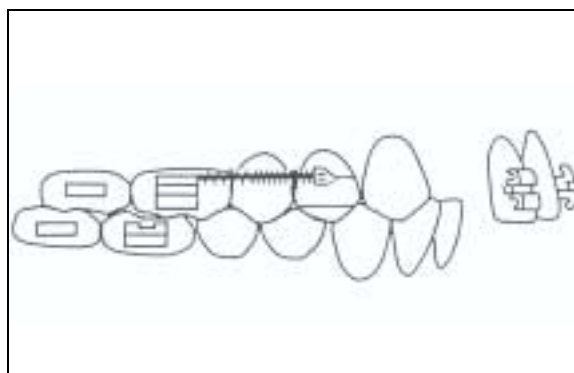


Fig. 2 Pistons placed at gingival level to avoid crown-tipping moments.

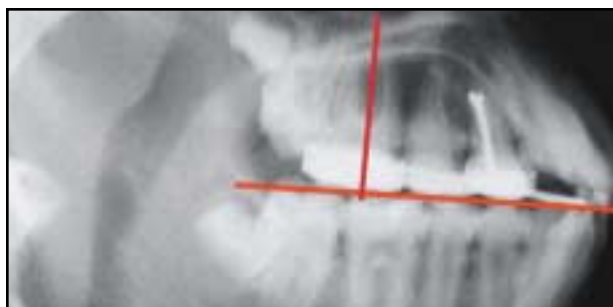
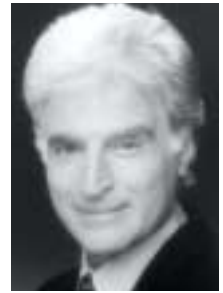


Fig. 3 A. Bodily movement of first molar with no apparent loss of anterior anchorage in case with unerupted second molar (nine months of treatment). B. Bodily distalization of first molar with insignificant loss of anterior anchorage in case with fully erupted second molar (10 months of treatment).



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There is virtually no loss of posterior anchorage during space closure, because the root lies directly below the crown. The appliance does not interfere with the occlusal plane, allowing vertical control to be maintained.

For precise application of a controlled, light force, a 2mm stop* is added to each piston every

eight weeks until the desired amount of distalization is achieved (Fig. 4). Each 2mm stop produces about 50g of force.

A number of variations of the GMD are possible, but each version requires an enlarged Nance button with enough surface area to counteract reciprocal forces (Fig. 5). The large acrylic button also helps the tongue neutralize any extrusive forces on the molars, which is helpful in hyperdivergent growth patterns. The GMD can be applied in early Class II treatment by using the deciduous second molars as anchor units, as long

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**Dentronix Corp., 235 Ascot Parkway, Cuyahoga Falls, OH 44233.



Fig. 4 A. 2mm split-ring stops placed every eight weeks for reactivation. B. Stop held with contra-angle optical plier.** C. Stop squeezed over mesial end of piston. D. Compression of superelastic nickel titanium open-coil spring, producing activation of about 50g.

