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Contouring, Finishing, and Polishing Anterior Composites

The key to beauty and biologic integrity of long-term restorations lies in the final steps of the procedure.

By K. William Mopper, DDS, MS

One of the most important steps in successfully creating bonded restorations is contouring, finishing, and polishing. Proper finishing and polishing greatly increase esthetic results, maximize patients' oral health,[1] and increase the longevity of restorations.[2] Unfortunately, the proper sequence of polishing steps necessary to achieve optimum results is often overlooked.[3] The purpose of this article is to describe a technique that will help achieve maximum esthetics and biological success when contouring, finishing, and polishing anterior restorations (Table 1 and Table 2).

Finishing and polishing anterior composite restorations is a sophisticated art form. However, proper technique is actually quite simple and extremely efficient once the practitioner understands the concept behind the finish and polishing process.[6,7]

Step 1: Material Selection

The ability to achieve a good finish and polish on anterior composites is determined by two very important factors—access to the right materials and the artistic ability of the dentist. Having access to the right materials, however, does not mean simply polishing discs and strips. The dentist must also realize that the type of composite(s) used will have a large impact on the restoration's longevity, durability, polishability, and wear-resistance. Achieving a good understanding of the materials available, and grasping their impact on overall results will maximize restorative success.



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Composites

In terms of color stability and polishability, in the author's opinion microfill is the only composite material that really stands the test of time. A microfill must be used as the final layer in order to obtain the best polish, surface smoothness, and long-term wear resistance. Nanohybrids or nanofills can also be used to replace the enamel layer in composite restorations. These materials initially provide a relatively good surface smoothness and high shine. Over time, however, nanofill composites lose their luster and are less wear-resistant than microfill composites.[8] Microhybrids are the least polishable of the three main composite types. Used as an anterior enamel layer, microhybrids rapidly lose polish and are more susceptible to staining. To achieve a beautiful, long-lasting polish, a microfill composite must be used as the final layer.

Finishers and Polishers Overview

Where do polishers best fit into a practice's current procedures? One- or two-step polishers can certainly be used when polishing composite restorations quickly. But, if the goal is to achieve the best long-term polish, then it is more desirable to use a comprehensive polishing system.

Different types of composites call for different polishing techniques, depending on the type of restoration and the dentist's ultimate goals. As a reference, diamond impregnated polishers should be used, followed by an aluminum-oxide polishing paste when polishing nanofill and microhybrid composites. When polishing microfill composites, aluminum-oxide polishers should be used, followed by an aluminum-oxide polishing paste.[9]

Polishing Materials

Thorough and complete finishing and polishing requires the use of a sequential series of finishing and polishing burs, discs, strips, and pastes. Following the proper sequence of materials ensures the long-term health and polishability of restorations. If a part of this process if skipped, the tooth will often be left rough and susceptible to plaque and staining. Either multi-fluted carbides or fine diamonds for gross contouring can be used to begin finishing the restoration.

Discs

Discs can be used for the contouring of all tooth surfaces as well as bulk reduction of excess material. Discs will help contour and finish curved surfaces such as labial proximal line angles, lingual marginal ridges, cervical areas, incisal edges, shaping and finishing of incisal corners, plus finishing and polishing of labial surfaces. They are also excellent for contouring and finishing of posterior marginal ridge areas, and for lingual and buccal surfaces.

TABLE 1

Why is Finishing and Polishing So Important?

Proper finishing and polishing is important for several reasons, such as:

- It ensures the oral health and longevity of restorations. A smooth surface reduces the likelihood of adhesion, which means plaque is less likely to accumulate on a polished surface.[4,5] This leads to healthier, longer-lasting restorations.
- A smooth tooth surface minimizes gingival irritation and surface discoloration. A polished tooth is more biologically compatible with the gingival tissue, so the health of the gingival tissue is maintained.
- Proper contouring, finishing, and polishing will heighten the marginal integrity of the restoration. Interproximal surfaces have the maximum potential for plaque retention, and polishing these surfaces will significantly lower patients' risk for secondary caries and periodontal disease.
- A highly polished tooth surface increases the reflective and refractive index of the restoration to create more natural and esthetic smiles. From a visual standpoint, a restoration simply cannot be left unpolished.
- If proper technique is followed, finishing and polishing greatly enhance the longevity, durability, and long-term wear resistance of the restoration.
- Finishing and polishing enhances patient comfort and satisfaction, and patients greatly appreciate the natural beauty and health benefits realized from a properly polished restoration.

