

# Miniscrew-Supported Transitional Tooth Replacement: An Esthetic Alternative

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**W**hen a patient presents with a missing lateral incisor, the orthodontist can propose canine substitution or prosthetic replacement, neither of which is ideal in all circumstances.<sup>1-3</sup> If canine substitution is not a suitable option, the treatment plan usually involves implantation of a replacement tooth once growth is complete. This leaves the problem of how to manage the edentulous space during the period between completion of orthodontic treatment and placement of the implant.

Traditional options have included a “flipper” (a retainer of some sort with a denture tooth bonded to it in the lateral space), a Maryland bridge (an acid-etch-bonded bridge with a cast-metal framework), and a resin-bonded bridge. Flippers are easy to create and maintain, but they are inconvenient for the patient and do nothing to support the edentulous ridge, nor do they effectively maintain the edentulous space or the root positions of the adjacent teeth. Maryland bridges can be expensive, require some interproximal reduction of the adjacent teeth, tend to cast a dark shadow around the pontic where the connector shows through, and also do nothing to support the edentulous ridge, although they are effective in maintaining the space and root positions. Resin-

bonded bridges have many of the same shortcomings, except for the shadow effect.

An effective and esthetic alternative to these traditional techniques is the miniscrew-supported transitional tooth replacement first described by Graham in 2007.<sup>4</sup> The pontic can be placed either shortly before or immediately after removal of orthodontic appliances, does not involve any reduction of the adjacent teeth, and requires little or no laboratory work. **The miniscrew stimulates the alveolar ridge and thus helps prevent ridge atrophy, and it prevents the adjacent roots from drifting into the edentulous space.**<sup>5</sup> Moreover, the fixed transitional crown, if properly designed and placed, maintains space for the future permanent implant while allowing for future growth and slight eruption of the adjacent teeth. Finally, because miniscrews do not osseointegrate, the screw is simply removed when the patient is ready for a permanent implant, and the implant is placed immediately in the same site.

## Technique

1. After preparing the space orthodontically, select a plastic denture tooth of the correct size and shade. Adjust the tooth to the approximate correct length.
2. Hollow out the gingival (apical) aspect of the denture tooth to create sufficient room for the screw head, taking care not to remove the lingual wall of the crown form (Fig. 1A).
3. Prepare the interproximal surfaces by creating a slight concavity (Fig 1B). **This step is important to prevent rotation of the pontic after insertion, while still allowing passive eruption of adjacent teeth.** When properly prepared, the crown form should slide into place like a tongue-and-groove with the adjacent teeth. Make any final length adjustments in the mouth (Fig. 1C) to produce

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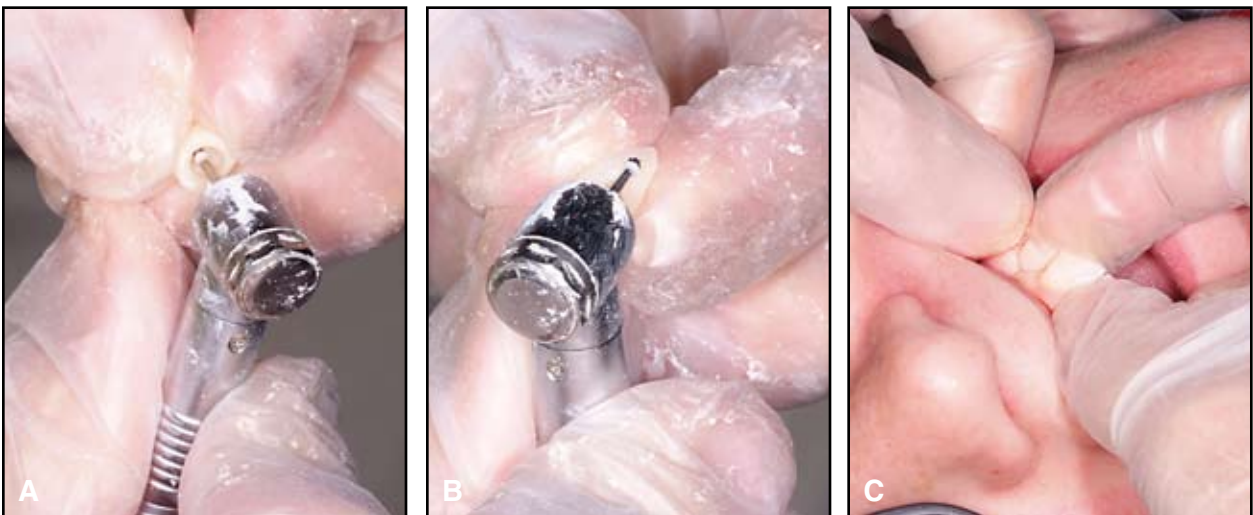
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gingival embrasure contours that will help assure proper hygiene. Polish the altered areas.

