

Correction of Adult Incisor Crowding with a New Removable Appliance

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Incisor crowding seems to be an inevitable part of the aging process, with or without prior orthodontic treatment.¹⁻³ Although about 70% of the U.S. population have some degree of tooth irregularity, only about 20% have severe posterior malocclusions.⁴ Therefore, it appears that there are many adult patients with adequate posterior occlusions who might seek orthodontic treatment if their malpositioned incisors could be straightened without the use of fixed appliances. This article describes a new removable appliance that, combined with judicious interproximal reduction, can align crowded or displaced incisors with an arch-length discrepancy of 2.5mm or less.

Appliance Design and Use

The Bloore Removable Aligner resembles a standard Hawley retainer in its labial bow, soldered .030" C-clasps on the bicuspids and occlusal rests on the molars, and horseshoe-shaped acrylic foundation (Fig. 1). However, a standard Hawley retainer, with acrylic coverage of the lingual incisor surfaces, is incapable of correcting crowded incisors. The Bloore Removable Aligner can control and move any incisor because of the addition of lingual .026" Eyelet Arm Springs and .030" and .045" stainless steel reinforcing wires.

Incisor movement can be accomplished from the labial by adjusting the standard labial bow. Movement from the lingual is achieved through pressure from the Eyelet Arm Spring. The spring's .026" stainless steel wire is rigid enough to resist distortion, yet flexible enough to deliver an effective orthodontic force. The arm, which projects 1.5-2.5mm from the acrylic, is a straight section of wire that allows the spring to be moved mesiodistally into contact with any portion of the tooth. The eyelet can be opened or closed to adjust the length of the spring and place pressure on a specific target point.

The soldered C-clasps not only help retain the appliance, but also act as stress breakers. If one or more of the Eyelet Arm Springs are overactivated, the C-clasps will be overpowered and the appliance will be displaced.

The sequence of eyelet activation is critical. Teeth that require lingual-to-labial movement must be aligned first. This will increase the circumference of the arch, allowing the clinician to begin the alignment with a minimum of interproximal reduction, and improving access to crowded contact points so they can eventually be reduced. Once all the lingual-to-labial movement has been accomplished, the labial-to-lingual movement can be carried out.

When anterior interproximal reduction is needed to create the proper arch length, it should start with the most ideal contacts. As the displaced teeth move into better positions and the adjacent contacts are improved, those contacts can then be reduced. This process continues until all the teeth are aligned and the contacts are anatomically correct (Figs. 2A,B,C and 2D).

The movement of the incisors will be primarily tipping and rotation, and therefore the treatment time will be shorter than with fixed appliances. The average duration of treatment with the aligner is only four to eight months. After the desired movement has been completed, the Eyelet Arm Springs can be

made passive, and the appliance can serve as the retainer.

Patient Selection

To be treated with the Bloore Removable Aligner, a patient must meet all five of the following criteria:

- 1. Good posterior occlusion
- 2. Incisor crowding of no more than 2.5mm
- 3. Adequate crown anatomy
- 4. Incisor apices in adequate positions
- 5. Healthy periodontium

The appliance is contraindicated in patients with poorly positioned incisor apices, cuspids that are too far forward, narrow incisors, open bites, tipped occlusal planes, tongue thrusts, or periodontal problems.

Discussion

Successful resolution of incisor crowding requires two components: an appliance that can accurately and predictably deliver a force to a specific area of each tooth, and the ability to create the space necessary for tooth movement. Since incisor straightening usually involves some lingual-to-labial movement, precise lingual control of each incisor is essential. The Bloore Removable Aligner can deliver enough force to a specific area of a tooth to move it labiolingually, rotate it mesiodistally, or perform any combination of the two (Figs. 3A,B,C and 3D).

There are many ways to resolve crowding, but only anterior interproximal reduction can do so without moving the posterior teeth or expanding the arch. Interproximal reduction has been advocated as a method of achieving better tooth contacts and thus improving long-term stability after orthodontic treatment.⁵⁻⁷ Reshaping of anterior teeth can also improve esthetics, anterior occlusion, and periodontal health.⁸⁻¹⁰

Various authors have agreed that a total of 2.5mm of interproximal enamel can be removed without damaging the incisors or increasing their susceptibility to caries.^{5-7,9,11-13} Reproximated surfaces that are treated with fluoride have shown less demineralization than non-fluoridated surfaces.¹⁴ Although the interproximal reduction removes a caries-resistant layer on the surface of the enamel, remineralization readily occurs with the use of fluoride rinses.¹⁵

Conclusion

The Bloore Removable Aligner makes it possible to correct crowded incisors that could previously be straightened only with fixed appliances. □

ACKNOWLEDGMENTS: We would like to thank our entire staff—Paula Bacon, Kim Brody, Colleen Whalen, Nancy Nonskul, and Dr. Nooshi Akhavan—for their invaluable help. They permitted us to design and develop this appliance and assisted in the documentation of the treatment. Without them, we would not have been able to incorporate this treatment regime into a busy edgewise orthodontic practice.

