Laser-Welded Hollow Pontic Full-Gold Fixed Dental Prosthesis

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Abstract

This article describes a technique for the fabrication of a laser-welded hollow pontic full-gold fixed dental prosthesis.

Keywords

Fixed dental prostheses; laboratory techniques; dental materials; laser welding.

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The hollow pontic design has been described since the mid 1900s. Early designs were basically three-wall shell castings or swaged prostheses with porcelain or acrylic resin filling the void.[1-3] Shoher and Whiteman[4] found a 55% increase in load-bearing properties following the addition of porcelain to a perforated metal substructure compared to the substructure alone. An investigation by Rosenstein et al contradicted this study and found that a solid pontic without porcelain was significantly stronger than a metal framework with porcelain;[5] however, they found no significant difference in the fracture resistance of three-unit metal-ceramic fixed dental prostheses (FDP) with solid or hollow pontics after the addition of porcelain.[5]

The indication for a hollow pontic is usually extensive loss of tissue in the pontic area, resulting in the necessity to cast a large metal pontic. If the pontic is cast as one large volume of metal, this can result in significant casting porosity within the pontic or on the surface. Furthermore, within the past 2 years, the price of gold has fluctuated to well over $900 per ounce and is expected to continue to rise. The increase in price has many laboratories considering using less expensive alloys or other techniques to decrease the amount of gold alloy used.

The aim of this article is to describe a technique for the fabrication of a laser-welded hollow pontic full-gold fixed dental prosthesis.

Technique

1. Create a full contour wax-up leaving the facial portion of the pontic hollow (Fig 1). The walls of the pontic should be approximately 1.0 mm in cross-sectional thickness axially and 1.5 mm to 2.0 mm occlusally (Fig 2).
2. Place a block-out material into the wax hollow pontic (cotton pellet and Lab Putty, Coltene Whaledent Cuyahoga Falls, OH) (Fig 3). Lubricate the wax and block-out interface with petroleum jelly and create the cap using chemically activated acrylic resin (GC Pattern Resin, GC America Inc., Alsip, IL) (Fig 4).
3. Sprue both the FDP framework and the cap, invest together in the same ring, cast, and finish in the typical method (Fig 5).
4. Refine the pontic cap and pontic seating area with mirror-image reverse bevels (Fig 6).
5. Laser weld the cap to the pontic using ceramic alloy wire (K04 Laser wire, Gramm Technology Inc. Woodbridge, VA) (Fig 7) using the settings: 216 V, 0.7 mm diameter beam, 2.6 J, and 1.3 kW with 50% overlap (Alpha Laser ALP 50, Puchheim, Germany).
6. Finish the interface between the pontic cap and pontic.
7. Test for leaks of the cap by placing in a pressure pot at 20 psi for 15 minutes and evaluate for bubbles at the interface.

Figure 1 Full contour wax-up.

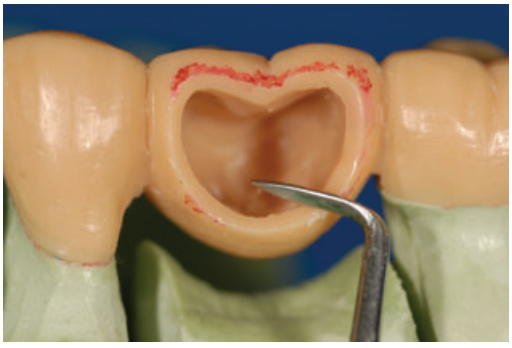

Figure 2 Hollow pontic wax-up.

Figure 3 Hollow pontic area block out.

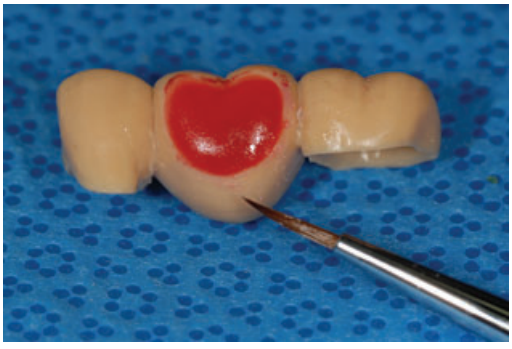

Figure 4 Acrylic resin cap.

Figure 5 FDP Framework and cap ready for investing.

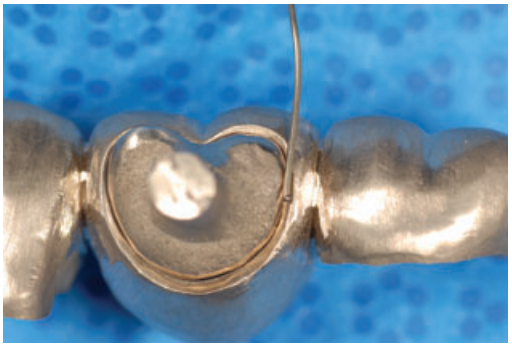

Figure 6 Pontic cap and seating area prepared with reverse bevels.

Figure 7 Cap laser welded to the pontic.

Figure 8 Completed prosthesis.

If leaks are observed, remove all water from the internal chamber and reaccomplish the welding procedure.

8. Complete the final polish. The prosthesis is ready for delivery (Fig 8).

References

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