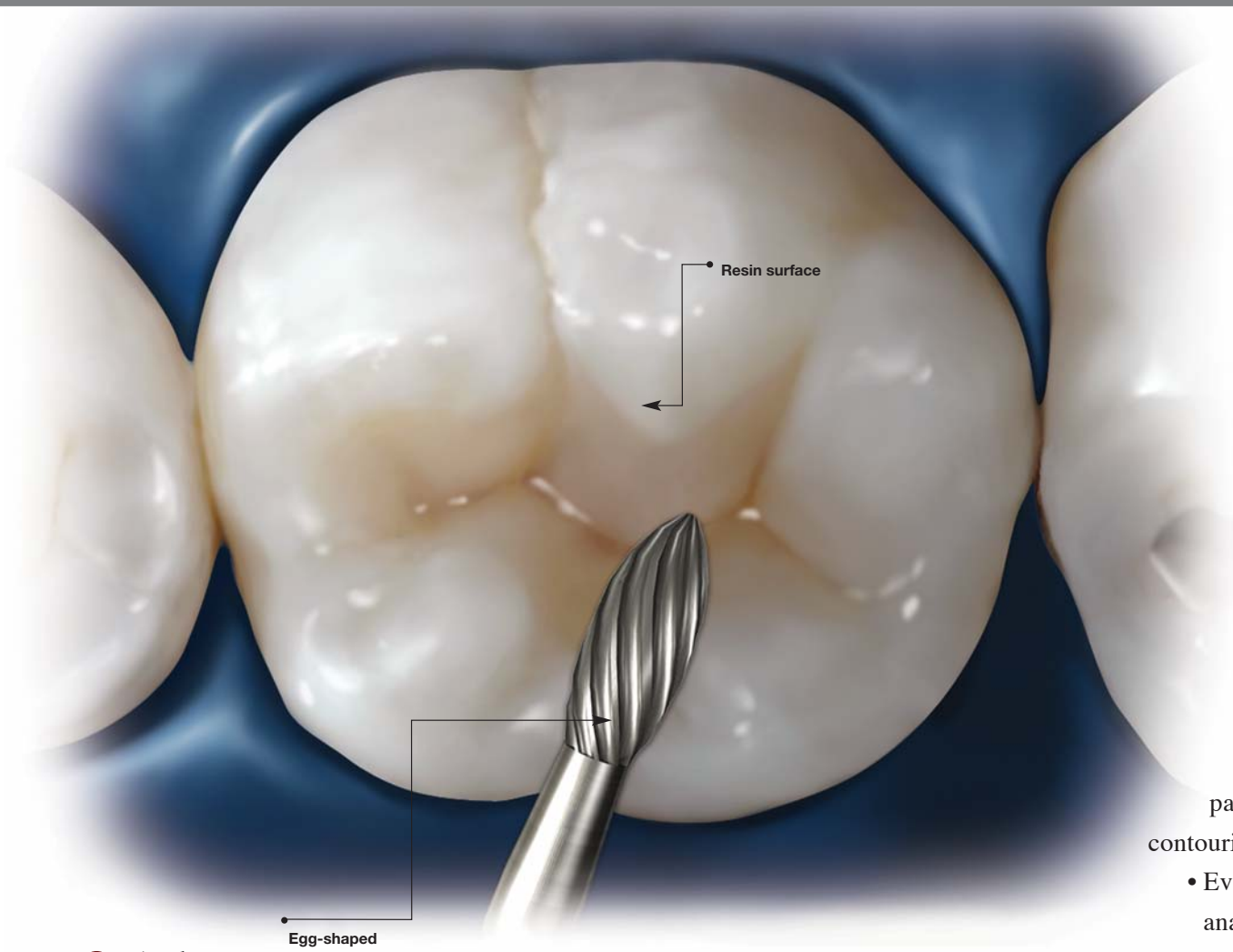
Instrumentation for Aesthetic Dentistry:

Finishing and Polishing of Direct Composite Resin Restorations in the Posterior Region

*Michael Morgan, DDS**



Optimal finishing and polishing of direct posterior composite resin restorations requires specific instrumentation and techniques. Even minimal mechanical finishing may result in trauma such as microcracks to the resin surface due to heat and vibration from finishing instruments.[1,2] Shade matching and perception can also be altered if the surface texture of the restoration is compromised[3] and long-term wear resistance in the restoration is diminished from increased surface roughness.[1,2]

An ideal posterior direct resin restoration would not require finishing and polishing following fabrication. The best strategy for minimizing the need for these procedures is to strive for an ideal restoration during the restorative process with diligent attention to detail and meticulous technique. Since most operative conditions are less than ideal, and some finishing will be necessary in the majority of cases. Illustrating the restoration of a maxillary premolar and a mandibular molar (Figures 1 and 2), the following presentation demonstrates a seven-step sequence and armamentarium for the completion of such cases.