Four-Disc Grit Sequence: Aluminum-Oxide Discs

The author is an advocate of the four-grit disc sequence, which is designed to gradually reduce the amount of roughness caused by initial abrasion until a smooth glossy tooth surface is achieved. To provide maximum control for the operator, composite finishing should be done under low-speed/high-torque (speed from 0 rpm to 30,000 rpms).

Coarse—The coarse grit is the stiffest of all the discs. This grit is used in conjunction with multi-fluted finishing burs for gross contouring and shaping. When used with pressure, the coarse disc makes it easy to blend the composite into the tooth surface, eliminating the white line and raised margins.

Medium—The medium grit should be used to continue smoothing the restoration surface. Medium grits remove any remaining imperfections and marks.

Fine—This part of the grit sequence is where polish really starts to shine through. The fine grit helps remove the smallest imperfections while adding a nice luster to the restoration.

Superfine—The superfine grit further refines the surface smoothness attainable to create a highly polished restoration.

Diamond Strips

Diamond strips help start the interproximal finishing process while maintaining the integrity of the interproximal contact. A larger-grit (45-µm strip) should be used for interproximal stripping of natural teeth or for gross removal of material, and smaller grits (15 µm and 30 µm) should be used to start interproximal polishing.

Aluminum Oxide

Strips should be used to contour and polish interproximal areas. Use of a high-quality strip will remove tenacious stains and create a high polish at the interproximal without damaging the soft tissue. It is important that the strip is thin and will stay intact as it is drawn through the interproximal contact areas.

Oxide Cups and Points

Aluminum-oxide cups should be used to polish gingival margins, achieve labial characterization and anatomy, and effectively reach areas such as the gingival third and the gingival margins of anterior teeth. Aluminum-oxide points should be used to create labial grooves in veneers, to finish and polish occlusal surfaces of posterior teeth, and on lingual surfaces of anterior teeth.

An aluminum-oxide polishing paste should be used as the last step in the finishing and polishing process. Polishing paste with felt discs and points can be



SCULPTING AND CONTOURING, REFINEMENT AND FINISHING (1.) Class III restoration preoperative view (note the long bevel). **(2.)** Lingual view of the preparation. **(3.)** Application of Renamel NANO Shade A1 (Cosmedent, www.cosmedent.com) using Cosmedent's 8A Composite Polishing Instrument. **(4.)** Lingual sculpting and shaping of Renamel NANO using Cosmedent's IPCT Composite Polishing Instrument. **(5.)** Addition of a small amount of Renamel NANO to blend onto the long bevel. This completed the block-out of shine-through and acted as an opaquer. **(6.)** Addition of the nano-hybrid composite is complete. Notice there is still enough room to apply Renamel Microfill (Cosmedent). **(7. AND 8.)** Sculpting and contouring of Renamel Microfill to proper shape and contour. **(9.)** A Brasseler ET-9 bur was used for for labial reduction. **(10.)** A Brasseler 0S-1 bur was used for lingual reduction. **(11.)** A Brasseler 8392-016 bur was used to refine the lingual and labial embrasure spaces. **(12. THROUGH 15.)** A disc system (FlexiDisc System by Cosmedent) from coarse to superfine was used to achieve a high polish and invisibly blend composite into the tooth structure. Note the high flex and resilience of the discs.

used to bring out the final beautiful polish of composites, metals, porcelain, or natural dentition after prophylaxis.

Step 2: Conceptualization

Before finishing and polishing, the dentist must conceptualize the desired end result. The dentist will not have to work as hard to obtain lifelike results if the restoration is pre-contoured to the correct shape and form before polishing. Many practitioners lose the shape of the restoration because of a lack of attention to the material application phase. Many dentists have a tendency to over-bulk the composite, and end up losing the intended shape. It is much easier to obtain the desired result if the composite is initially placed into the correct anatomical form and only slightly over-contour from the facial aspect.