FIGURES

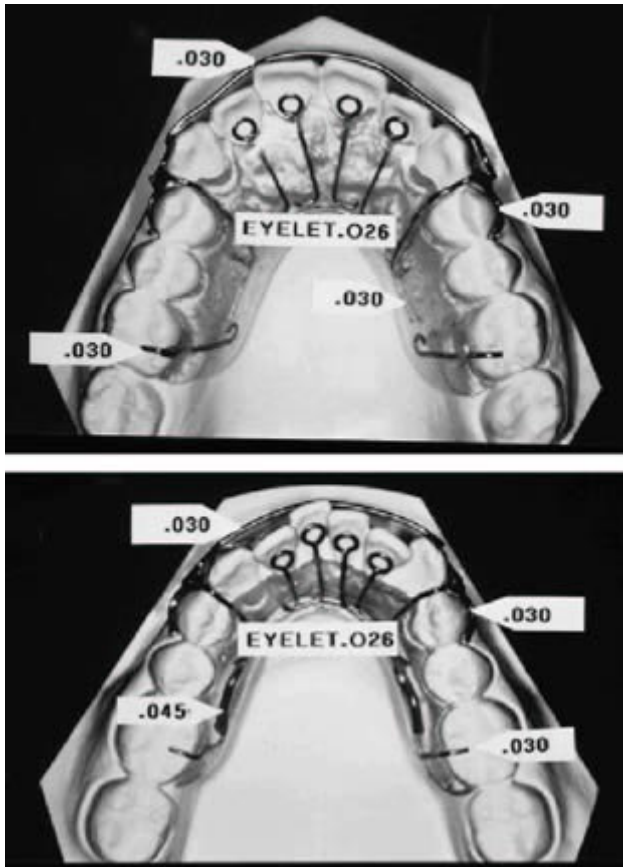


Fig. 1 Bloore Removable Aligner.

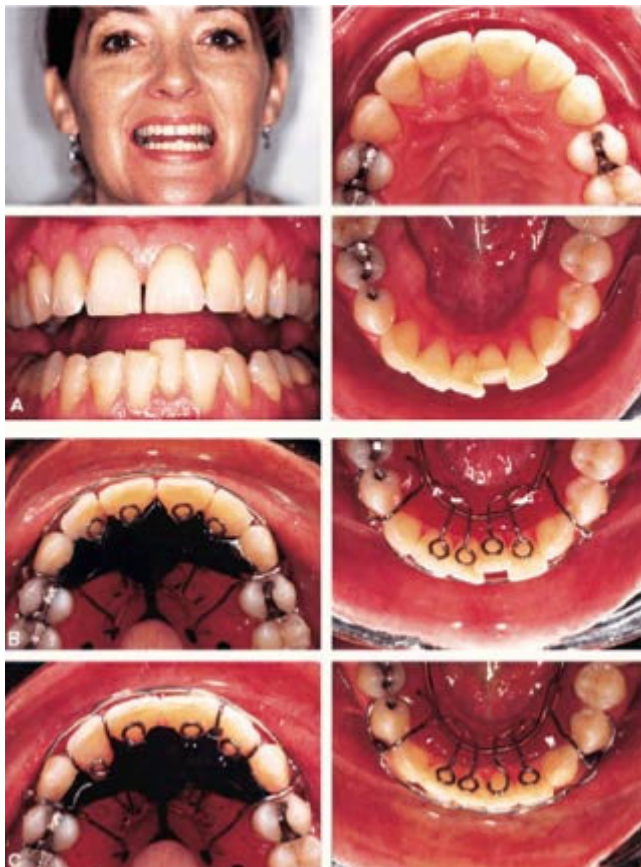


Fig. 2ABC A. Adult patient before treatment, showing maxillary midline diastema and lingually displaced mandibular left central incisor. B. Bloore Removable Aligners prior to activation of .026" Eyelet Arm Springs. C. After adjustment of springs. Note amount of eyelet opening needed to move mandibular left central incisor.