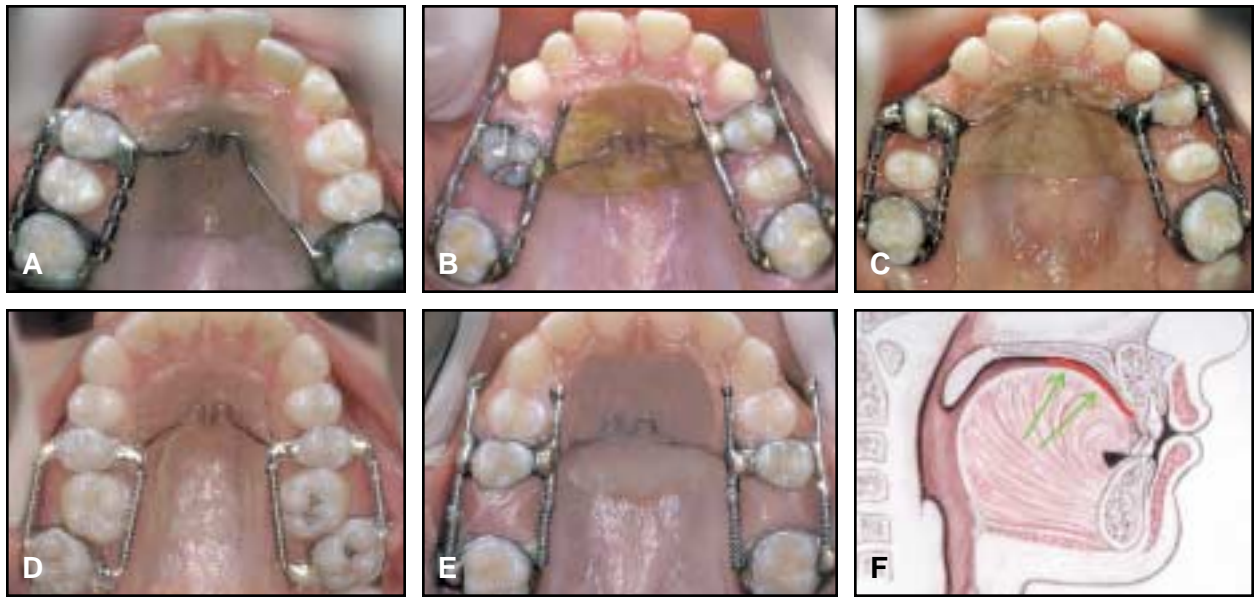


Fig. 5 Variations of GMD. A. Unilateral distalizer. B. First premolar used as anchor tooth on one side, second deciduous molar on opposite side. C. Canine used as anchor tooth. D. Second premolars and second molars used as anchor teeth for distalization of second molars. E. Second premolars used instead of first premolars in case requiring maximum anchorage, such as tongue thrust. F. Enlarged Nance button allows tongue to counteract extrusive forces on first molars.