A high luster on the occlusal surface can be achieved by utilizing a diamond-impregnated polishing brush.

CLINICAL PROTOCOL

STEP 1. A high-quality restoration is designed and fabricated in harmony with existing dentition and occlusion (Figures 3 and 4). It is important for the clinician to avoid overcontouring—a common fabrication error that necessitates significantly more finishing than restorations that are built to contour. Overcontouring also requires reduction and occlusal adjustments that compromise the anatomy and color of the restoration. Observation of the following occlusal parameters reduces the risk of overcontouring during fabrication:

- Evaluation of the occlusal surface and anatomy of the existing restoration. Any areas of fractured amalgam, flattened or deep anatomy, and cuspal inclines should be noted.
- Evaluation of the occlusion of the adjacent dentition, noting its occlusal anatomy, wear facets, and contacts in protrusive and lateral movements.
- Evaluation of opposing dentition and overall occlusion, again noting any contacts that may vary from the ideal.

STEP 2. Finishing disks are utilized to open the interproximal embrasures (Figure 5) (fine and medium grits are recommended for interproximal embrasures and the marginal ridge). Contouring of the marginal ridge and polishing of proximal areas are performed with a series of proximal finishing disks (ie, Sof-Lex, 3M, St. Paul, MN), FlexiDiscs, Cosmedent, Chicago, IL). Slowly

FIGURE 1. The preoperative occlusal view of the maxillary premolar demonstrates a defective amalgam restoration.

FIGURE 2. The mandibular molar shown on the preoperative occlusal view also presented with a defective amalgam restoration.

FIGURE 3. An artist's brush is used to smooth the buccal enamel margins of the posterior direct resin restorations in the maxillary premolar.

FIGURE 4. The mandibular molar is then smoothed using an artist's brush.

FIGURE 5. When finishing of the direct resin restoration is required, interproximal embrasures are opened with the proximal finishing disks.

FIGURE 6. The gingival margins are finished, and excess resin is removed with a #12B scalpel.

FIGURE 7. Apical convex areas are finished utilizing a narrow (2.0 mm) fine-grit interproximal finishing strip.

FIGURE 8. Excess resin on the occlusal surface of the maxillary premolar is removed with a superfine finishing diamond.

FIGURE 9. Cavosurface margins on the mandibular molar are polished with a superfine finishing diamond using a high-speed handpiece.

FIGURE 10. The egg-shaped, superfine, carbide fluted bur is used with water spray in a limited area.

rotating curved disks create a natural, rounded contour to the finished marginal ridge. Disks improve visibility when utilized with a light, intermittent touch, slow speeds, and without water. Properly orienting the polishing side of finishing disk will allow access from different angles.

NOTE: Throughout the finishing of Class II surfaces, the metal matrix used to form the proximal wall during fabrication of the restoration should remain in place in order to protect the adjacent marginal ridge from iatrogenic finishing and adjustments.

STEP 3. Excess or unbonded resin is removed with a #12B scalpel (Figure 6) from the proximal area as well as from the facial and lingual interproximal embrasures. The gingival cavosurface margin of the proximal box may be feathered with the curved tip of the scalpel's blade. The tip is especially suitable for cases in which the margin of the proximal box extends into an area where the natural anatomy becomes slightly concave, and a more ideal form can be sculpted in the natural morphology of the marginal ridge and the proximal contact area.

STEP 4. If further finishing of embrasure areas is necessary, a narrow (2.0 mm) fine-grit, interproximal finishing strip is used (Figure 7). The finishing strip is then passed through the contact area apical to the gingival margin. It is important not to roughen adjacent root surfaces or tear the rubber dam during this procedure.

NOTE: Polishing strips function properly only in areas with a convex or flat surface.

