The Inman Aligner

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The Inman Aligner,* a versatile removable appliance, is a unique modification of the traditional spring retainer. It uses superelastic open-coil springs to create light and constant forces on both the labial and lingual surfaces of the anterior teeth. The appliance is designed to correct crowding, spacing, and rotations of the anterior teeth with force levels that can be adjusted to meet the requirements of each case.

Appliance Design and Fabrication

The Inman Aligner is constructed on a cast by making a wax setup of the teeth to be moved. The labial bow is embedded in clear acrylic (Fig. 1), and its distal ends are inserted into round tubes that have been soldered to the buccal sides of standard Adams clasps, which are located on either the second premolars or the first molars (Fig. 2). The distal ends of the labial bow should extend well beyond the buccal tubes (Fig. 3).

A superelastic coil spring and a small polycarbonate bead are slid onto each end of the labial bow, and a helix is bent into each end to push the bead mesially and thus compress the open-coil spring. The force generated by the spring

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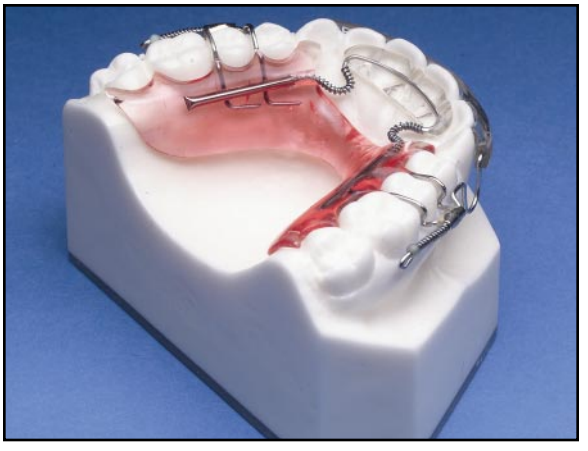

Fig. 1 Maxillary Inman Aligner uses reciprocal forces to correct minor dental irregularities (photo courtesy of Great Lakes Orthodontics, Ltd.).

Fig. 2 Mandibular Inman Aligner. A. Traditional acrylic lingual framework with soldered tube on Adams clasp; spring-loaded distal wire produces retraction force for anterior teeth. B. Banded version with cantilever labial component and lingual spring-loaded tube/piston assembly. (Photos courtesy of Orthotech Orthodontic Laboratory, Inc.)

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moves the teeth distally. The appliance can be reactivated on one or both sides of the arch by rolling the terminal helix mesially with a bird-beak plier, thereby shortening the distal portion of the wire and further compressing the coil spring. The acrylic bead prevents the coil spring from sliding up the wire helix during reactivation.

Fig. 3 Reactivation by rolling terminal helix forward to compress coil spring. Acrylic ball prevents spring from sliding up helix.

The lingual assembly of the Inman Aligner consists of a "U"- or mushroom-shaped wire, embedded in the acrylic so that it contacts the lingual surfaces of the anterior teeth at mid-crown (Fig. 4). Superelastic springs are slid onto both ends of this lingual wire; the ends are then inserted into two tubes, which are embedded in the main body of the retainer acrylic to lie parallel to the occlusal plane along either the palate or the lingual surfaces of the mandibular posterior teeth. The lingual assembly is thus "spring-loaded" to produce a constant mesial force against the lingual surfaces of the anterior teeth.

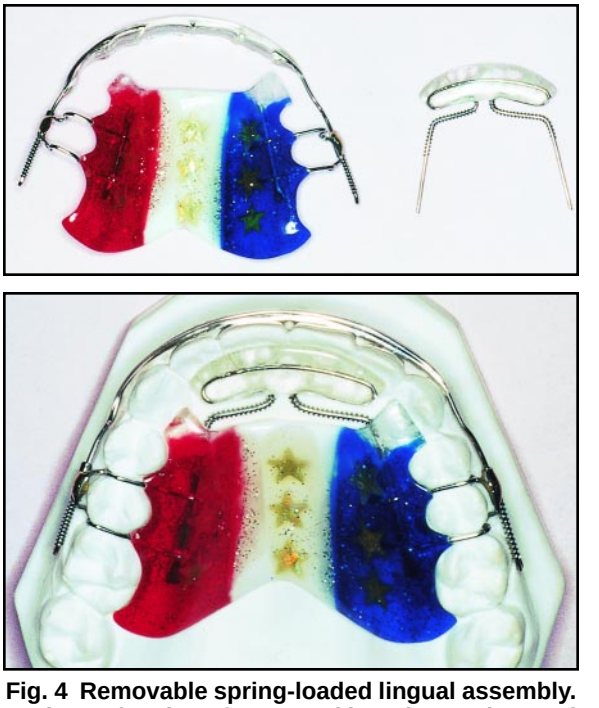

Fig. 4 Removable spring-loaded lingual assembly. Springs of various forces and lengths can be used to produce differential forces symmetrically or asymmetrically.

