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The Maryland bridge retainer: A modification of a Maryland bridge

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Preservation of the maxillary lateral incisor space after orthodontic treatment in an adolescent patient traditionally requires the use of a retainer with a lateral pontic, commonly referred to as a "flipper," which is minimally effective in the long term. This article illustrates a technique for chairside fabrication of a Maryland bridge retainer for semi-permanent retention. A stainless steel braided palatal wire is bonded to the anterior teeth. A pontic is then built intraorally with flowable composite, using the palatal wire as scaffolding. The retainer is maintained until the patient is of age for a more permanent restoration. (Am J Orthod Dentofacial Orthop 2020;157:128-31)

Maxillary lateral incisor agenesis in the permanent dentition occurs in 2% of the population.[1] For the adolescent patient, managing the space of a missing maxillary lateral incisor in retention can be challenging. These patients often have a waiting period of 5 or more years before they can receive an implant. Traditionally, orthodontists have used a plastic or Hawley retainer with a lateral pontic, commonly referred to as a "flipper", which is to be worn full-time until the patient completes skeletal maturity.[2] While flippers are an effective short-term solution for retaining lateral incisor spaces, these retainers have significant limitations for long-term use.

Such limitations include the need for compliance, frequent breakage, discoloration, and failure to maintain the root angulation of the adjacent teeth. For these reasons, patients who are expected to wear plastic or Hawley flippers for a prolonged period of time often experience relapse and require retreatment prior to their permanent restorations.

An alternative to the flipper is for the general dentist to immediately place a resin-bonded fixed partial denture, commonly referred to as a Maryland bridge. The Maryland bridge utilizes metal wings, instead of full-crown preparations, which are bonded to the palatal or lingual surfaces of the abutment teeth. The bridge provides a fixed and conservative solution for an edentulous space in an adolescent patient.

The primary disadvantage of the Maryland bridge, however, is its high failure rate. Approximately one third debond after only a few years, and this failure rate increases with each attempt at rebonding.[3] As such, a Maryland bridge is often viewed by general dentists as a temporary solution until the patient is old enough to receive a dental implant restoration. The dilemma for orthodontists is that many general dentists refuse to place Maryland bridges because of their high maintenance.

This article presents a chairside technique for the orthodontist to create a Maryland bridge-like retainer, using flowable composite and a braided palatal wire, as a fixed alternative to the flipper. A laboratory version of this retainer is presented, as well as the rationale for orthodontists providing semi-permanent tooth replacement.

PATIENT 1

The following chairside technique was applied to a female patient, aged 14 years, with a missing maxillary right lateral incisor and a peg-shaped maxillary left lateral incisor, who recently completed orthodontic treatment. The patient refused to wear a removable retainer, and her dentist was unwilling to place a resin-bonded fixed partial denture. The decision was made to fabricate a Maryland bridge retainer in the orthodontic office and then refer the patient back to her general dentist for restoration of the peg-shaped lateral incisor (Fig 1, *A-H*).

The Maryland bridge retainer is created from flowable resin and a stainless steel braided palatal wire.

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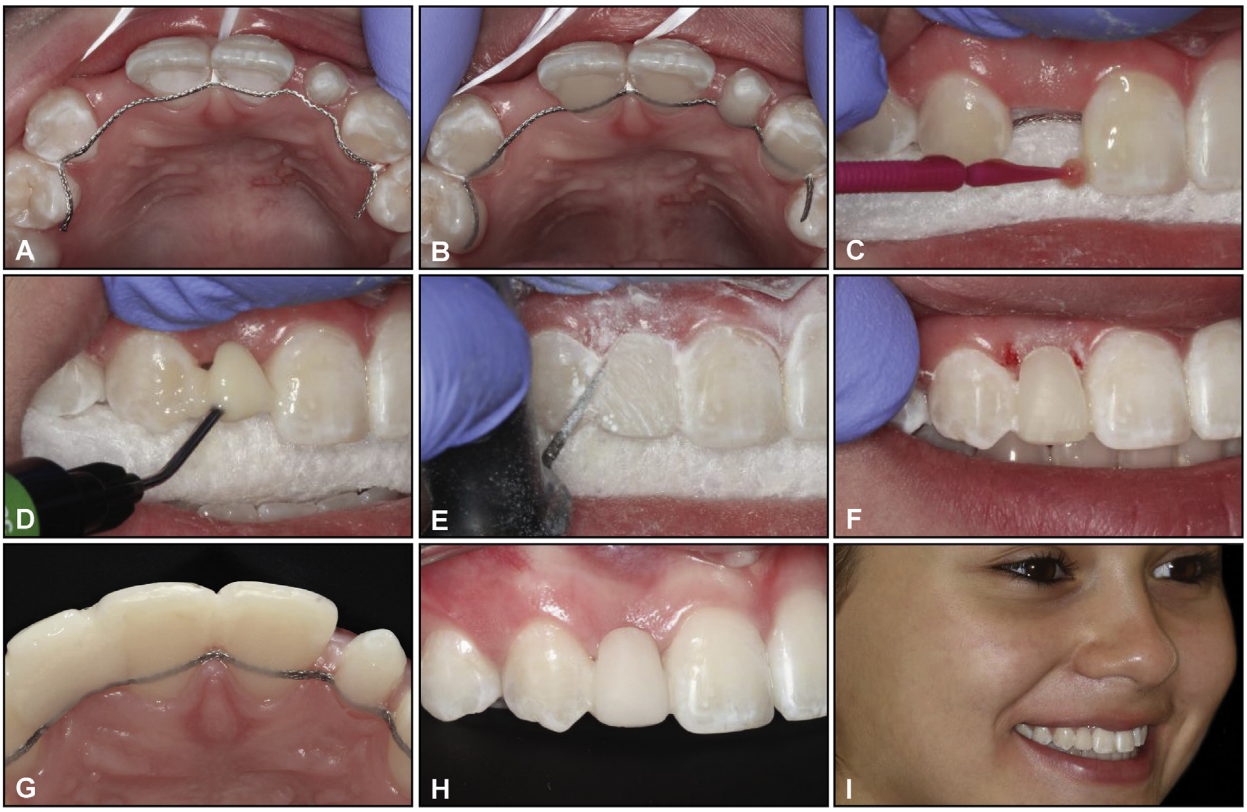