STEP 5. Final occlusal adjustments are performed with a superfine finishing diamond (Figures 8 and 9). An egg-shaped, fine-diamond finishing bur (eg, Diamond Finishing Bur, Brasseler USA, Savannah, GA; NeoDiamond #3900VF, Microcopy, Kennesaw, GA) is ideal for removing excess resin from the occlusal aspect. Such burs allow the clinician to sculpt excess resin away selectively, without significant effect on marginal integrity. Ideally, the bur is used at the low range of an electric high-speed handpiece to maximize tactile sense.

FIGURE 11. The fine bristles of the polishing brush are effective in reaching concave surfaces and other less accessible areas.

FIGURE 12. A diamond-impregnated brush is useful in achieving a desirable luster on the occlusal surfaces.

FIGURE 13. Sealing the restoration with a surface-penetrating sealant following acid etching reseals microcracks resulting from the trauma of finishing.

FIGURE 14. The finished posterior direct composite resin restoration of the maxillary premolar exhibits optimal aesthetics.

FIGURE 15. Note the natural contours and highly polished surface in the completed mandibular molar.

NOTE: Degradation of the resin surface and compromise of marginal integrity may occur if the resin surface is heated to above 200°F during this procedure.

Egg-shaped, superfine, carbide fluted burs with water spray should be used only to adjust minute areas (Figure 10). Less tactile sense is available with carbide burs than with diamond burs, making them more difficult to control. They also tend to chatter the resin surface.

Optimal finishing and polishing of direct posterior composite resin restorations requires specific instrumentation and techniques.

STEP 6. Previously adjusted areas are polished with composite polishing cups and points, followed by polishing brushes (eg, Jiffy Brushes, Ultradent Products, South Jordan, UT; Sof-Lex Brushes, 3M, St. Paul, MN) (Figure 11). Light, intermittent touches are required to prevent loss of anatomy and surface morphology. A high luster on the occlusal surface can be achieved by utilizing a diamond-impregnated polishing brush (Figure 12). The fine bristles are particularly effective in concave surfaces and other areas where cups and points are too bulky to reach.

STEP 7. A surface-penetrating sealant is used to seal the restoration (Figure 13). Long-term studies of the use of surface sealants as a final step in polishing are not currently available, resulting in controversy regarding this technique. Short-term studies, however, have found that microcracks resulting from the trauma of finishing procedures are resealed.[4] Since microcracks can propagate over time, particularly at the cavosurface margins, these findings suggest that post-operative utilization of surface sealants may decrease surface wear of direct resin restorations with a resulting increase in longevity.

Traditional surface sealants (eg, Fortify, Bisco Dental Products, Schaumburg, IL; PermaSeal, Ultradent Products, South Jordan, UT) incorporate an oxygen-inhibited layer that remains and must be cured or removed following light curing. A new acrylate-based, light-cured surface sealant and glaze (BisCover, Bisco Dental Products, Schaumburg, IL) do not produce an oxygen-inhibited layer. A restoration that has been fully cured and polished can be sealed with this product to fill any microcracks and will cure without an oxygen-inhibited layer. The definitive results (Figures 14 and 15) illustrate an outcome that is achievable by carefully finishing direct resin restorations in the posterior region.

CONCLUSION

Trauma such as microcracks may result even during minimal mechanical finishing from the heat and vibration of the instruments. If the surface texture of the restoration is compromised, shade matching may also be altered and long-term wear resistance diminished from increased surface roughness. Optimal finishing and polishing of direct composite resin restorations in the posterior region, therefore, requires specific instrumentation and techniques. With the aforementioned protocol, a successful restorative outcome that will satisfy both clinician and patient can be accomplished on a consistent basis.■

REFERENCES

1. Leinfelder KF. Using composite resin as a posterior restorative material. J Am Dent Assoc1991;122(4):65-70.
2. Ratanapridakal K, Leinfelder KF, Thomas J. Effect of finishing on the in vivo wear rate of a posterior composite resin. J Am Dent Assoc 1989;118(5): 524.
3. Vanini I. Light and color in anterior composite restorations. Pract Periodont Aesthet Dent 1996;8(7):673-682.
4. Dickinson GL, Leinfelder KF. Assessing the long-term effect of a surface penetrating sealant. J Am Dent Assoc 1993;124(7):68-72.

Private practice, Chicago, IL.