Modes of Action

Superelastic coil springs from .009" × .030" to .012" × .030" can be selected for different applications. If only anterior crowding needs to be corrected, then .012" × .030" springs are standard for both the lingual and labial portions of the appliance (Fig. 5), which work together using opposing forces to move teeth. The Inman Aligner's reciprocal action allows lighter and

Fig. 5 A. Poor compliance with traditional retention resulted in mandibular irregularity. B. Mandibular Inman Aligner used with clear acrylic maxillary retainer to recover and maintain orthodontic result. C. After realignment and some interproximal reshaping.

more comfortable forces to be used than with more rigid aligners. This permits controlled movement of teeth over a greater distance without reactivation or replacement of the appliance. In contrast to more rigid aligners and retainers with finger springs, the Inman Aligner is not prone to occlusal deflection and thus will always seat properly.

For retraction of anterior teeth, as when closing residual extraction spaces, greater force is applied to the labial bow by using heavier springs or by rolling the terminal helices mesially, while reduced forces are applied lingually by using .009" × .030" or shortened coil springs, or by completely removing the lingual assembly, until the spaces are closed (Fig. 6). The lighter forces on the lingual allow the spaces to close, but help control tipping of the incisors. Thus, the Inman Aligner is a useful alternative to retainers that use intraoral elastics, stretched from the molars to sectional wire hooks in the palatal acrylic, which tend to ride up the labial surfaces of the teeth, impinging on the gingival tissues, and to promote incisor tipping.

If advancement of the anterior teeth is desired, as in anterior crossbite cases, the forces of the lingual assembly are increased by using heavier (.012" × .030") or longer coil springs, while the labial forces are reduced or eliminated by using lighter or shorter springs or unrolling the terminal helices, until correction is achieved. In the transitional dentition, a bonded version with no labial component and gentle .009" × .030" coil springs is recommended (Fig. 7).

If the Inman Aligner is used as a retainer after retraction or advancement, the equilibrium between the opposing labial and lingual forces should be reinstated to prevent unwanted changes. In some cases, a conventional retainer

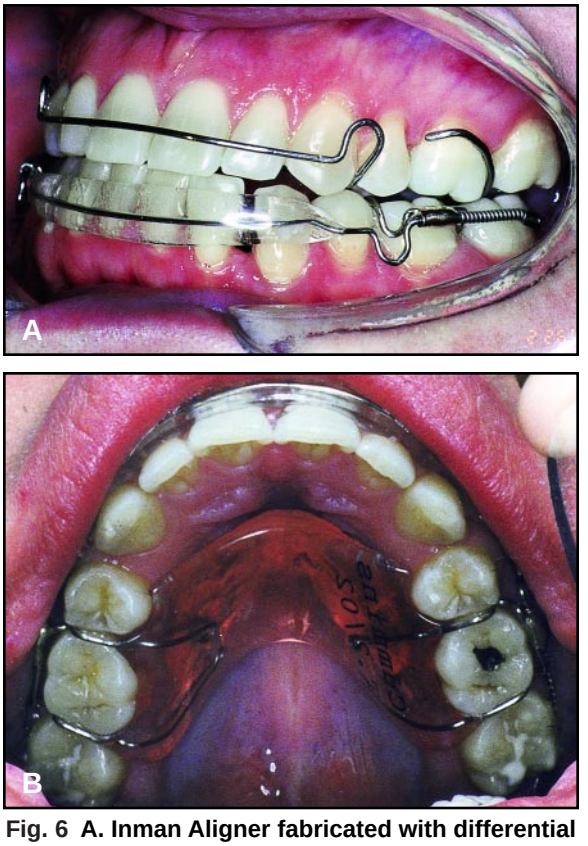

Fig. 6 A. Inman Aligner fabricated with differential forces to retract lower anterior teeth. B. Residual maxillary spaces closed using Inman Aligner with lingual portion removed (different patient). After space closure, lingual portion is replaced to maintain balance of forces on labial and lingual.

Fig. 7 Bonded Inman Aligner designed to advance maxillary incisors for resolution of anterior crossbite in transitional dentition. Posterior bite blocks are used to open anterior bite (photo courtesy of Orthotech Orthodontic Laboratory, Inc.).

Fig. 8 Midpalatal coffin spring may be incorporated into Inman Aligner to produce limited maxillary expansion (photo courtesy of Orthotech Orthodontic Laboratory, Inc.).

Fig. 9 Inman Aligner with fixed bow, used when more lingual force and adjustment-free labial bow are required (photo courtesy of Orthotech Orthodontic Laboratory, Inc.).

may be preferable for long-term stabilization.

The Inman Aligner can be modified to incorporate other features such as a coffin spring for maxillary expansion (Fig. 8), an invisible labial bow for esthetics, or a fixed, adjustment-free labial bow for more lingual force (Fig. 9). It is also possible to produce differential forces on the right or left side of the arch by simply increasing or reducing the length or force of the springs on one side. ❑