Fig 1. A, Bond-a-Braid secured with floss loops. **B,** The palatal retainer is bonded with Transbond LR Adhesive. The wire is pushed into the edentulous space to receive the pontic. **C,** Applying self-etching primer to the interproximal surfaces. **D,** Gradually adding flowable to create a pontic, using the palatal wire as scaffolding. **E,** Shaping the pontic. **F,** Retainer immediately after chairside fabrication. **G,** The pontic is checked with articulating paper to eliminate all occlusal interferences. **H,** Side view of final retainer. **I,** Smiling adolescent patient with Maryland bridge retainer.

The pontic is built intraorally with the flowable resin, using the palatal retaining wire as scaffolding. The palatal wire further served to retain the root positions of the teeth adjacent to the edentulous space, as well as the spacing on either side of the peg-shaped lateral incisor.

Etchant was placed on the palatal surfaces of the maxillary anterior teeth and on the first premolar on the affected side. Including the first premolar in the palatal retaining wire helps to control the root position of the canine. After rinsing and drying the teeth, the wire is closely adapted to the etched cingulums using interproximal floss loops and a band pusher and bonded with Transbond LR Adhesive (3M Unitek, St Paul, Minn).

Bond-a-Braid (Reliance Orthodontic Products, Itasca, Ill), a dead soft 8-braided wire (0.67 mm width), is used for the palatal retainer. It is easy to adapt to the palatal anatomy and sturdy enough to prevent inadvertent space opening. The wire is positioned on the gingival one third of the crowns to avoid occlusal interferences and then pushed into the edentulous space to receive the pontic.

The pontic is built intraorally using GrandioSO in VITA shade A2 (VOCO America, Indian land, SC), a nanohybrid flowable composite. The interproximal surfaces of the teeth adjacent to the edentulous space are first prepared with self-etching primer. The composite is then slowly added into the shape of a lateral incisor. Finishing burs are used to provide the tooth anatomy and clearance away from the gingival tissue. The finished pontic is securely bonded to the adjacent teeth as well as to the palatal wire.

The entire appointment for the procedure takes approximately 15 minutes. Afterward, the patient is instructed on how to floss the opened gingival embrasures. The retainer is provided at no additional charge and the family clearly understood that it is a temporary restorative solution. Most importantly, the retainer is well-received by the patient's dentist and hygienist.

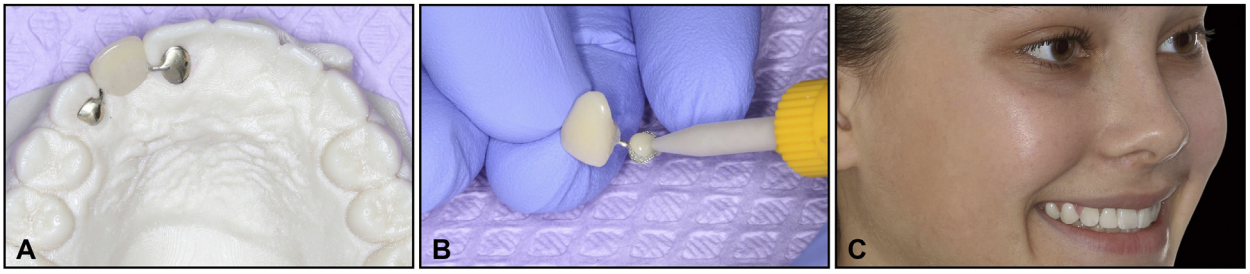

Fig 2. A, Laboratory-processed retainer made at AOA Orthodontic Laboratory. The retainer consists of an acrylic pontic and 2 soldered palatal pads. **B,** Applying RelyX Unicem, a universal resin. **C,** Smiling adolescent patient with laboratory-processed Maryland bridge retainer.