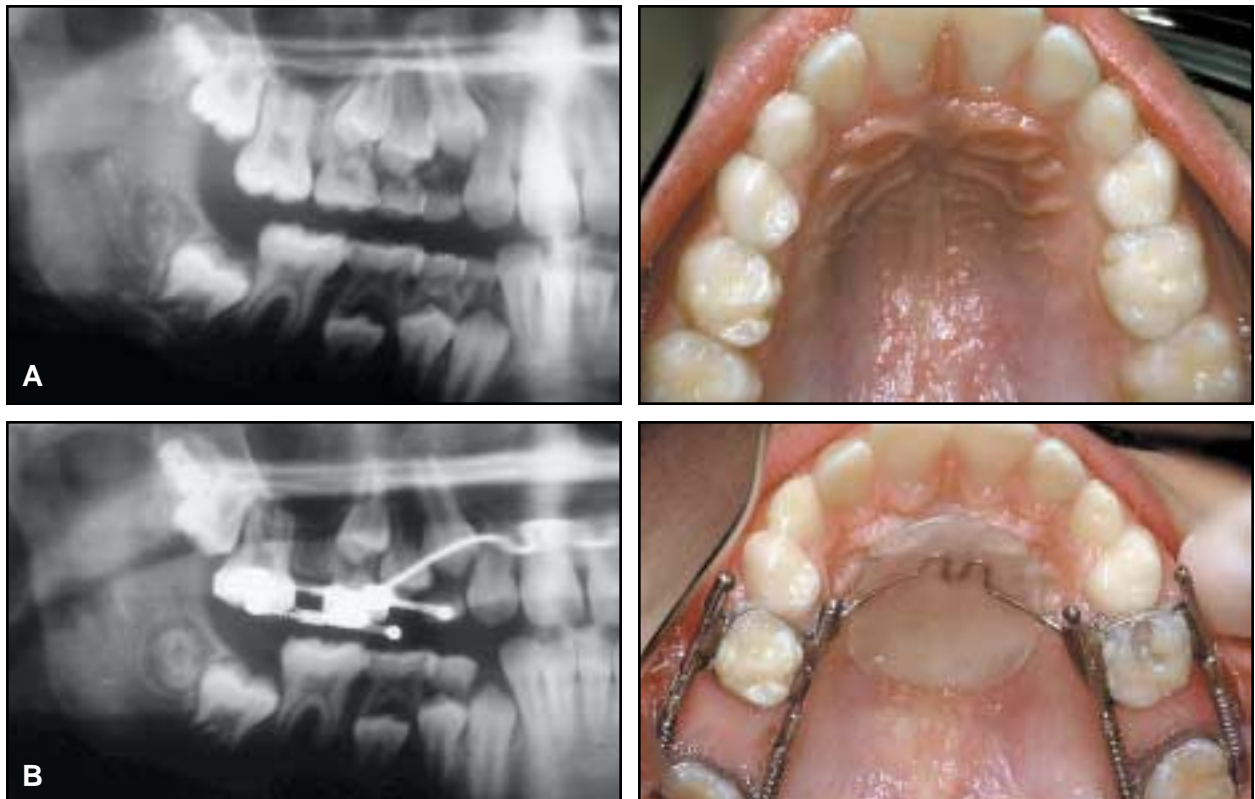


Fig. 6 A. Second deciduous molar used as anchor unit in early Class II treatment. B. Note bodily molar distalization.



Fig. 7 Expansion screws added to enlarged Nance buttons according to desired location of expansion. A. Opposite first premolars. B. Opposite second premolars. C. Opposite first molars.

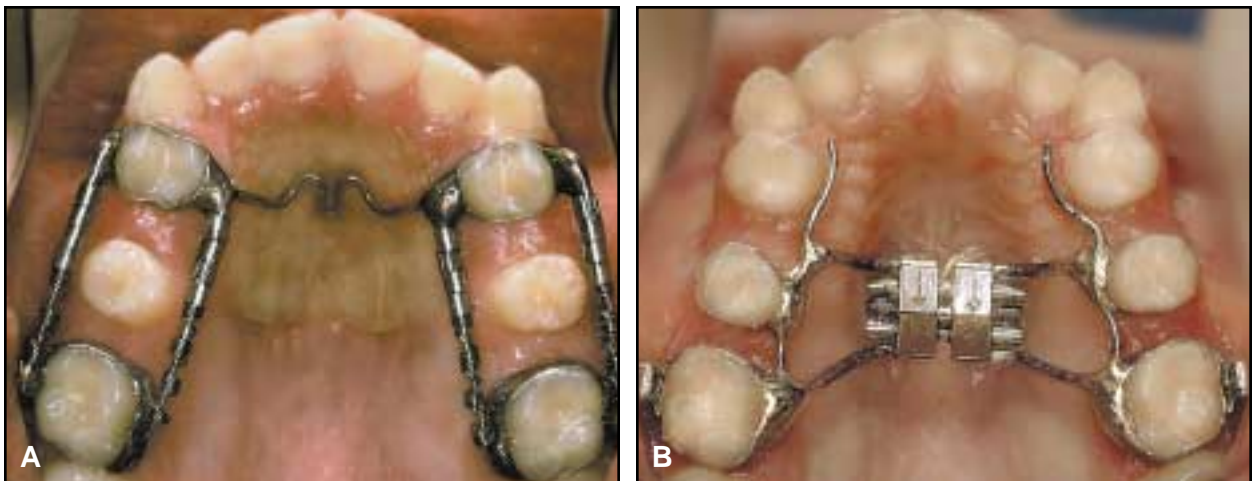


Fig. 8 A. Patient after molar distalization with GMD. B. GMD replaced by expander, with no loss of anchorage.

as at least half of the deciduous molar roots are still present (Fig. 6).

An expansion screw may be added to the enlarged Nance button at any point along the midline, allowing the expansion force to be applied anteriorly or posteriorly during distalization (Fig. 7). To maintain light forces, the screw should be activated no more than one-quarter turn every two to three weeks. Care must be taken not to overexpand the molars prior to distalization, which would move the distal aspect of the molar into the cortical plate and make distal molar movement impossible.⁴

The GMD can also be replaced by an expander using the same anchor teeth (Fig. 8). After molar distalization, the GMD is temporarily re-

moved, new bands are fitted, and an impression is taken for the expander. The GMD is reinserted with temporary cement until the expander is received from the laboratory. The distalizer is then removed, and the expander is cemented immediately, preventing any relapse during the conversion.

The appliance is extremely comfortable and esthetic. It does not require any special patient compliance beyond adequate oral hygiene.

