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Expediting Class II Posterior Composite Placement

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The need for aesthetic tooth-colored restorative materials has resulted in the introduction of a wide variety of composites.[1] The ideal material would be biologically acceptable, have the physical and mechanical properties similar to tooth structure, be moderately priced, and be as easily manipulated as amalgam.[1]

When composites were first introduced in the mid-1960s, they were hailed as an amalgam substitute. However, problems with wear resistance, postoperative sensitivity, secondary caries, and fracture reduced the placement of posterior composites. The past 30-year improvements in wear resistance, dentin bonding, and fracture strength, as well as easier delivery systems, have resulted in an upsurge of composite placement.[2] However, despite the improvement in physical properties of the materials, composite placement is relatively complex compared with that of amalgam. Achievement of adequate contacts and appropriate proximal contour, decreased sensitivity and recurrent decay, color matching, and adequate curing in a relatively short period of time present a challenge.[2]

Figure 1. Class II preparation terminating on cementum.

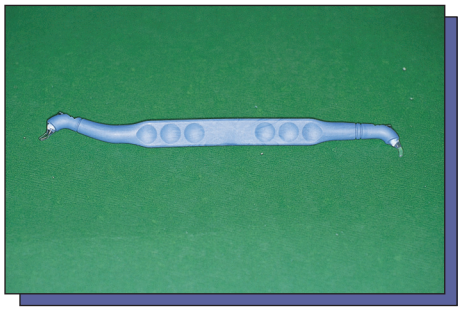

Figure 2. The Trimax contact forming instrument with disposable light-conducting inserts. Each side permits four different positions by 90° rotations.

Figure 3. A cut-away model demonstrates the alignment of the marginal ridge guide, contact area 1 mm below guide, and the position of the insert in the proximal box.

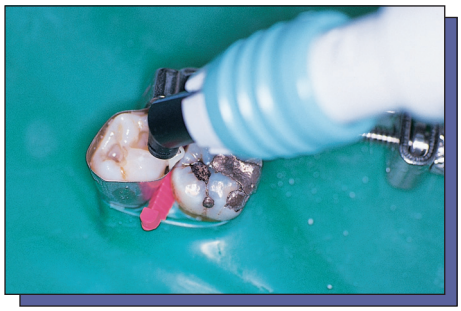

Figure 4. Composite is placed into the proximal box until it is half filled.

The recent introduction of new composites, matrix retainers, wedges, and contact-forming instruments has resulted in techniques to expedite and provide more predictable composite placement. This article delineates the

Figure 5. The Trimax instrument is inserted into the composite in the proximal box until the marginal ridge guide lines up with the adjacent tooth. The tip is moved elliptically to preclude any possibility of binding, and torqued against the matrix band.

Figure 6. Excess composite is removed with an interproximal carver and a light guide is placed on the recess provided on the top of the instrument so that the light is focused down the center of the insert.

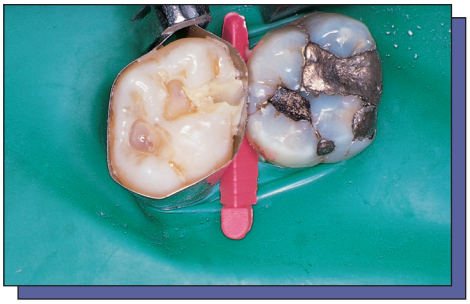

Figure 7. Occlusal view demonstrating a thin wall of composite with contact at the correct height and position.

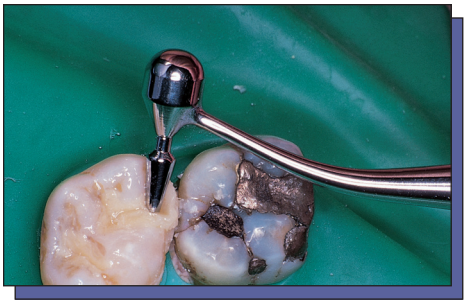

Figure 8. Ivoclar Vivadent Heliomolar P-1 instrument is used to create rounded fossa. The marginal ridge has been established and the matrix band removed.