The primary disadvantage of this technique is the potential for the pontic to separate from the palatal wire. When this occurs, the patient must be seen immediately. Since the pontic will not be able to withstand heavy occlusal forces, complete deep bite correction during orthodontic treatment is essential. All occlusal contact from the pontic should be eliminated. A secondary limitation is the potential for soft tissue irritation if the pontic is built too close to the gingiva, or if the patient refuses to floss properly.

PATIENT 2

Alternatively, an orthodontic laboratory (AOA Orthodontic Appliances, Sturtevant, Wis) can create the Maryland bridge retainer (Fig 2, *A-C*). The following technique is applied to a female patient, aged 15 years, with a missing maxillary right lateral incisor. At the appointment and prior to debanding, an intraoral digital scan, including the lower reference arch and bite registration, is submitted to the orthodontic laboratory. The pontic shade (Vita A2) is selected using a shade guide and included in the comments section of the digital prescription.

The laboratory-processed retainer consists of an acrylic (not porcelain) pontic, with 2 soldered metal pads. The retainer is bonded with RelyX Unicem (3M Unitek), a strong resin used for indirect restorations; however, orthodontic retainer resin is acceptable. The patient is also given a plastic overlay retainer to hold the position of the remaining teeth and protect the Maryland bridge retainer against nighttime bruxism.

Over the past 2 years, I have placed 13 laboratory-processed Maryland bridge retainers without a single bond failure, complication, or complaint.

DISCUSSION

The history of Maryland bridges dates back over 40 years. In 1973, Rochette[4] first reported the resin bonding of perforated metal castings, which were used as periodontal splints. Applying this technique, in 1977 Howe and Denehy[5] reported on a resin-bonded fixed partial denture with perforated metal abutment wings. It was, however, the extensive research by Livaditis and Thompson[6-14] in the 1980s at the University of Maryland Dental School that popularized these bridges and gave them their moniker.

Maryland bridges fell out of favor over time because of their high failure rate. In a 10-year retrospective study by Williams et al,[15] the authors reported a failure rate of 32%. Kerschbaum et al[16] likewise reported a failure rate of 34% after 5 years, and Creugers et al[17] reported a failure rate of 25% for anterior Maryland bridges after 7.5 years. These failure rates are similar to what has been reported for orthodontic bonded lingual retainers.[18-24]

Indeed, it is reasonable to view the Maryland bridge simply as a type of bonded retainer. Livaditis[6] even referred to the resin-bonded fixed partial denture as a "retainer" throughout his original paper. As the Maryland bridge retainer is a "prepless" technique, it should be considered as an adjunctive bonded retainer within the scope of orthodontics. After all, orthodontists have been placing semi-permanent restorations as retainers for as long as Maryland bridges have existed.

For example, in 1981 Fields[25] reported on the placement of interproximal resin restorations to address tooth size discrepancies. He referred to this solution as an "orthodontic-restorative technique" to avoid potential retention problems. In 1984, Artun and Zachrisson[26] studied the efficacy of anterior bridge retainers made from an acrylic tooth and orthodontic wires. The authors placed 53 bridges and reported a failure rate of 19% after 15 months. They write in their conclusion that "the technique represents a cheaper, simpler, and perhaps more durable alternative than the cast variants."

More recently, orthodontists have reported the semi-permanent replacement of missing incisors with miniscrew-retained pontics in growing patients.[27-30]

Because of their thin diameter, miniscrews do not osseointegrate, and they can be removed easily when the patient reaches skeletal maturity. Graham,[27] Paquette,[28] Ciarlantini and Melsen,[29] and Cope and McFadden[30] reported the successful retention of these restorations after 14, 32, 60, and 99 months, respectively.

Even so, a Maryland bridge provided by the general dentist likely remains the standard fixed approach for managing the space of a missing maxillary lateral incisor in an adolescent patient. When this option is not possible, however, a semi-permanent Maryland bridge retainer provided by the orthodontist should be considered.

CONCLUSION

A Maryland bridge retainer provides a fixed and conservative solution to the problematic flipper. Orthodontists should feel comfortable placing such semi-permanent restorations as an acceptable means of orthodontic retention in adolescent patients.

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.ajodo.2019.08.007.

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