Lingual Distalizer

The newest design of the GMD, the Greenfield Lingual Distalizer*** (GLD), applies the distalizing force only from the lingual of the



Fig. 9 A. New Greenfield Lingual Distalizer (GLD), with Twin Piston Modules on lingual side only. B. Occlusal piston is at gingival level, as in original GMD, but palatal piston is at least 5mm deeper in palatal vault.

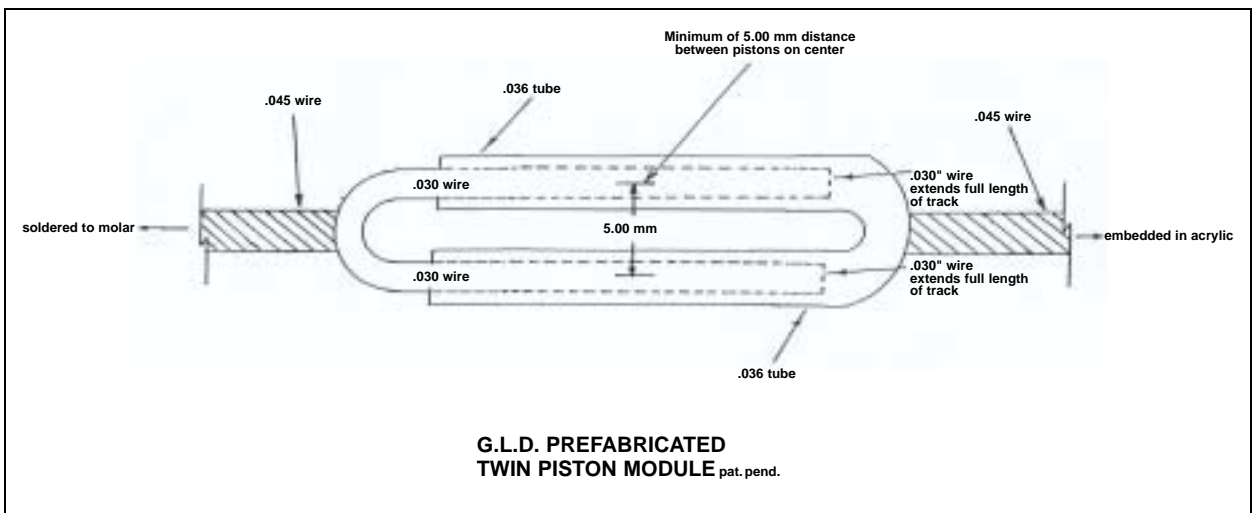


Fig. 10 Pistons should be at least 5mm apart on center (6.5mm between outer surfaces). This allows force of palatal piston to be directed through center of resistance of first molar and provides sufficient space for splitting stops on both pistons.

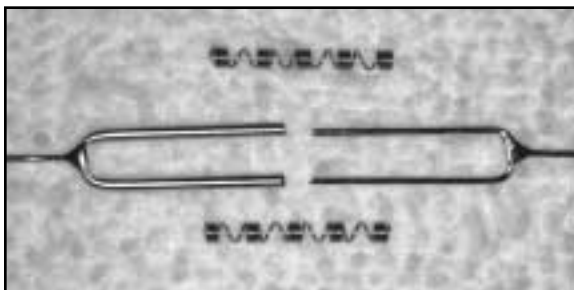


Fig. 11 Components of Twin Piston Module: .030" stainless steel wire assembly and .036" sleeve, each with .045" stainless steel extension; super-elastic nickel titanium open-coil springs with .055" internal diameter.

maxillary molars, utilizing Twin Piston Modules*** (Fig. 9). The occlusal piston is placed at the gingival level, but the palatal piston is at least 5mm deeper in the palatal vault (Fig. 10). Thus, the palatal piston transmits the force directly through the center of resistance of the molar to avoid tipping.

Each Twin Piston Module consists of an

***Registered trademark of Dr. Raphael Greenfield, 9327 W. Sample Road, Coral Springs, FL 33065. Patent pending. Available from GAC International, Inc., 355 Knickerbocker Ave., Bohemia, NY 11716, and nX Orthodontic Services, LLC, 9381 W. Sample Road, Coral Springs, FL 33065.