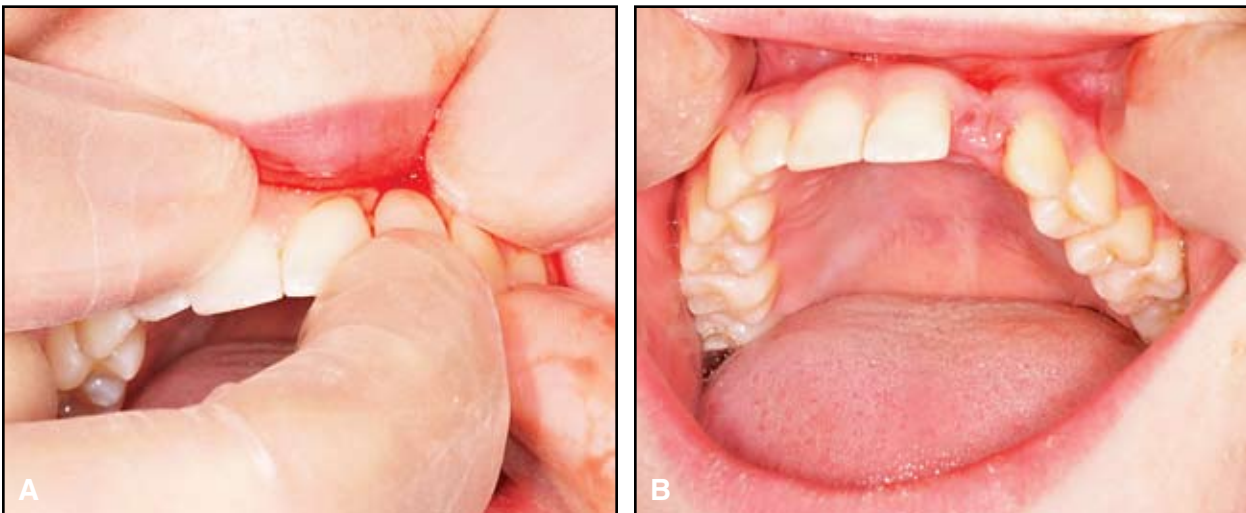
4. Anesthetize the area, then press the crown form firmly against the gingival tissues while maintaining the correct final orientation (Fig. 2). This leaves a reddened circle on the gingiva that will serve as a target for miniscrew placement.

5. Place the miniscrew as usual, inserting the tip in the center of the target and at the correct angulation to match the adjacent teeth (Fig. 3A). We use a 12mm VectorTAS screw\* because its length promotes lateral stability and its gold color, similar

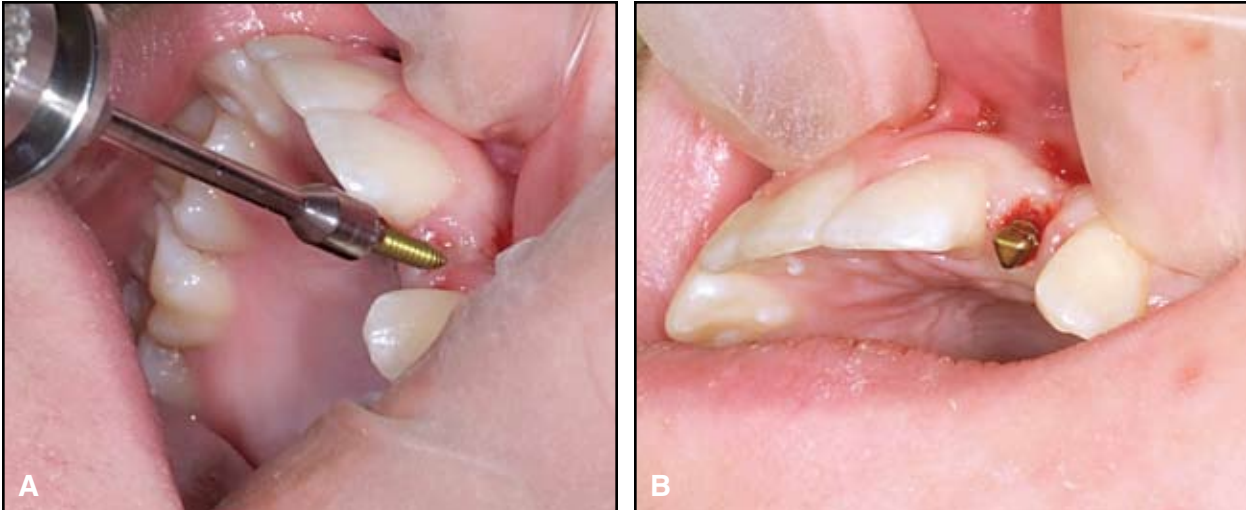
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**Fig. 1** A. Gingival aspect of transitional tooth replacement carefully hollowed to accommodate miniscrew head. B. Interproximal surfaces of pontic hollowed slightly to help prevent rotation after placement. C. Pontic tried in mouth for final adjustments.



