Perioesthetic Approach to the Diagnosis and Treatment of Carious and Noncarious Cervical Lesions: Part II

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ABSTRACT

Several classes of tooth-colored materials are available for restoring carious and noncarious cervical lesions. Included are the composite resins, which can be bonded into the cervical area to provide predictable form, function, and esthetics. Part I of this two-part report reviewed the etiology of noncarious cervical lesions and provided a series of clinical case reports showing the importance of the periodontal aspect of lesion management. In part II we present information about adhesive preparation design and esthetic restoration of the noncarious cervical lesion.

CLINICAL SIGNIFICANCE

When used with proper attention to preparation design and restoration placement and finishing, resin composites can be used to successfully restore form, function, and esthetics to defective cervical areas of teeth.

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Even though newer and better tooth-colored materials have been developed, dentists tend to be guided by existing restorative philosophies.[1–5] Clinicians sometimes continue to use yesterday's restorative procedures and philosophies with the newer restorative materials and identify this combination as esthetic dentistry. A person would never use a buggy whip to start a car, but some clinicians continue to apply outdated concepts with modern restorative materials. However, to provide true esthetic results, we must redefine the mentality regarding restoration to include an interdisciplinary treatment approach.

Ensuring gingival health through proper anatomic contours, marginal integrity, and surface texture is an important consideration for restorations of carious and noncarious lesions.[6] The restorative equation of the past considered only form and function, and restorative therapy of the cervical lesion was limited to replacement of the missing tooth structure. Now a third element is possible —esthetics.

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Restorative treatment of cervical lesions can eliminate cervical dentin hypersensitivity, restore proper tooth form and contour, prevent further loss of tooth structure toward the pulp, improve gingival health by providing food deflection, prevent food and plaque accumulation, strengthen the tooth and reduce the likelihood of tooth fracture, relieve discomfort caused by existing sharp cavosurface edges, and improve the esthetic appearance. Restorative methods have included direct and indirect procedures using direct gold foils, gold inlays, silicate cements, amalgam, gold crowns, ceramic crowns, porcelain inlays, conventional glass ionomers, resin-modified glass ionomers, compomers, flowable composites, microfill composites, and hybrid composites.[7–11]

New parameters of restorative therapy require consideration of esthetic results that might require both periodontal and operative procedures to restore a harmonious integration and an esthetic balance of gingiva and tooth. This article continues the discussion of the preoperative considerations and the operative procedures for treating carious and noncarious cervical lesions.

PREOPERATIVE CONSIDERATIONS

Management of a carious or noncarious lesion begins with identifying the etiology. Controlling and preventing the progression of hard tissue destruction can begin with oral hygiene and dietary instructions to the patient, occlusal evaluation and equilibration with occlusal guard fabrication or orthodontic treatment, fluoride treatments, application of desensitizing dentifrices, sealing with dentin adhesives, or elimination of the etiology.[7,12,13]

After preventive strategies are in place, clinical considerations for a successful esthetic result using an operative approach begin at the cementoenamel junction (CEJ). The following clinical criteria should be considered:

- Cervical lesion *with* gingival recession: removal of the caries or existing restoration coronal to the CEJ and restoration prior to surgical treatment
- Cervical lesion *without* gingival recession: the carious or noncarious lesion is restored without any need for surgical treatment

RESTORATIVE MATERIAL SELECTION

Many tooth-colored restorative materials are available for replacement of cervical tooth structure, including conventional glass ionomers, resin-modified glass ionomers, compomers, flowable composites, microfill composites, and hybrid composites.[7,8,11,13] Cervical areas also can be restored indirectly using porcelain inlays and laboratory-processed composite resin inlays.[10] This article addresses the selection of restorative materials for direct restorations of cervical lesions. The initial clinical consideration for selecting a direct restorative material is the type of cervical lesion—carious or noncarious. Restoration of a carious lesion may require the use of a fluoride-releasing material such as a glass ionomer, resin ionomer, or compomer. A review of each of these three categories of materials is useful in determining their clinical benefits.

Traditional self-curing glass ionomers contain aluminofluorosilicate glass and polyacrylic acid set by an acid-base reaction. These materials are biocompatible and tooth colored, bond to dentin and enamel, release fluoride over time to inhibit demineralization and enhance remineralization, and have a coefficient of thermal expansion similar to that of dentin. However, the glass ionomers afford some challenges including sensitivity to moisture during initial set; lengthy setting time, which requires a second appointment for finishing and polishing; rough surface texture; lack of translucency; and susceptibility to dehydration.[11,14–19]