Figure 9. A Compo-Sculp instrument as designed by Dr. Didier Dietschi (Sutter Dental Manufacturing) is used to create more detailed anatomy.

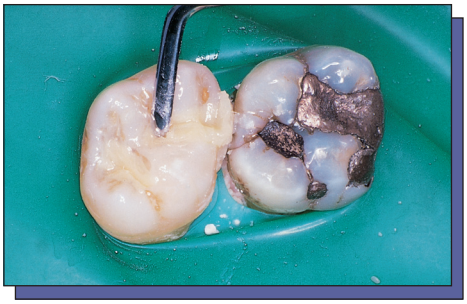

Figure 10. An interproximal carver is used to accentuate grooves and inclines.

use of new materials and techniques to provide a more predictable class II composite in a relatively short period of time.

PROCEDURE

The case presented involved a class II composite restoration placed in a maxillary second molar. The tooth was anesthetized and a rubber dam placed. The decay on the mesial of the tooth was removed. The gingival margin in the proximal box terminated on cementum (Figure 1). It has been suggested by some clinicians that placement of a light-cured glass ionomer lining to the cavosurface margin (open sandwich) may inhibit microleakage of class II composites.[3,4] However, the following technique may reduce or eliminate this need.

The tooth is etched by placing phosphoric acid on the enamel initially, and then 5 seconds later on the dentin for another 10 seconds. The tooth is then rinsed with a copious amount of water for 15 seconds. Excess water is blown off and then a high-speed evacuation system is used to remove remaining excess water. The preparation is then blotted with a cotton pellet so that the dentin remains slightly moist, to prevent the collapse of collagen. A single dose of Excite (Ivoclar Vivadent) is activated by plunging a microbrush through the membrane in the capsule. This provides a fresh mix each time, and helps prevent evaporation of the solvent. The microbrush is used with a light scrubbing motion to apply Excite to cover the dentin and enamel margins. The material is lightly air dried so the material is not totally removed, and then light cured for 10 to 20 seconds. A second coat can be applied in a similar manner to ensure complete coverage of all surfaces. The dentin surface should be shiny at this point, indicating complete coverage.

Placement of a thin layer of flowable composite is optional at this point. Studies have indicated mixed results regarding the need for flowables to reduce microleakage.[5,6] A thin layer of Heliomolar Flow (Ivoclar Vivadent) was placed in this case, covering the axial walls and extending out to the gingival margin. This layer was then light cured. A recently introduced instrument, the Trimax (Figure 2) (AdDent Corporation) can be used to light cure this layer, and even the previous layer of bonding agent (Figure 3). This allows a close proximity of light into the proximal box. Some clinicians place a flowable composite but do not light cure immediately, using the heavy body materials that follow to help seal the margins,[7] and then light cure. Heliomolar HB–C2 (Ivoclar Vivadent) was placed in the proximal box so that it was filled halfway (Figure 4). A smooth plugger was used to carefully adapt the composite to the walls of the preparation. Since the material is not sticky, there is no pullback, which may result in open margins.

The Trimax instrument with its removable and disposable insert was placed into the composite, pushed into place until the marginal ridge guide aligned with the adjacent tooth, moved slightly elliptically (to prevent any possible binding), and then torqued toward the matrix band (Figure 5). The insert is 4 mm from the marginal ridge guide to the tip, and can be shortened by cutting the end. The largest insert (of three available sizes) that will fit into the proximal box should be selected. This will

Figure 11. Stain can be placed in the grooves with an endodontic file.

Figure 12. Finishing burs are used just to remove excess at the margins.

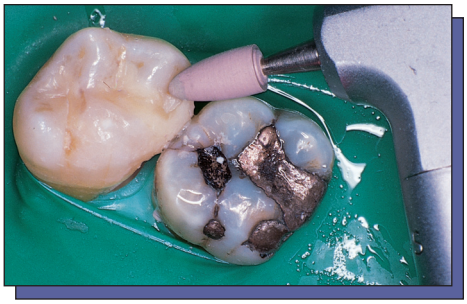

Figure 13. Astropol points are used to polish fossa.