**Fig. 2** Crown pressed firmly into gingival tissues, leaving red mark as target for miniscrew placement.



**Fig. 3 A.** Miniscrew inserted in center of target at correct angulation to match adjacent teeth. **B.** Flat side of delta-shaped screw head parallel with labial surface of crown form.

to that of dentin, provides a more natural-appearing tooth when completed. Ensure that the flat side of the delta-shaped screw head is parallel with the labial surface of the crown form (Fig. 3B).

6. Make any necessary adjustments to the internal surfaces of the crown form so it will fit snugly over the screw head. Create a small groove inside the hollowed-out area of the crown form to provide an undercut for enhanced mechanical retention.

7. Apply a plastic primer such as Add&Bond\*\* to the inside of the crown form (Fig. 4) and petroleum jelly to the outside. The petroleum jelly prevents the adhesive from adhering to the outside of the crown, thus making cleanup faster and easier.

8. With a round or small diamond bur, cut a small hole in a mylar matrix strip (Fig. 5A). Place the strip over the screw head, tucking it under the collar of the screw (Fig. 5B). The mylar strip helps keep the composite away from the soft and hard tissues and smoothes the gingival surface of the composite to minimize irritation.

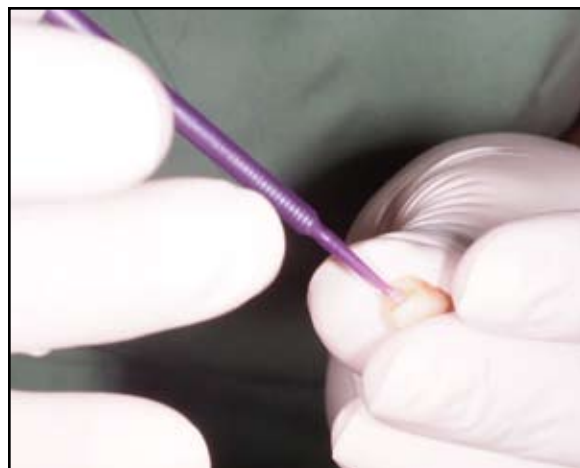
9. Inject the appropriate shade of a light-cured

\*\*Trademark of Parkell, Inc., 300 Executive Drive, Edgewood, NY 11717; www.parkell.com.

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composite such as Point 4\*\*\* both inside the hollowed-out crown form and around the screw head (Fig. 5C), and firmly seat the crown form over the screw head in the correct orientation. Remove excess composite with a scaler.

10. While firmly holding the crown form in place, pull the mylar strip up tightly against the base of the crown form while the adhesive polymerizes