Resin-modified glass ionomers represent a newer generation of light-activated tooth-colored restorative materials (Vitremer™, 3M ESPE, St. Paul, MN, USA; Photac-Fil Quick Applicap™, 3M ESPE; Fuji II LC™, GC America, Alsip, IL, USA), which are set both by an acid-base reaction between an ion-leachable glass and a polyalkenoic acid and by a methacrylate polymerization reaction.[20] These materials offer advantages to the conventional materials in improved physical and mechanical properties, higher bond strengths to mineralized tissue, capability of immediate finishing, improved shade matching and translucency, improved fluoride release, polishability, reduced water sensitivity, and the potential for increased retention and wear resistance.[13,21,22] Both categories of glass ionomers are indicated in patients with an elevated caries index because they release substantial concentrations of fluoride ions into the adjacent enamel and dentin.[11,13]

The third category of restorative material that releases fluoride after placement is the compomer or polyacid-modified composite resin; however, these release less fluoride than do glass ionomers. Compomers combine the properties of glass ionomers with those of light-activated composite resins.[11] Their setting reaction involves methacrylate polymerization, but after absorbing water a secondary acid-base reaction occurs also. These materials will bond somewhat to tooth structure even without etching.[21] Although some manufacturers indicate their use without acid etching, the use of an acid-etch technique and a dentin adhesive appears necessary for strong adhesion to the tooth surface.[23] These materials are sculptable and polishable and have physical properties more similar to those of composite resins than to those of glass ionomers.[11,24]

When fluoride is not a consideration, composite resin provides an optimal esthetic result for carious and noncarious cervical lesions because of the bond provided by dentin adhesive systems.[13] Hybrid, microfill, and flowable composites are among the options for use in cervical lesions. The tooth flexure theory indicates that occlusal forces are transmitted through the cusp and can become concentrated in the cervical region of the tooth.[21,25] This can affect the selection of a restorative material for cervical lesions. Resin composites with a low modulus of elasticity can absorb this transferred energy from the occlusal surface, reducing transmission to the dentin-restorative interface.[26] The microfill and flowable composite resins have a lower modulus of elasticity than do hybrid or conventional composite resins.[13] Additionally, some dentin adhesives can provide an elastic intermediate layer between the restorative material and the cavosurface to absorb this flexural deformation of the tooth.[27]

A successful procedure using composite resins to restore cervical lesions relies not only on the type of selected material but also on preparation design, isolation, occlusion, and patient compliance. Fundamental principles of this process require maintenance of sound tooth structure, establishment of a gap-free hybrid layer, and elimination of microleakage by securing a stress-free tooth-restoration interface.[28]

ADHESIVE PREPARATION DESIGN

G.V. Black defined the class V lesion as occurring in the gingival one-third of a tooth (not in pits) and below the height of contour on the labial, buccal, and lingual surfaces of the tooth.[29] Black's principles of preparation design and instrumentation were developed for metallic restorations such as gold foil and amalgam restorations that required resistance and retention form.

In contrast, composite resins require a distinctive adhesive preparation design different from that for the classic gold foil or amalgam restoration. Resin composites have a far greater potential for bonding to tooth structure than do gold foil or amalgam; thus, minimal mechanical retention is required. Accordingly, clinicians who are acquainted only with mechanical principles associated with gold foil or amalgam must reexamine operative procedures for adhesive restorations and adapt to the new nonmechanical philosophy.[30,31]

An ideal adhesive preparation design involves maximum preservation of remaining tooth structure, with no extension for prevention. Geometric outline forms are not required; rather, the outline form should follow the extent of the lesion. Because composite requires less volume to resist clinical fracture than does gold foil or amalgam, the preparation is limited to access to the lesion or defect.[32,33] Because of its low thermal conductivity, the composite restoration not only provides strength to unsupported or weakened tooth structure, it also eliminates a potential cause of postoperative discomfort.[34,35] To allow for better resin adaptation, all internal line angles should be rounded and the walls should be smooth. When enamel is present, a bevel should be placed but only on the enamel margin. Beveling increases the bonding surface area and decreases microleakage by exposing the ends of the enamel rods for etching and improves blending of the resin with tooth structure.[36] A chamfer line should be created at the cervical edge of the lesion. This chamfer preparation defines the finish line and allows a greater bulk of material to be placed at the restorative margin to increase fracture resistance and reduce stress at the restorative interface.[37,38]

ADHESION VERSUS POLYMERIZATION SHRINKAGE

Application of the aforementioned adhesive design principles requires an understanding of the complex interplay between polymerization shrinkage and adhesion. The cross-linking of resin monomers into polymers is responsible for an unconstrained volumetric shrinkage of 2 to 5%.[39,40] When restricted, such forces can exceed the bond strength of the resin to the tooth, resulting in an interfacial gap formation from a loss of adhesion.[41] Bacterial and fluid penetration through the marginal gaps may then occur, leading to colonization of microorganisms, recurrent caries, postoperative sensitivity, or pulpal irritation, any of which can result in clinical failure.[42,43]