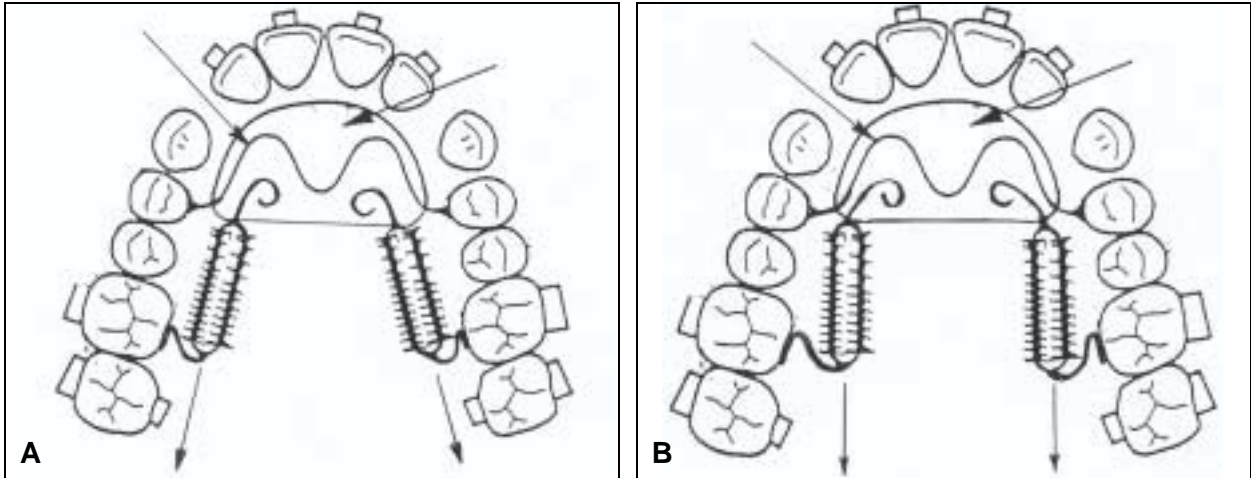


Fig. 12 A. Divergent Twin Piston Modules increase arch width as molars are distalized. B. Parallel modules keep arch width constant.



Fig. 13 Bondable lingual pad can be substituted for first premolar band to enhance esthetic appearance of GLD.

.030" stainless steel wire assembly that fits into an .036" sleeve (Fig. 11). Soldered extensions of .045" stainless steel wire are used to attach the module to the molar on one end and to the acrylic of the Nance button on the other. Superelastic nickel titanium open-coil springs with an .055" inside diameter fit over the sleeves for force delivery. The modules are entirely prefabricated, ensuring parallelism of the pistons and virtually eliminating friction as the mechanism slides. The pistons can travel 10-12mm before disengaging—more than enough for overcorrection.

The clinician can adjust the angle of the distalizing force to suit the requirements of the case (Fig. 12). Opening the angle adds expansion during distalization; closing the angle reduces ex-

pansion. A parallel configuration should be used if the bone on the buccal surface of the molar root is thin.

The premolar band of the GLD can be replaced with a bondable lingual pad, making the appliance essentially invisible when the patient smiles (Fig. 13). This esthetic enhancement is especially appealing to adult patients.

Case Report

A 12-year-old male presented with a Class II malocclusion and a history of finger sucking until age 7. The second permanent molars were