**Fig. 4** Plastic primer applied to inside of crown form.

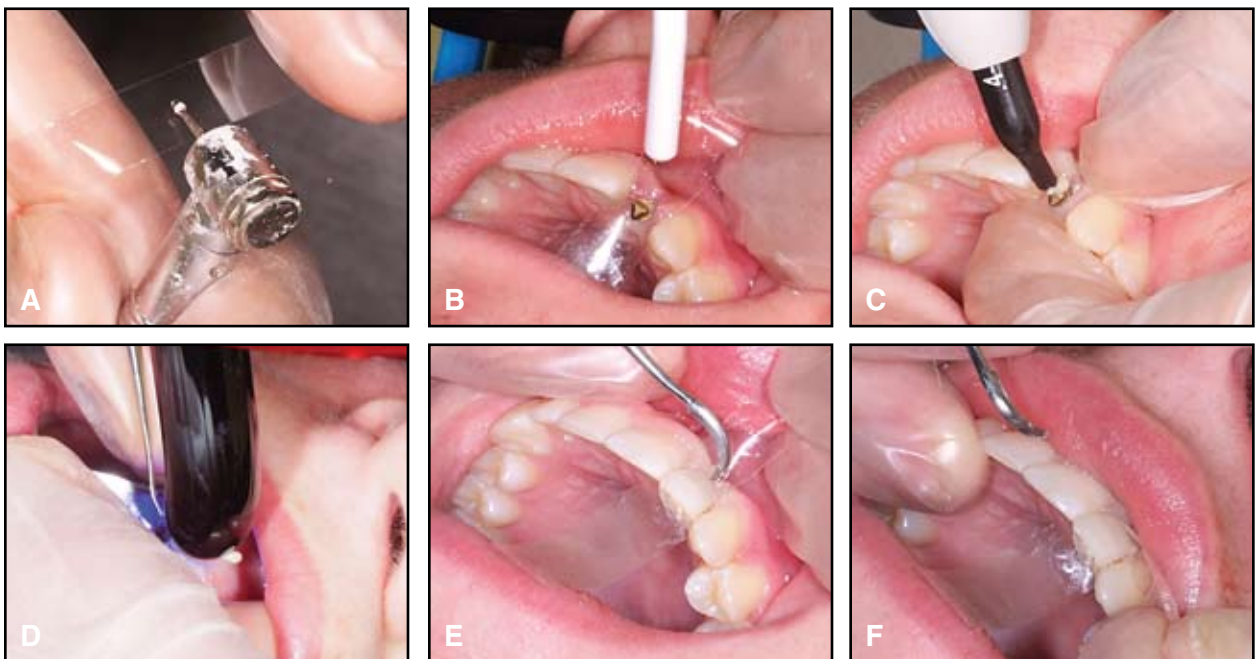
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(Fig. 5D).

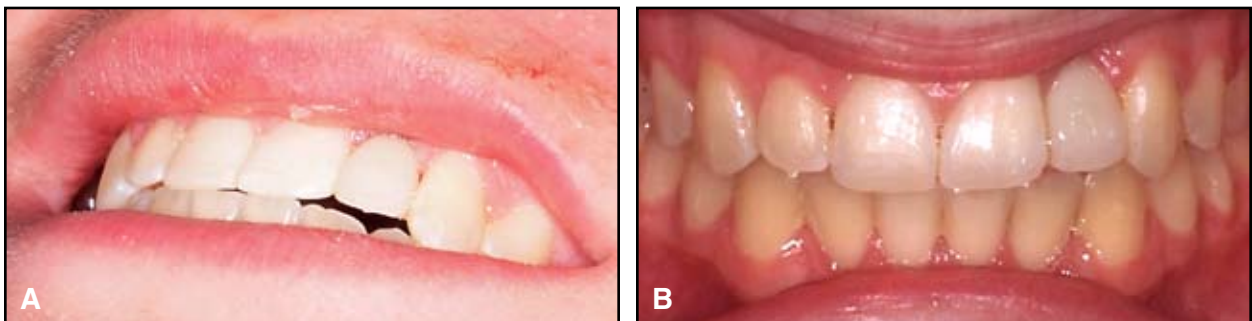
11. Use a scaler to flick off any remaining flash (Fig. 5E), and pull the mylar strip free (Fig. 5F). If the strip fails to tear free easily, use a scaler or scissor to start a tear for removal.