When the cervical margin is in dentin, polymerization shrinkage tends to be directed toward the bonded enamel-composite interface. Therefore, even if the adhesion process is effective, shrinkage forces generated by a high-modulus material or a high volumetric shrinkage can result in stresses being transferred in a coronal direction, resulting in separation at the weaker dentin interface.[41,44,45] Methods for preventing undesirable effects include the use of a lower-modulus composite resin to compensate for curing contraction stress, controlling polymerization contraction forces by the cavity design, using internal cavity liners, controlling the curing intensity, and incremental layering of the restorative material.[38,45,46]

In deeper cervical cavity configurations, the ratio between the free and bonded restoration surfaces (configuration factor [C-factor]) is high, creating shrinkage stresses that are higher than the bond strength.[46] This can result in partial delamination generating marginal gaps and/or enamel fractures.[28,41] The process of selective bonding creates free surfaces within the cavity, reducing the C-factor of the restoration. The liner seals the dentin but does not adhere to the restoration; therefore, the gap formation is confined to the internal aspect of the cavity, creating a free surface within the preparation and reducing the C-factor. Selective bonding enables more flow during polymerization, resulting in a more stress-resistant marginal adaptation.[34]

The use of a flowable composite ensures a more intimate contact with the dentin adhesive because of its lower viscosity and results in enhanced internal adaptation.[27] Most flowable composites are hybrids that are filled 60 to 70% by weight, typically with an average particle size of 0.7 to 1.0 μm.[48] The low-modulus composite also acts as an elastic buffer that can compensate for polymerization shrinkage stress by flow and that absorbs flexural deformation during mastication and occlusal stress, thus reducing gap formation and microleakage.[27,38] Composite with a low-elastic modulus accommodates the inherent modulus of the tooth, allowing the internal layer to absorb polymerization shrinkage stress of the resin composite by elastic elongation.[48,49] Also, the lower-viscosity flowables may enhance wetting, resulting in better internal adaptation and reducing voids.[50]

The following restorative sequence describes the use of an incremental layering technique with the application of the aforementioned design principles and selective bonding protocol. It enables development of a tooth-restorative complex with optimal functional and esthetic results, reduction of the polymerization shrinkage, and improved ease of placement and, potentially, longevity.

CLINICAL PROCEDURE

Figure 1 illustrates abfraction lesions that are noncarious, likely caused by deflective occlusal contacts.[7,51] The flex and stresses at the cervical area of the teeth cause a loss of tooth structure. To complicate matters, many patients with these lesions present because of sensitivity to brushing and temperature changes and may require an anesthetic prior to the procedure.

This patient, a 68-year-old female, presented with sensitivity to the mandibular left first and second bicuspids. Clinical examination revealed saucer-shaped cervical defects with no caries, plaque, gingival recession, or inflammation. The occlusal surfaces had wear patterns on each buccal cusp. After a review of the patient's medical and dental history and consideration of all the activities and effects of the loss of tooth substance, a differential diagnosis indicated abfraction lesions caused by compressive stresses.

Before administration of an anesthetic, the occlusal stops and excursive guiding planes were recorded with articulation paper. The occlusal surfaces were equilibrated to eliminate the premature occlusal deflective contacts on the buccal cusps. A preoperative selection of composite resins, tints, and modifiers with shade and orientation was recorded. Shade selection should be accomplished before rubber dam placement to prevent improper color matching that can result from dehydration and elevated values.

Figure 1. Preoperative view of saucer-shaped noncarious cervical lesions on the mandibular left bicuspids. Note the wear pattern on each buccal cusp.

Once the anesthetic had been administered, the teeth were isolated with a rubber dam to achieve adequate field control and to protect against contamination. A modified technique was used to create an elongated hole that allowed placement of the dam over the retainer.[52,53] To gain adequate access to the gingival margin, a plain knitted retraction cord (Ultrapak® #00, Ultradent, South Jordan, UT, USA) was placed using a Fischer's Ultrapak packer #170 (Ultradent) (Figure 2A). Additional gingival displacement was obtained by injecting Expa-syl® (Kerr Corporation, Orange, CA, USA), a kaolin material containing aluminum chloride that acts as a hemostatic agent, into the sulcus with a specially designed syringe and needle tip (Figure 2B).

