OPEN-BITE TREATMENT UTILIZING CLEAR REMOVABLE APPLIANCES WITH INTERMAXILLARY AND INTRAMAXILLARY ELASTICS

Clear removable appliances with elastics can be effective and efficient in extruding maxillary teeth during aligner treatment or following a relapse of an open bite. Some patients with open bites refuse to wear conventional fixed appliances. In these individuals, clear aligners with elastics could be a valuable alternative. World J Orthod 2009;10:130–134.

Open bites are difficult to treat because they result from the interaction of multiple etiological factors. Many patient reports describe the orthodontic treatment of anterior open bites with various techniques. One option is to apply intrusive forces to posterior teeth. Another possibility, if not contraindicated, would be the extrusion of maxillary anterior teeth. Reitan reported that extruded teeth have a greater tendency to relapse than intruded ones.

Clear aligners with elastics represent an unproblematic way to treat open-bite patients when minor extrusions (less than 2 to 3 mm) are indicated.

CLEAR ALIGNERS WITH INTERMAXILLARY ELASTICS (COW-CATCH ALIGNERS)

To fabricate a clear aligner for correcting an open bite, an impression is taken and a working cast produced. The teeth on this cast are ideally set-up (extruded) before a 1-mm plastic sheet (Duran, Schu-Dental, Iserlohn, Germany) is formed with either a pressure-molding machine (Biostar, Schu-Dental, Iserlohn, Germany) or a vacuum machine (Raintree Essix, Sarasota, Florida, USA). The teeth to be extruded are supplied with buttons and connected to the opposite arch with elastics where buttons were attached to the aligner (Fig 1). When the expected extrusion is achieved, the respective teeth will contact the inner surface of the aligner so that no additional extrusion occurs. Thus, it is a fail-safe appliance. More examples of Cow-Catch aligners are given in Figs 2 to 4.

CLEAR ALIGNERS WITH INTRAMAXILLARY ELASTICS (MODIFIED COW-CATCH ALIGNERS)

If a patient cannot tolerate the limited opening while wearing Cow-Catch aligners with intermaxillary elastics or needs to verbally communicate a lot, it is recommended to use an appliance modification characterized by buttons on the lingual side of the aligner (Figs 5 and 6). The application of this modified Cow-Catch aligner is the same as that of the regular one. This type of aligner is more convenient and comfortable for all patients because it allows a more normal function (Figs 7 and 8).

1Assistant Professor and Director, Postgraduate Orthodontic Program, Arizona School of Dentistry & Oral Health, Mesa, Arizona, USA.
2President, Korean Society of Lingual Orthodontics, Seoul, South Korea.

CORRESPONDENCE
Dr Jae Hyun Park
Postgraduate Orthodontic Program
Arizona School of Dentistry & Oral Health
5855 East Still Circle
Mesa, AZ 85206
Email: JPark@atsu.edu
Fig 1  Frontal (a) and lateral (b) view of clear aligners with intermaxillary elastics. To allow for this arrangement, the cervical portion of the maxillary aligner is removed. To prevent dislodging of the mandibular aligner, undercuts are created in the posterior interproximal spaces with a Clear Aligner Plier (IV-Tech, Seoul, South Korea) or Undercut Enhancing Hilliard Thermolier (Raintree Essix, Sarasota, Florida, USA). (c) Situation after the expected extrusion is achieved.

Fig 2  Patient 1. (a) Pretreatment situation. (b) Set-up casts for Cow-Catch aligners. To simultaneously correct the minor crowding in the mandibular arch, the set-up included all anterior teeth. (c) Extrusive force exerted by Cow-Catch with triangular elastics, 3/16-in medium (4 oz) (arrow shows the extrusive force applied to the maxillary right lateral incisor). (d) Situation after 6 weeks of treatment.

Fig 3  Patient 2. (a) Clear buttons are attached to the target teeth. (b) Application of Cow-Catch aligners with vertical elastics, 3/16-in medium (4 oz). (c) After 4 weeks, transparency of the appliance increased which indicates that extrusion has occurred due to good patient cooperation. (d) After 6 weeks of treatment, a sound anterior overbite has been established.
DISCUSSION

Anterior open bite is considered to be most difficult to treat. Proper diagnosis, treatment planning, successful treatment, and retention all contribute to the long-term stability of any open bite therapy. Some of the numerous factors responsible for the development of an open bite comprise an unfavorable (hereditary) mandibular growth pattern, digit-sucking habits, nasopharyngeal airway obstructions, and incorrect tongue and head posturing.3

Fig 4  Patient 3. (a) Relapse 2 years after orthodontic treatment. (b) Overbite has been increased by Cow-Catch aligners after 8 weeks of treatment.

Fig 5  Sagittal (a) and occlusal (b) view of how the extrusive force (arrow) is produced by the intramaxillary elastics.

Fig 6  Frontal (a) and sagittal (b) view of how the extrusive force is produced by intramaxillary elastics (arrows). (c and d) Situation after extrusion has occurred. Note that the plastic is cut off buccodistogingivally of the terminal molar to facilitate appliance removal.
Various treatment modalities have been proposed for the correction of anterior open bites. Nonsurgical therapies include multiloop edgewise archwires, tongue cribs, posterior bite blocks with and without magnets, and functional appliances. Previous studies have indicated that one common reason for relapse is a persisting anterior tongue posture.

After extrusion, it is recommended to bond a lingual 0.0175-in Twistflex wire in the maxilla and mandible from canine to canine. In addition, patients should be taught to swallow correctly. To prevent a reintrusion of the extruded teeth, small projections can be added into the interproximal areas of the target teeth with Clear Aligner Pliers (IV-Tech, Seoul, South Korea). However, a removable appliance with a tongue crib is recommended if the tongue-thrust habit persists after treatment.

A potential disadvantage of this type of appliance is that it is highly dependent on patient compliance. These aligners and
the respective elastics should be worn at least 17 hours a day. Yet, current data suggest that this rarely occurs. The great advantage of this approach is that more detailing can take place simultaneously. With good cooperation, the intended treatment is achieved within 6 to 8 weeks. If any patient is concerned about mouth opening or speaking while wearing a Cow-Catch aligner, a modified Cow-Catch aligner with intramaxillary elastics could be used.

**CONCLUSION**

If a patient wears a clear removable appliance with intra-/intermaxillary elastics, teeth can be extruded. Esthetics is excellent because the aligner is hardly visible. This can be a definite psychological advantage in teenagers and adults alike. These kinds of clear aligners with elastics can be an effective alternative in patients with open bite who refuse to wear conventional fixed appliances.

**REFERENCES**