Step 3: Action

A realistic tooth form should be developed before the pre-contouring phase begins. Now it is time to apply the correct technique during the final phases of the restoration.

Handpiece

Finishing and polishing should be achieved with a low-speed, high-torque handpiece, typically anywhere from 7,000 rpm to 30,000 rpm. A high-speed handpiece may be used to pre-contour, but using anything over 30,000 rpm during finishing and polishing is too high. Low-speed, high-torque is preferable, because it gives the operator complete control.

The best finishing and polishing technique depends on the type of restoration the dentist is presented with. When polishing a Class IV restoration, for instance, the dentist should rely mainly on discs. However, cups and points will help develop more realistic characterization when polishing a veneer. A step-by-step guide to polishing on various restorations is outlined below.

Class III, IV, and Diastema Closures

Starting with a coarse disc or a carbide-finishing bur, the restoration can be completely contoured moving from restorative material to tooth surface, similar to burnishing metal. This can be done in a wet or dry field. The material should be extended well past the long bevel, and the dentist should not come back to the beveled margin. The final restoration should be feather-edged onto the tooth surface past the beveled margin. If done properly, any white line or raised margin will completely disappear. At this stage, the disc should be flexed for maximum finishing potential.

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FIG. 16


FIG. 17


FIG. 18


FIG. 19


FIG. 20


FIG. 21


FIG. 22


FIG. 23


FIG. 24


FIG. 25


FIG. 26


FIG. 27


FIG. 28


FIG. 29

FINAL POLISHING (16.) Gingival torquing opened the contact to start the interproximal finishing. **(17. AND 18.)** Use of both wide and narrow superfine diamond finishing strips (Cosmedent's FlexiDiamond Strips). Running these strips once or twice through the contact will smooth the contact area. **(19.)** This view shows that there is still more finishing and polishing to be done to further refine the embrasure space. **(20.)** Further refinement of the mesial-labial line angle to further refine embrasure space and create symmetry of both centrals. Here, the use of the medium-grit (FlexiDisc) is preferred. **(21.)** Continuing the polishing with a fine disc. **(22.)** Polishing with a superfine disc. **(23.)** Polishing the lingual surface with diamond polishers (Cosmedent's nanohybrid composite polishers). **(24.)** Polishing the lingual surface with a superfine cup. **(25.)** Finishing and characterizing the labial surface with a superfine point. **(26.)** Application of an aluminum-oxide polishing paste (Enamelize, Cosmedent) with a felt buff (FlexiBuff, Cosmedent). **(27.)** Polishing the lingual surface with Enamelize and Felt FlexiPoint (Cosmedent). **(28.)** This is the incisal view of the finished restoration. Note the symmetry of the labial surfaces, the contour at the embrasures surfaces, the contact, and the beautiful blend of the polished material into the tooth surface. **(29.)** Labial view of the finished restoration.

The different grit sizes—medium, fine, and superfine—should be continued through in succession. An enamel-like luster rapidly appears. The interproximal process should be started with diamond strips to maintain the integrity of the contact. One or two times through the interproximal should be sufficient, followed with the fine-superfine aluminum oxide strip on dry surface until no resistance is felt, and a smooth surface is apparent.

For the final polish, an aluminum oxide polishing paste with felt discs and points should be used. This is the step that really brings out the amazing final polish.

Class V

On occlusal or incisal margins, 5/8" or 1/2" coarse disc should be used past the long bevel. Discs are always preferred on exposed margins. To start finishing from restoration to tooth surface, a coarse disc is used, followed by medium and then fine; finishing with the superfine disc to achieve maximum polish. The 3/8" disc should be used at the gingival margin. Although this is a small diameter, the 3/8" disc can be flexed to gain access to hard-to-reach areas. The gingival half of the restoration can be polished nicely using flexible cups, but rubber must be kept off the occlusal and incisal margins.

If Class V restoration invades the proximal surfaces, the diamond strips and aluminum oxide strips should be used in the narrow width for polishing these surfaces. An aluminum-oxide polishing paste with felt discs and points is recommended for the final polish.