To effect an esthetic result, a 0.3 mm deep chamfer was placed along the occlusal margin with a long tapered diamond (#6850, Brasseler USA, Savannah, GA, USA) (Figure 3A). A scalloped bevel was developed 0.5 mm in the enamel to interrupt the straight line of the chamfer (Figure 3B). The bevel was placed on all enamel margins to reduce the potential for microleakage. Although mechanical retention is not necessary, a slow-speed bur or air abrasion may be used to roughen the dentin surface to allow better resin penetration of the sclerotic dentin. The preparation was scrubbed with a slurry mixture of disinfectant and pumice (Consepsis®, Ultradent) (Figure 4A). A total-etch

Figure 2. A, A retraction cord was placed to gain adequate access to the gingival margin. B, Additional gingival displacement was obtained by injecting Expa-syl into the sulcus.

technique was used to minimize the potential for microleakage and enhance bond strength to dentin and enamel.[54–56] The preparation was etched for 15 seconds with 37.5% phosphoric acid (Kerr) (Figure 4B), rinsed for 5 seconds, and gently air dried for 5 seconds. A single-component adhesive (OptiBond® Solo Plus, Kerr) was applied with a brush for 20 seconds with a light continuous scrubbing motion and was re-applied every 5 seconds (Figure 5A). Any excess was removed with a disposable applicator, and the adhesive was gently air dried for 5 seconds and light cured for 20 seconds (Figure 5B). Although a small amount of excess adhesive can be applied over the margins to improve sealing, this excess should be removed during finishing procedures.

Although studies have demonstrated that pulp tissue possesses the inherent ability to repair, heal, and form reparative mineralized bridges under various restorative materials,[34,57] failure of composite restorations may be related to the inadequate sealing of the tooth-restoration interface. Bacterial infiltration and microleakage are major factors in pulpal inflammation and necrosis, regardless of the selection of restorative material applied to the dentin or pulp.[34,58] The use of nonadhesive restorative materials might result in a gap at this interface, allowing colonization by bacteria or acting as a hydraulic pump to stimulate the flow of tubular fluid inward; this pressure may be responsible for postoperative sensitivity upon mastication.[34,59,60] Hybridization of the exposed dentin with an adhesive system is now considered an effective way to protect this pulp-dentin interface and bond the composite resin to the tooth structure, providing resistance to microleakage and retention to the restoration, regardless of the depth of the preparation.[34,49,61–63]

The use of a low-viscosity resin composite as a stress-breaking liner between the adhesive system and

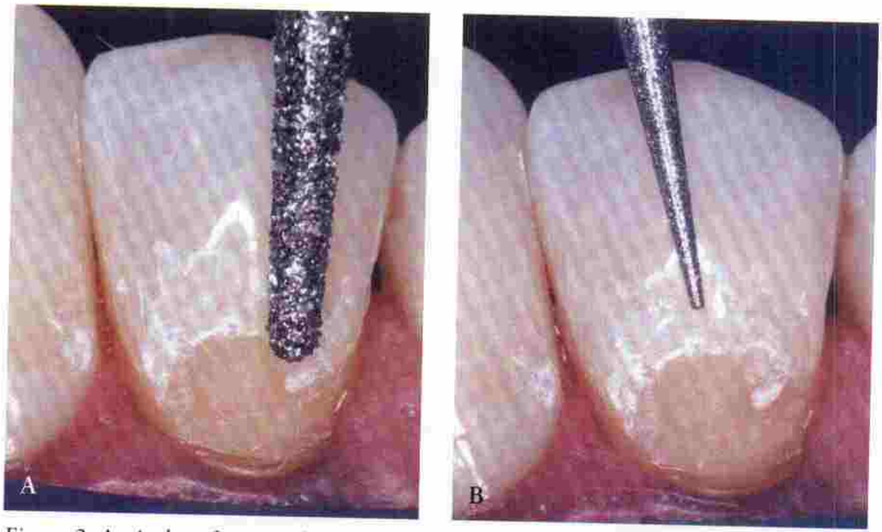

Figure 3. A, A chamfer was placed along the occlusal margin. B, A scalloped 0.5 mm bevel was placed to interrupt the straight line of the chamfer and to reduce the potential for microleakage.

Figure 4. The preparation was scrubbed with a slurry mixture (A) and etched with phosphoric acid (B).

the restorative composite resin has been mentioned already. A very small amount of B3-shaded flowable composite (Revolution®, Kerr) was injected on the axial wall with a syringe tip (Figure 6A) and uniformly distributed with an applicator (M-1 TN®, Cosmedent, Inc., Chicago, IL, USA) (Figure 6B). This technique reduces the possibility of entrapping bubbles and ensures optimal adaptation of the resin material to the adhesive interface. An increment 0.5 mm thick was applied to the axial wall of the class V cavity preparation. Confining the using thickness to 2 mm, or less, of composite results in a reduction of shrinkage and stresses and improves marginal adaptation.