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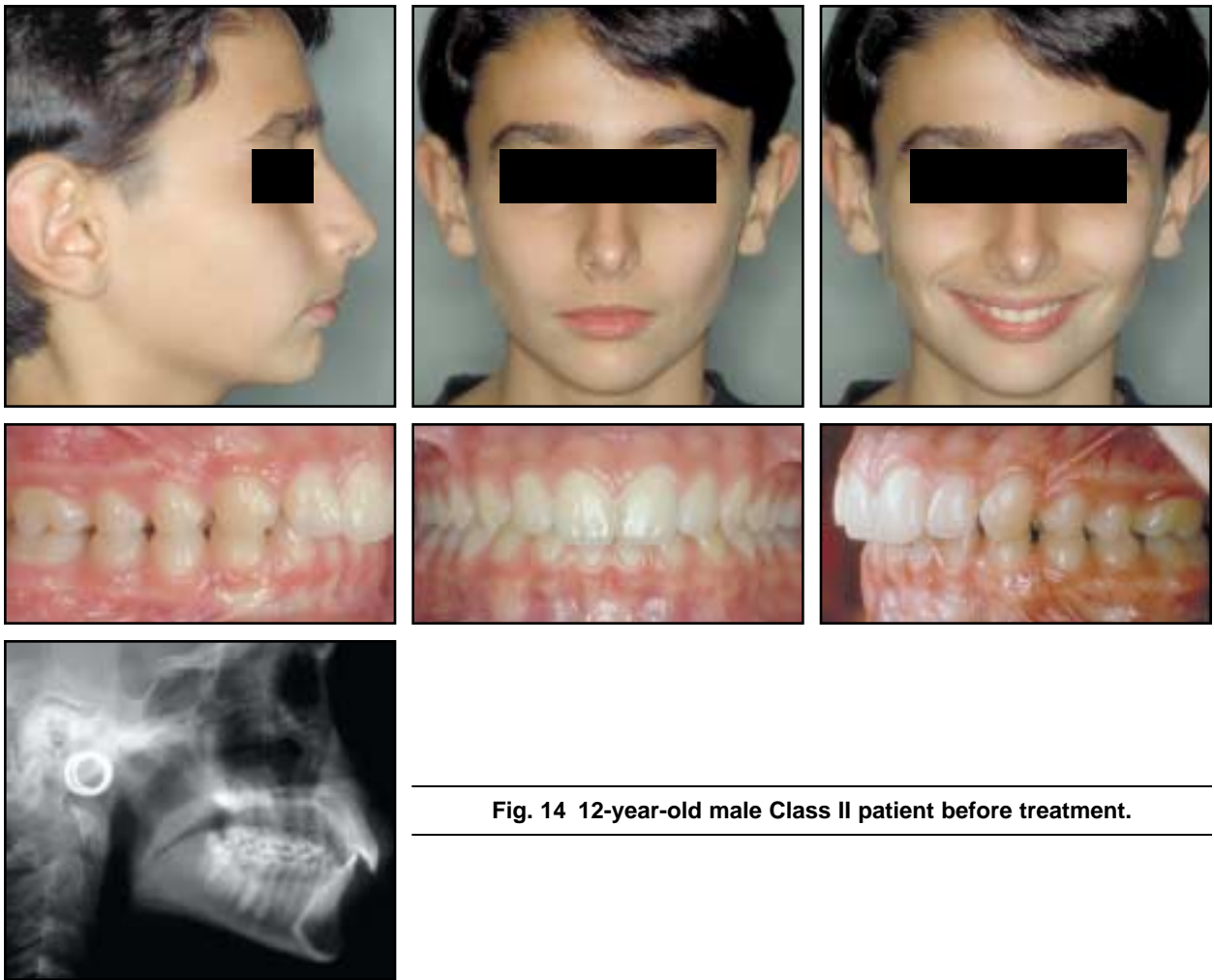


Fig. 14 12-year-old male Class II patient before treatment.



Fig. 15 After eight months of maxillary first molar distalization with GLD.

