Making multiple predictable single-unit provisional restorations using an indirect technique

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This article describes a method to fabricate single provisional restorations for multiple preparations using an indirect technique. Provisional restorations need to mimic the definitive restoration as closely as clinically possible. When multiple adjacent provisional restorations are fabricated, the ability to make each separately, with its own path of insertion and contour, aids in providing a predictable final result for the patient. Individual provisional restorations will also allow the patient to maintain better hygiene. (J Prosthet Dent 2009;102:260-263)

The fabrication of provisional restorations for multiple prepared teeth is a common task for the restorative dentist. Methyl methacrylates are commonly used for the fabrication of provisional restorations; however, the presence of unpolymerized monomers can be cytotoxic.[1,2] During polymerization, excessive heat can be generated. The rise in temperature may cause thermal damage to the dental pulp and odontoblasts.[3-6] The use of clear matrices and silicone matrices does not reduce the possible thermal damage to the tooth.[6]

Fabrication of provisional restorations indirectly on a cast can produce more accurate margins. Small[7] reports that more accurate margins and a greater ability to control morphology occur as a result of using the indirect technique. Small further indicates that time can be saved by using the indirect method as the need for relines of the provisional restorations is eliminated or reduced. Crispin[8] and Monday[9] demonstrated the marginal accuracy of provisional restorations using the indirect technique was significantly better than that of provisional restorations made by the direct technique. Fabricating the provisional restorations individually and indirectly allows the clinician better access to the margins to polish and contour the restorations.

Direct fabrication of provisional restorations intraorally for multiple prepared teeth is a common method of fabricating provisional restorations.[10-13] When making provisional restorations for multiple teeth, clinicians often attempt to make a single large provisional restoration including multiple teeth. The advantage of this single provisional restoration is the ease of fabrication; in addition, the provisional restoration will splint the teeth into a single position and minimize movement of the teeth while the definitive restorations are being fabricated.

The fabrication of multiple provisional restorations in a single piece intraorally can result in a locking of the restoration into place if undercuts are present. By removing the provisional restoration prior to complete polymerization, locking into the undercuts can be avoided.[10] Movement of the provisional restoration in and out of the mouth during the polymerization period can minimize the heat generated to the individual teeth, but will also have a tendency to generate open margins. Clinicians can refine the margins by adding new acrylic resin intraorally.[13] Generally, tooth preparations have different paths of insertion which the provisional restorations are required to accommodate. The resulting provisional restorations have open margins or large spaces between the tooth and the provisional restoration.

Fabrication of a single-piece provisional restoration for multiple prepared teeth will also make hygiene more difficult. Without the ability to adequately clean the interproximal areas, inflammation can result, causing possible overgrowth or recession of the gingival tissues.[14] Proper gingival embrasure form is difficult to achieve using a single provisional restoration for multiple teeth. Fabrication of individual provisional restorations allows the clinician better control of the interproximal areas, resulting in better hygiene and tissue health.[14]

The purpose of this article is to describe a method of fabricating single provisional crowns for multiple tooth preparations. This method is unique because of the use of matrix bands to act as separators between each unit.

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The ability to make individual provisional crowns will help both the clinician and the laboratory technician. The provisional crowns can provide esthetic and functional information that can be used to achieve predictable final results for the definitive restorations.

TECHNIQUE

1. Mount diagnostic casts in an articulator and complete diagnostic waxing to ideal contours (Figs. 1 and 2).[15]

2. Duplicate the waxing in improved dental stone (Microstone; Whip Mix Corp, Louisville, Ky).

3. Fabricate a 0.020-inch-thick vacuum-formed matrix (Buffalo Dental Mfg Co, Syosset, NY) to duplicate new length and contour of the teeth (Fig. 3).

4. Fabricate a splint using light-polymerizing acrylic resin (Triad Denture Base Material, Regular Pink Unfibered; Dentsply Intl, York, Pa), using the palate as a stable, unchanging area from the preliminary cast to the cast poured after tooth preparation (Fig. 3).

6. Prepare the teeth and make an irreversible hydrocolloid (Jeltrate Plus; Dentsply Intl) impression of the prepared teeth.

7. Cast the irreversible hydrocolloid impression in a fast-setting stone (Snap-Stone; Whip Mix Corp) (Fig. 4).

8. Paint a separator (COE-SEP; GC Lab Technologies, Inc, Alsip, Ill) onto the stone surface to allow the completed acrylic resin provisional restorations to be separated from the cast with ease. Dilute the separator with distilled water in a 1:1 ratio to provide a thinner coating.

9. Paint a single coat of die spacer (Rubber Sep; George Taub Products and Fusion Co, Inc, Jersey City, NJ) on the cast to allow space for cement. Paint die spacer on the prepared tooth structure, leaving approximately 1 mm of tooth structure uncovered next to the gingival tissues. Use die spacer to allow easier seating of the new provisional restorations (Fig. 4).

10. Evaluate the vacuum-formed matrix on the fabrication cast to ensure that it fits properly and that there is adequate space for the provisional material.