The preparation was filled incrementally, using a B3-shaded hybrid composite (Point 4®, Kerr) from the preoperative shade map. The initial layer, consisting of 1 mm of dentin-shaded composite resin, was applied to the occlusal half of the preparation and contoured with a long-bladed composite instrument (TNCVIPC®, Hu-Friedy, Chicago, IL, USA) to ensure complete adaptation to the underlying resin and tooth structure (Figure 7). Each layer was smoothed with an artist's brush to prevent surface irregulari-

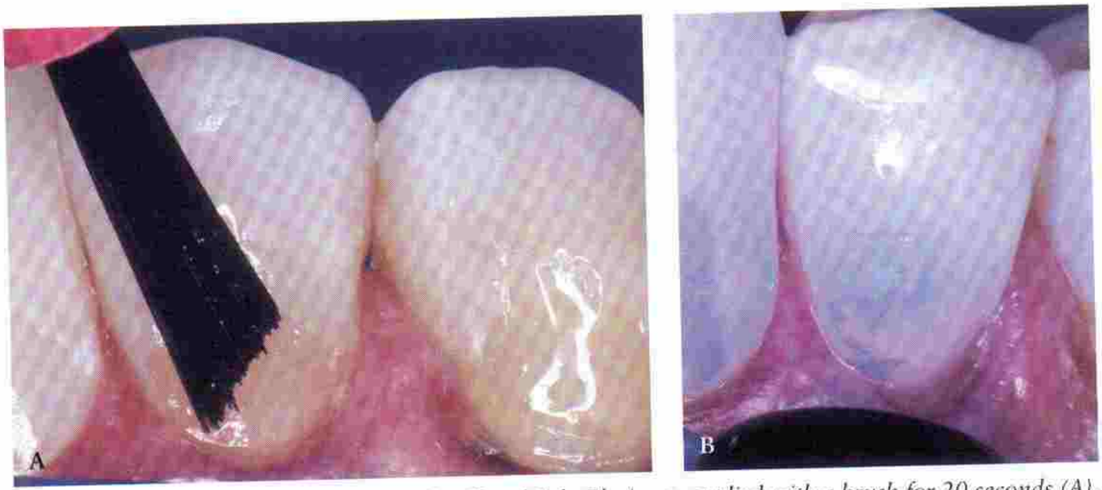

Figure 5. A single-component adhesive (OptiBond Solo Plus) was applied with a brush for 20 seconds (A), gently air dried for 5 seconds, and light cured for 20 seconds (B).

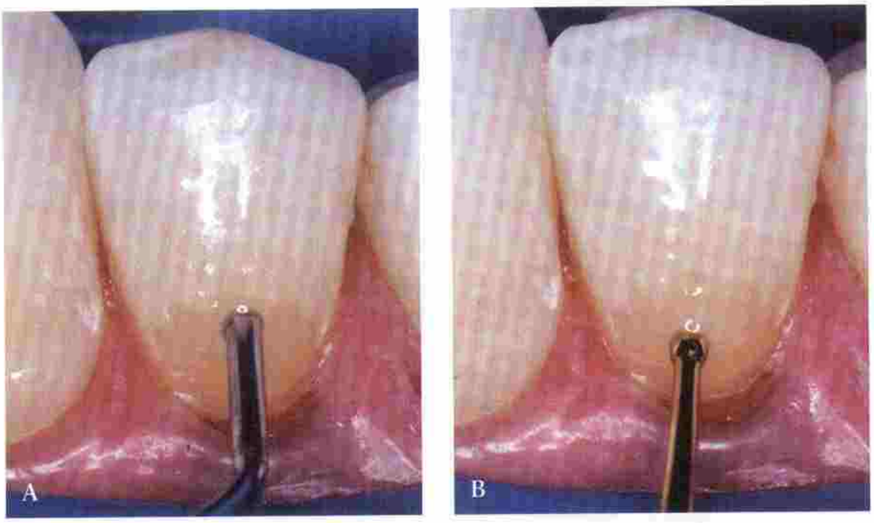

Figure 6. A small amount of B3-shaded flowable composite (Revolution) was injected on the axial wall with a syringe tip (A) and uniformly distributed with an applicator (B).

ties that could interfere with placement of the tints for internal characterization. This step is crucial. Each increment was polymerized with a curing unit for 10 seconds using the boost mode (Optilux 501®, Demetron/Kerr, Danbury, CT, USA), which allows placement of subsequent increments without deforming the underlying composite layer. The second dentin-shaded layer was placed in the gingival half of the preparation (Figure 8), and the previous process was repeated. Because the microhybrids (eg, Point 4; Vitalescence, Ultradent; Esthet-X®, Dentsply Caulk, Milford, DE, USA) have refractive properties and a variety of color selections that are similar to those of dentin, they imitate the natural tooth structure extremely well.