Full Resin-Bonded Veneer

The coarse disc or contouring bur is used to start contouring and finishing. The coarse and medium discs can be used to complete the contouring of the veneer. It is desirable to maintain the character and anatomy placed in the facial surface. This cannot be done with discs, but cups and points are very useful for this purpose. To characterize, the cup is placed flat on the tooth surface, flexed slightly, and run with pressure up and down the tooth surface. Blunting off sharp edges on a green stone prior to characterizing prevents scarring and over-characterization.

After a grooved surface has been developed, augmenting with rubber points highlights the grooves. Polishing the surface is completed with fine and then superfine polishing discs. To polish the interproximal surfaces, diamond and aluminum-oxide strips are used as previously described. For the final polish, an aluminum-oxide polishing paste with felt discs and points is used.

Maintenance of Composite Restorations

Excessive staining is removed in the usual fashion. A small amount of aluminum-oxide polishing paste is then applied to each surface and polish. To remove interproximal staining, each interproximal should be packed with polishing paste, and a wide, fine/superfine polishing strip is used to polish the surface.

Conclusion

The proper contouring, finishing, and polishing of anterior restorations is a key component to the long-term success of bonded restorations. This article outlines the importance of three different phases in the finishing and polishing process. First, the appropriate restorative materials, from composites to polishers, must be carefully selected to help get the job done right. Then, the dentist must conceptualize the desired end result, and set up the restoration accordingly. And, finally, the proper finishing and polishing technique must be executed in order to achieve maximum restorative success.

For a clinical example of the technique described, the author provides a complete case pictured in Figure 1 through Figure 29.

Disclosure

The author is part owner of Cosmedent.

References

1. Jefferies SR. Abrasive finishing and polishing in restorative dentistry: a state-of-the-art review. *Dent Clin North Am*. 2007;51(2):379-397.
2. Turkun LS, Turkun M. The effect of one-step polishing system on the surface roughness of three esthetic resin composite materials. *Oper Dent*. 2004;29(2):203-211.
3. Mopper KW. How do composite resins stand the test of time? *Dent Today*. 2004;23(5):74-79.
4. Ikeda M, Martin K, Nikaido T, Foxton RM, et al. Effect of surface characteristics on adherence of S. mutans biofilms to indirect resin composites. *Dent Mater J*. 2007;26(6):915-923.
5. Kantorski KZ, Scotti R, Valandro LF, et al. Adherence of Streptococcus mutans to uncoated and saliva-coated glass-ceramics and composites. *Gen Dent*. 2008:56(7)740-747.
6. Mopper KW. Let's talk composites! *Dent Today*. 2008;27(10):120-122.
7. Craig RG, Ward ML (eds). *Restorative Dental Materials*. Mosby, St. Louis, 1997,p263.
8. Barucci-Pfister N, Gohring TN. Subjective and objective perceptions of specular gloss and surface roughness of esthetic resin composites before and after artificial aging. *Am J Dent*. 2009;22(2):102-110.
9. Takanashi E, Kishikawa R, Ikeda M, et al. Influence of abrasive particle size on surface properties of flowable composites. *Dent Mater J*. 2008:27(6):780-786.
10. Cenci MS, Venturini D, Pereira-Cenci T, et al. The effect of polishing techniques and time on the surface characteristics and sealing ability of resin composite restorations after one-year storage. *Oper Dent*. 2008;33(2):169-176.

TABLE 2

Quick Tips

- Aluminum-oxide discs, rubber cups and points, and an aluminum-oxide polishing paste are used to obtain the best polish on a microfill composite.[10]
- Diamond or aluminum-oxide discs, and aluminum-oxide or diamond polishing points, cups, and wheels are used to achieve the best polish on a nanofill restoration, followed with an aluminum-oxide polishing paste.
- The best polish on a microhybrid restoration is obtained by starting with aluminum-oxide finishing discs, followed with diamond-impregnated cups, points, and wheels. Maximum polish is achieved with the use of a diamond polishing paste, followed by the use of an aluminum-oxide polishing paste with felt wheels and felt points.