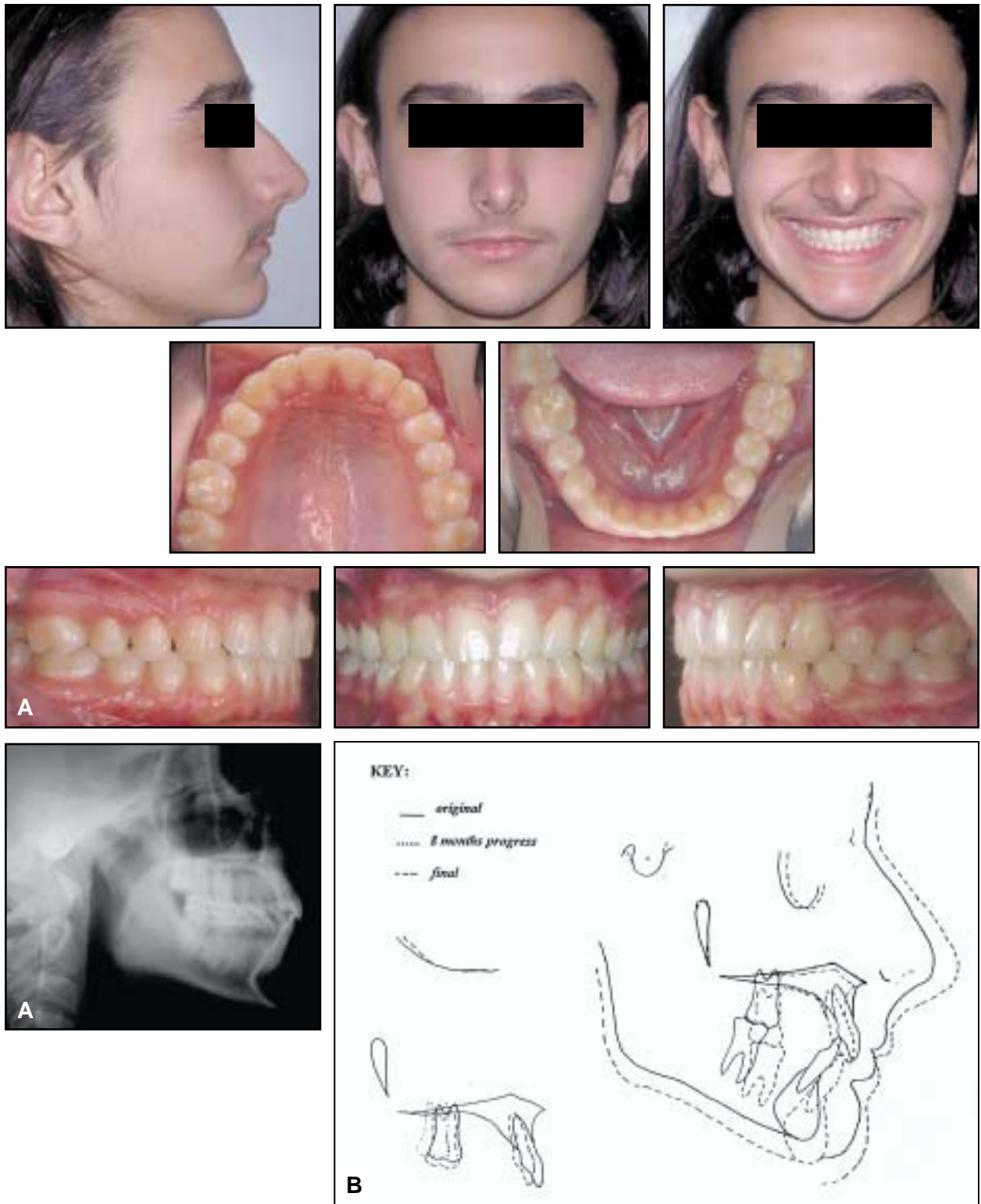


Fig. 16 A. Patient after 28 months of treatment. B. Superimposition of cephalometric tracings before treatment (solid line), after eight months of maxillary molar distalization with GLD (dotted line), and after 28 months of treatment (dashed line).

present (Fig. 14).

A maxillary GLD was worn for eight months. The patient was asked to wear a cervical headgear while sleeping, but after four months of poor compliance, the headgear was discontinued. A Nance holding arch was inserted immediately after removal of the GLD (Fig. 15).

Fixed appliances were placed only in the maxillary arch. The Nance appliance was used during eight months of anterior retraction, then removed. Total treatment time was 28 months, even though the patient missed nine appointments (Fig. 16).

Conclusion

The GLD is a unique appliance that allows

the clinician to fully control molar distalization in all three planes of space with light, continuous forces.

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REFERENCES

1. Greenfield, R.L.: Fixed piston appliance for rapid Class II correction, *J. Clin. Orthod.* 29:174-183, 1995.
2. Jones, R.D. and White, J.M.: Rapid Class II molar correction with an open-coil jig, *J. Clin. Orthod.* 26:661-664, 1992.
3. Hilgers, J.J.: The Pendulum appliance for Class II non-compliance therapy, *J. Clin. Orthod.* 26:706-714, 1992.
4. Cetlin, N.M. and Ten Hove, A.: Nonextraction treatment, *J. Clin. Orthod.* 17:396-413, 1983.