To increase the chroma, a yellow tint (Kolor+Plus®, Kerr) was diluted with a clear untinted resin and applied in a thin wash at the gingival layer and was gradually faded out at the occlusal edge of the body layer (Figure 9). To recreate the natural translucency of the enamel, a yellow translucent shaded hybrid composite (T-2, Point 4) was used to achieve the proper value of the restoration. The resin was rolled into a ball and placed on the cervical region of the tooth (Figure 10A), sculpted with a long-bladed composite instrument, and smoothed with a sable brush (Figure 10B) to obtain an anatomically correct emergence profile that

Figure 7. The dentin layer, a B3-shaded hybrid composite, was applied to the occlusal half of the preparation and contoured with a long-bladed composite instrument.

Figure 8. A second layer of hybrid composite was placed in the gingival half of the preparation and contoured.

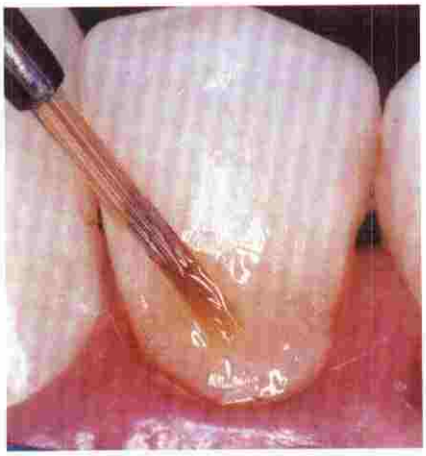

Figure 9. To increase the chroma, a thin wash of diluted yellow tint was applied at the gingival region.

encased the underlying matrix cervicoincisally and mesiodistally. The process of careful shaping of the composite resin to those confines before curing facilitates the establishment of anatomic morphology and minimizes the finishing protocol. At least one study reveals that a reduction in finishing results in less damage to the composite and improved wear and clinical performance.[64] A thin coating of glycerin was applied to the surface and polymerized for a 2-minute postcure, ensuring complete polymerization of the composite resin at the margins.

FINISHING AND POLISHING

Newer formulations of small-particle hybrids and microhybrids have altered filler components; finer filler size, shape, orientation, and concentration improve their physical and mechanical characteristics and allow the resin composite to be polished to a higher degree.[65] The hardness difference between the inorganic filler and the matrix can result in surface roughness because these two components do not abrade uniformly.[65,66] Accordingly, it is imperative that the surface gloss of the restorative material and tooth are similar because the gloss can influence color perception and shade match of the restoration and tooth surface.[67]

The esthetic appearance of the surface of a composite resin restoration is a direct reflection of the instrument system used.[68] The surface of the composite can be finished and polished with a variety of techniques. Diamonds, multifluted burs, abrasive disks, and polishing points and cups have all been used to reproduce the shape, color, and luster of the natural dentition. As Pratten and Johnson have indicated, there is no statistical difference between finishing and polishing anterior versus posterior restorative materials.[69] The considerations for finishing and polishing any restoration are dependent on the instrument shape, tooth and restoration surface shape and texture, surface of finishing and polishing instruments, and the sequence of the restorative treatment.

For finishing the labial surface, a long needle-shaped finishing bur allows the proper anatomic contours of the facial aspect of the anterior tooth to be followed. To replicate natural form and texture, initial contouring and shaping can be achieved with a 12-fluted needle-shaped bur. For example, the 7714 (BluWhite Diamonds®, Kerr) has sufficient length to overlap the tooth-resin interface and provide a parallel plane to the tooth surface of the maxillary and mandibular anterior teeth. It is important to use a dry protocol and closely observe the tooth-resin surface.[70] Dry finishing allows for better visualization of the contour and margins. A smooth surface can be achieved by following a sequential increase in the number of flutes (eg, 12 and 30) (Figure 11).

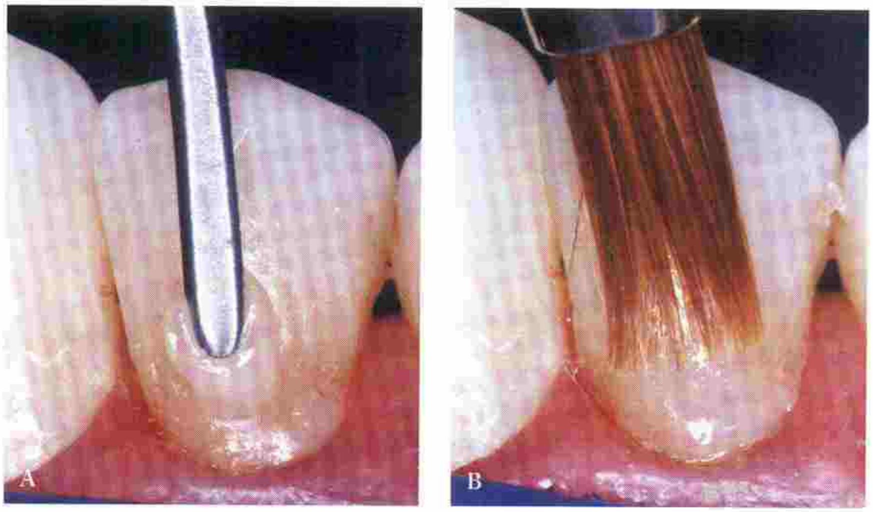

Figure 10. A yellow translucent shaded hybrid composite T-2 (Point 4) was placed on the cervical region of the tooth (A) and smoothed with a sable brush (B).