12. Adjust the occlusion to make certain there is no direct contact with the crown form (Fig. 6).

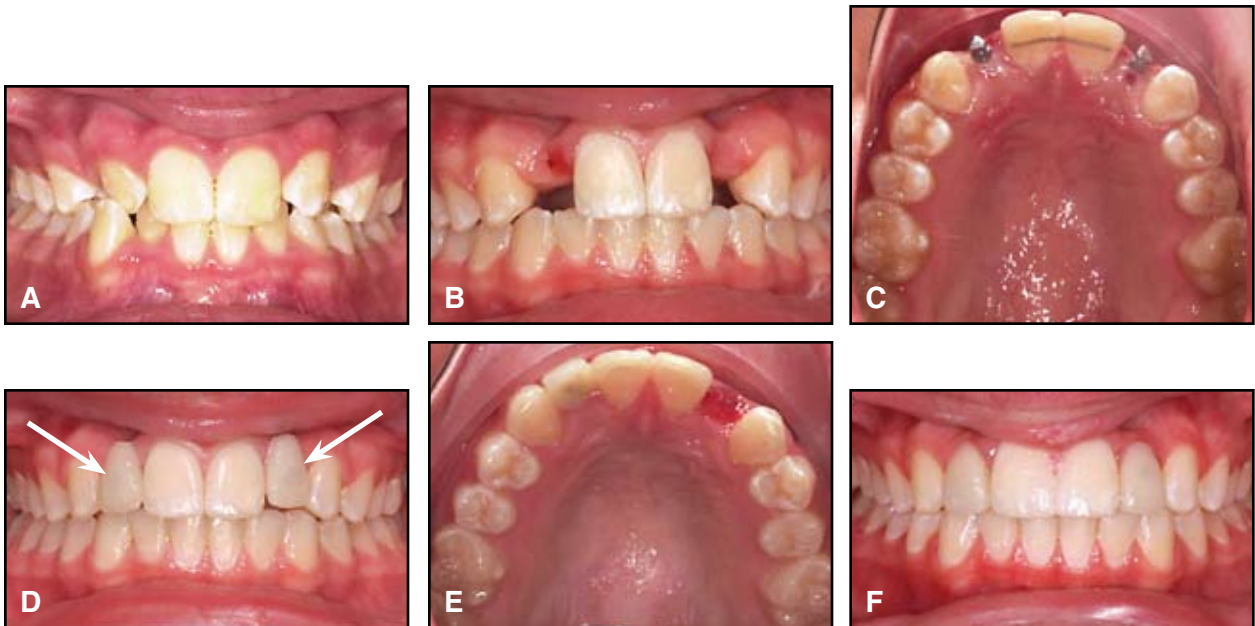
13. Fabricate a clear, vacuum-formed retainer and instruct the patient to eat with it in place for the first month to avoid placing excessive force on the temporary tooth replacement. Because the pontic feels more resilient than natural teeth, most patients will initially try to bite on it, potentially causing crown failure or loosening of the screw.



**Fig. 5** A. Small hole drilled in mylar matrix strip. B. Mylar strip placed over screw head. C. Composite added around screw head. D. Mylar strip held tightly against base of crown during polymerization of composite. E. Remaining flash removed with scaler. F. Mylar strip pulled free from base of crown.



**Fig. 6** A. Occlusion examined carefully to ensure opposing teeth do not contact crown form. B. Temporary tooth replacement after final adjustments.



**Fig. 7** A. 11-year-old female patient before orthodontic treatment. B. After 32 months of treatment, lateral incisor spaces ready for temporary tooth replacement. C. Improper orientation of miniscrew heads in lateral incisor spaces. D. Initial pontic placement, with purple screw heads barely visible through crown forms (arrows). E. Left lateral incisor pontic and miniscrew removed for replacement, showing minimal inflammation after 18 months. F. Improved esthetic appearance after replacement of pontics, reorientation of right lateral miniscrew, and proper orientation of new left lateral miniscrew. (Purple screws still give pontics slightly darker shade; gold-colored screws now used produce better esthetics overall, as seen in Figure 6B.)

## Discussion

Temporary restorations have now been in place on some of our patients for at least two years, with negligible problems. Figure 7 shows one such patient, in whom one screw and both pontics were replaced after 18 months purely for esthetic reasons. The original 10mm VectorTAS\* screws were positioned so that the apex of the miniscrew's delta head, rather than its flat surface, was facing the labial. Because of this improper positioning, the purple color of the screws showed through the facial surface of the crown forms. Once the crowns were removed for replacement, the right screw was simply rotated into the correct orientation; the left screw was replaced after it became loose during the crown removal. Only minimal inflammation was evident where this screw was removed, after being in position for 18 months without the aid of

the mylar matrix strip during original placement (Fig. 7E). Note the esthetic improvement after the proper technique was used (Figs. 7D,F). The replacement (left) and original (right) miniscrews have now been in place for one year and two and a half years, respectively.

## REFERENCES

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