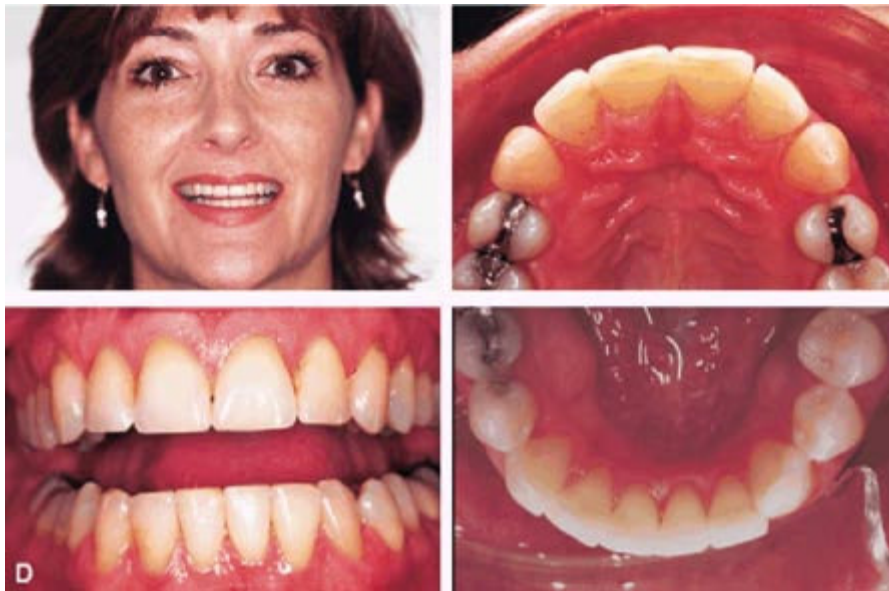


Fig. 2D Patient after reproximation and alignment.

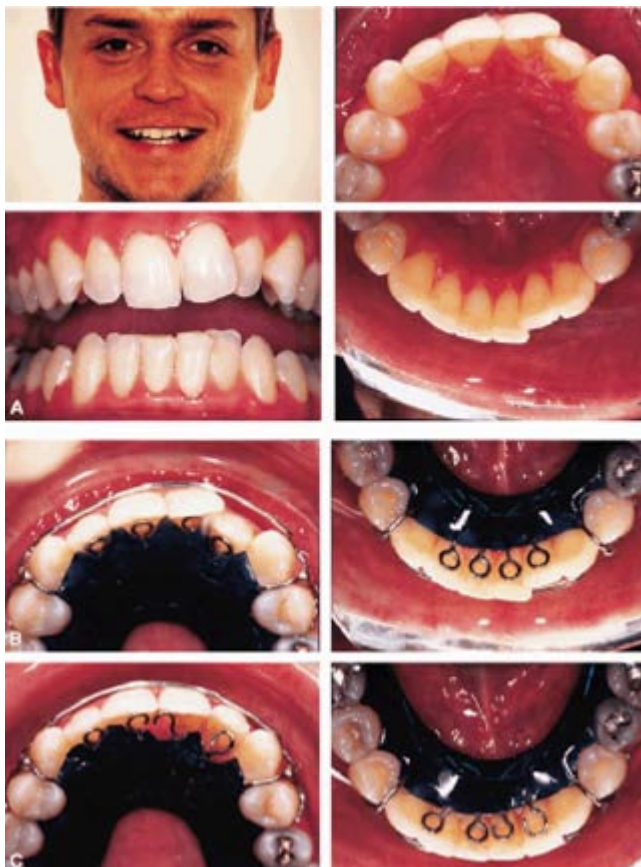


Fig. 3ABC A. Adult patient before treatment, showing maxillary incisor crowding, lingually positioned left lateral incisor, and tipped left central incisor, and lingually displaced mandibular left lateral incisor. B. Bloore Removable Aligners prior to activation of Eyelet Arm Springs. C. After

adjustment of springs. Maxillary left lateral incisor was moved labially with spring; left central incisor was moved lingually with labial bow and rotated by tipping Eyelet Arm Spring to the mesial.

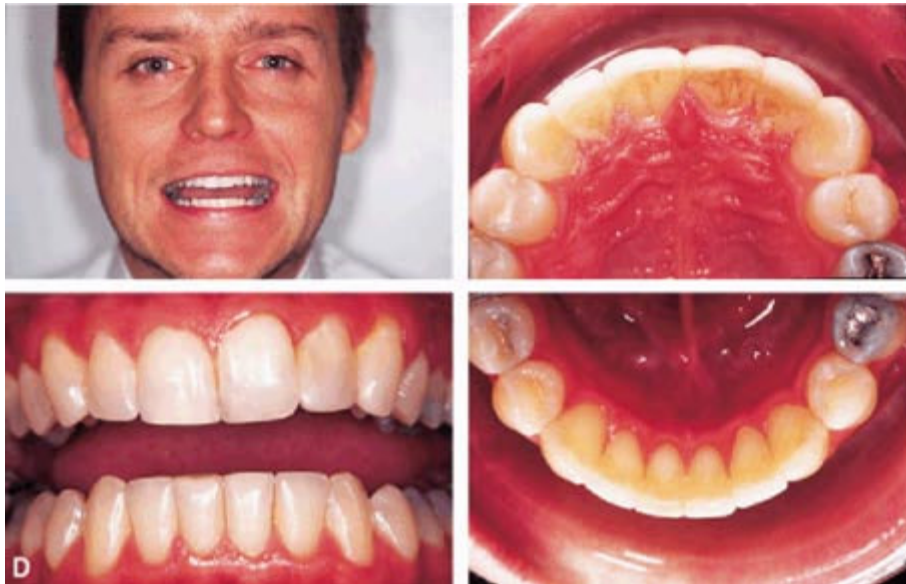


Fig. 3D Patient after reproximation and alignment, with incisal edge recontouring and bonding to improve contours of maxillary left lateral incisor and both cuspids.

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