The gingival contouring was accomplished with a short tapered straight finishing bur (7610, BluWhite Diamonds) that conforms to the straight emergence profile as the tooth emerges from the gingival sulcus. Excess resin composite can be removed with the 12-fluted egg-

Figure 11. The anatomic contour was accomplished with 12- and 30-fluted needle-shaped finishing burs.

shaped bur at medium speed with air coolant, light intermittent pressure, and a staccato motion. A smooth surface can be achieved by following a sequential increase in the number of flutes (eg, 12 and 30) (Figure 12). It is imperative that the cementum not be ditched or scarred at the gingival margin or the restorative material overheated with excessive pressure.

After the initial finishing procedure, the margins and surface defects were sealed. The restoration and all margins were re-etched for 15 seconds with 37.5% phosphoric acid (Figure 13A), rinsed for 5 seconds, and dried. A layer of resin surface sealant (OptiGuard®, Kerr) was applied over the margins and the restoration (Figure 13B). This helps to prevent leakage and to seal any microfractures or microscopic porosities in the material that may have formed during the finishing procedures. The use of surface sealant has been shown to reduce the early wear rate of posterior resin composites,[71–73] improve resistance to interfacial staining, and decrease microleakage around class V composite resins.[44,47,74] Any excess resin can be removed with a no. 12 scalpel (Figure 14); the retraction cord is removed to inspect for overhangs.

The facial and gingival aspects were polished with prepolish and high-

Figure 12. Gingival areas were contoured and finished using a 12-fluted tapered finishing bur.

shine rubber points and rubber hollow cups (Identoflex Gloss Polishers®, Kerr) (Figure 15A and B). The impregnated cup follows the contour of the gingival neck and reaches into the sulcus to smooth any rough areas. The final polish was performed with an Enhance® foam cup (Dentsply Caulk) and a synthetic diamond

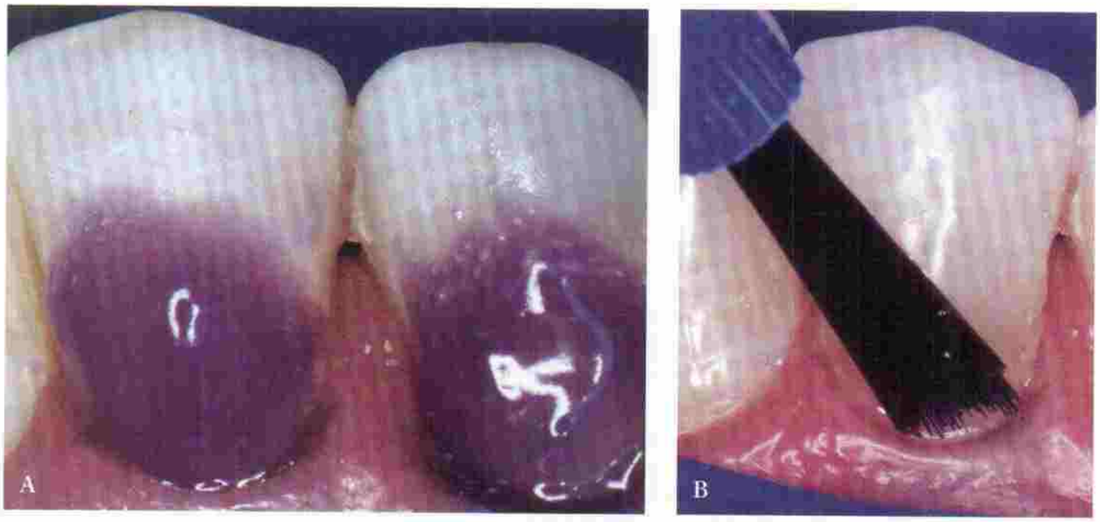

Figure 13. The cavosurface margins were re-etched (A), and a composite surface sealant was applied (B).

Figure 14. Excess resin was removed with a no. 12 scalpel.