11. Cut a thin slit into the vacuum-formed matrix at the interproximal of each tooth. Insert a piece of stainless steel matrix band (.0015 in; Water-Pik, Inc, Ft Collins, Colo) into the slit (Fig. 4). Insert the matrix band so that the band contacts the stone cast and protrudes out of the matrix in a buccal lingual direction. Ensure that the matrix band clinically demonstrates

1 Initial appearance of anterior teeth.

2 Diagnostic waxing.

3 Duplicated cast from wax up, vacuum-formed matrix, and splint.

4 Vacuum-formed matrix is in proper position with small pieces of matrix band interposed to allow separation of provisional crowns.

no gap between the provisional restorations. Ensure that the interproximal contacts of the new provisional restorations hold shimstock (.0005 in; Artus Corp, Englewood, NJ).

12. Select a shade of provisional material which will match the shade selected for the final restorations. Use methyl methacrylate resin to provide a color-stable restoration.[16,17]

13. Mix the acrylic resin according to the manufacturer's recommendations. Fill the vacuum-formed matrix with acrylic resin (Jet Acrylic; Lang Dental Mfg Co, Wheeling, Ill) and place the matrix onto the fabrication cast. Hold the vacuum-formed matrix in place with the splint to ensure the dimensions of the new provisional restorations will not be distorted, and place the cast in a pressure pot with warm water (Fig. 5).[15] Remove the matrix covering the polymerized provisional restorations and separate the provisional restorations from the cast.

16. Remove the rubber separator from the intaglio surface of the provisional crowns, then separate the individual provisional restorations from each other using simple finger pressure to snap them apart.

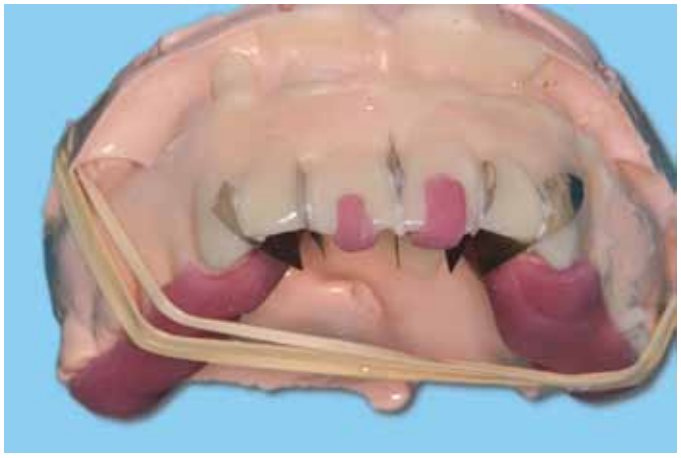
17. Trim and polish the contours of the new provisional restorations extraorally using burs and rubber wheels (Acrylic Temporization Kit; Brassler USA, Savannah, Ga) and pumice (Preppies; Whip Mix Corp).

18. Evaluate the provisional restorations intraorally for length, width, and contour.

19. Insert provisional crowns and instruct the patient and family members to review the contours.

21. Recontour the provisional restorations and add new acrylic resin to achieve the esthetics the patient desires, if necessary (Fig. 6).

22. Make an irreversible hydrocolloid (Jeltrate Plus; Dentsply Intl) impression of the accepted provisional restorations intraorally, and fabricate a cast for the dental laboratory technician to use as a guide in fabricating the definitive restorations (Fig. 7).



5 Splint placed to ensure correct position of matrix.

6 Incisal edges were easily modified several days later, by adding additional acrylic resin to lateral incisors.

7 Definitive porcelain to metal crowns demonstrating contours and incisal edge relationship developed in provisional restorations.

SUMMARY

Indirectly fabricated individual provisional restorations allow the patient better access for oral hygiene. Indirect provisional restorations provide better marginal adaptation, greater opportunity for the dentist to change contours of individual teeth to accommodate patient esthetic preferences, and allow quick clinical fabrication.

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Noteworthy Abstracts of the Current Literature

Combined influence of implant diameter and alveolar ridge width on crestal bone stress: A quantitative approach

Yu W, Jang YJ, Kyung HM.
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Purpose: To quantitatively evaluate the combined influence of implant diameter and alveolar ridge width on crestal bone stress.

Materials and Methods: ITI solid-screw implants, 10 mm in length and 3.3, 4.1, and 4.8 mm in diameter, and the alveolar bone were modeled using axisymmetric finite elements. Four different alveolar ridge geometries were selected for each implant: 5-, 6-, 7-, and 8-mm-wide ridges for the 3.3-mm implants; 6-, 7-, 8-, and 9-mm-wide ridges for the 4.1-mm implants; and 7-, 8-, 9-, and 10-mm-wide ridges for the 4.8-mm implants. A nonaxial oblique load of 100 N was applied at 30 degrees to the implant axis. Regression analysis was used to avoid ambiguity when estimating the peak stress occurring at the coronal contact point between the implant and the crestal bone, ie, the singularity point.

Results: Peak stresses were dependent on both implant diameter and alveolar ridge width. Substantially lower stresses were recorded around the implants placed in narrower ridges.

Conclusion: A regression analysis may be used to quantify the peak stress at the singularity point. An implant with a diameter that is at least half the ridge width is recommended to reduce the stress concentration in the crestal bone.