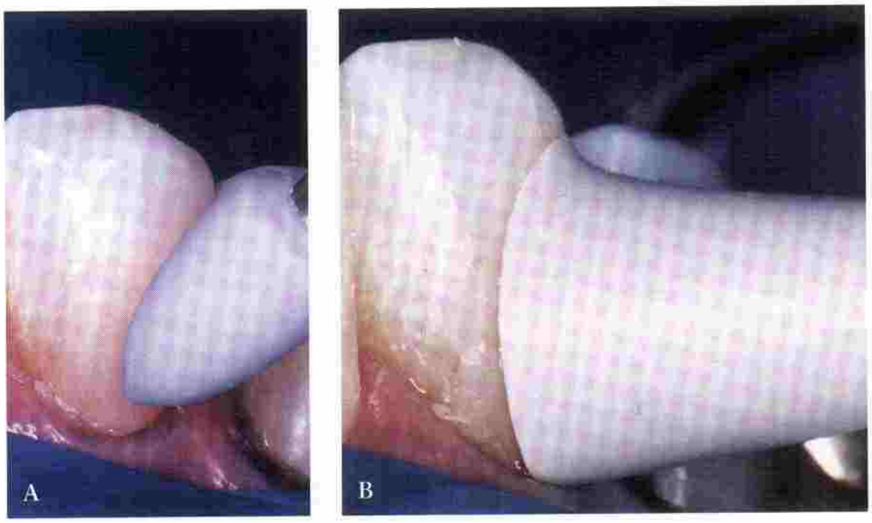

Figure 15. Final polishing was accomplished with rubber points (A) and cups (B).

polishing paste (Vivere®, Leach and Dillon, Cranston, RI, USA) (Figure 16). The completed restoration reinstated a harmonious integration with the surrounding tissues while eliminating the sensitivity for the patient (Figure 17A and B).

CONCLUSIONS

The ultimate challenge in restorative dentistry is to diagnose, treat, and reconstruct with proper form, function, biocompatibility, predictability, and esthetics. The interdisciplinary perspective described in these articles provides a blueprint for proper sequence of treatment and restorative therapy of hard and soft tissue profiles, which are critical to function and esthetics. This two-part article provides the clinician with an organized protocol for restoring the cervical lesion by redefining restorative therapy into periodontal and operative approaches. Noncarious and carious cervical lesions have been the research ground for developing adhesive technology, biomimetics, and tissue engineering and understanding the forces of occlusion through bioengineering for the past century. With ever-changing technology and advances in dentistry, clinicians must take steps to ensure that their treatment and techniques are appropriate for the materials used. Broadening the old mentality of "restorative means operative procedure only" and adopting a new philosophy that includes an interdisciplinary treatment approach allow for a true restorative outcome.

Figure 16. To impart a high luster, a diamond polishing paste was applied with a foam cup.

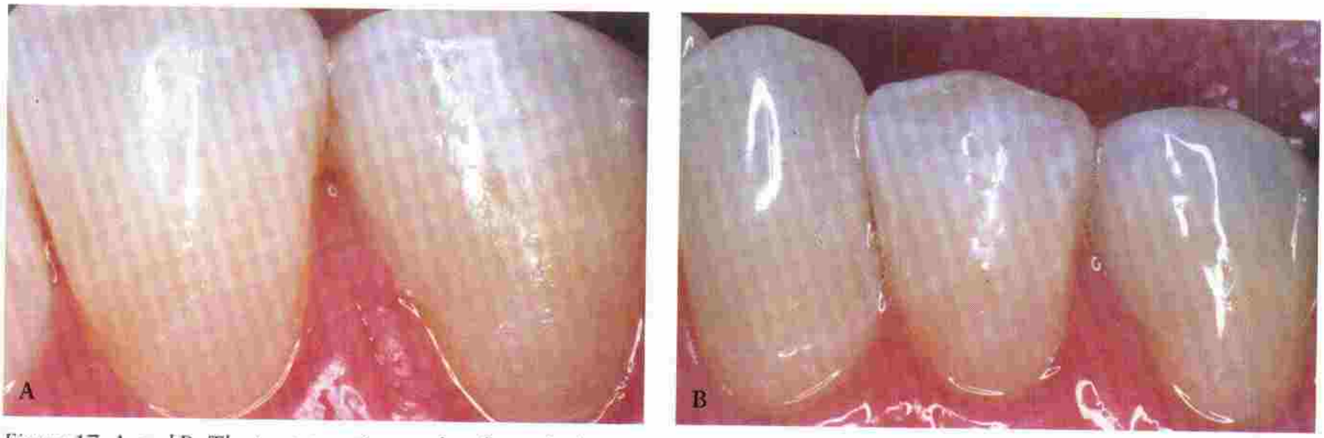

Figure 17. A *and* B, *The postoperative result reflects the harmonious integration of form, function, biocompatibility, and esthetics at the dentogingival complex.*

DISCLOSURE

The authors have no financial interest in any of the products or companies mentioned in this article.

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