Figure 14. Astropol cups are used on inclines and buccal and lingual margins.

Figure 15. Astropol discs can also be used on inclines and interproximal margins.

Figure 16. The final restoration demonstrates a natural occlusal anatomy, tight anatomical contact area, and a smooth surface.

reduce the bulk of resin composite, and wedge the composite against the walls of the preparation and toward the bonded surface. If the insert is too wide, it can be tapered.

Excess composite at the marginal ridge can now be contoured with an interproximal carver. The composite is cured through the Trimax instrument, allowing the light to penetrate the depth of the preparation (Figure 6). This is done for 10 to 40 seconds depending on the light or composite used. Because the insert is disposable, repeated sterilization does not degrade optical output. The Trimax instrument is then removed. Because the greatest curvature of the convex side is 1 mm below the marginal ridge guide, this is where the contact area is achieved (Figure 7). By angling the Trimax instrument buccally or lingually (if necessary), the contact can be positioned even more precisely. Heliomolar HB can be used as an enamel replacement to finalize the marginal ridge contour and occlusal embrasure, and the matrix band removed.[8,9]

The dentin layer is now built up with Heliomolar. A variety of instruments are used to create cusps and fossae, including Heliomolar P-1 (Ivoclar Vivadent) (Figure 8), Compo-Sculp (Sutter Dental Manufacturing) (Figure 9), and an interproximal carver (Figure 10). This is light cured 40 seconds. Tetric Color can be placed in the grooves with an endodontic file if desired (Figure 11). The final enamel layer using Heliomolar HB is then placed and contoured following the previously incorporated cusps and fossae, and then light-cured for 10 to 40 seconds. Finishing burs and diamonds can be used to remove excess composite and refine anatomy if needed (Figure 12) (posterior composite sculpting kit, Brassler). The Astropol (Ivoclar Vivadent) series of points (Figure 13), cups (Figure 14), and discs (Figure 15) can be utilized to achieve a polished smooth surface for the final restoration. The final restoration demonstrates a pleasing natural contour that can be achieved in a relatively short period of time (Figure 16).

DISCUSSION

Composites are often used as an alternative to amalgams in class I and class II restorations. Packable composites should be considered amalgam alternatives, not substitutes. Amalgams can be condensed to hold the contact. Composites are pushed back almost to the original position by the matrix band. Composites exhibit viscoelastic behavior, and deformation of the composite by pushing during packing is not retained.[2] The material undergoes viscoelastic recovery, thereby reversing some of the previous deformation. Resistance to flow or Binghan body behavior would be ideal, but this doesn't occur. To overcome this deficiency and achieve a more predictable, properly contoured contact, a combination of matrix retainer and bands, modification in the composite, and instrumentation to displace the band and move the adjacent tooth slightly is necessary.

The Trimax allows the achievement of a tight anatomical contact area. It also conducts light into the composite, possibly reducing microleakage and improving the degree of conversion and physical properties. Heliomolar HB (High-Viscosity Reinforced Microfilled restorative) is based on the chemistry of Heliomolar.

It can be light cured in 20 seconds when placed in 2-mm increments. The availability of nine aesthetic shades allows the creation of a natural-appearing restoration.

Heliomolar chemistry features PIP (particle in particle) technology. This allows the volume of filler to be increased beyond that of traditional microfilled composites. Filler particles in microfills are very small (0.4 µm), and have a combined surface area that is 1,000X greater than the surface area of macrofillers. This increased surface area of particles means the resin (organic) portion becomes too viscous and unworkable.

Heliomolar HB is made by compressing individual particles into large agglomerations or clumps of particles. By doing this, filler loading could be nearly twice what was achievable before with microfills, and still provide good handling properties. Prepolymerized particles are also made by creating an agglomerated mixture, curing it, and then milling this prepolymerized composite into small "fillers." The prepolymerized particles are then added into a fresh mixture of free resin and agglomerated particles to allow increased filler loading. Heliomolar HB may allow the surface benefits of a microfill (polish and wear).[8]

The use of sectional matrices and retainers such as Composi-Tight (Garrison Dental Solutions), Palodent Matrix System (Dentsply Caulk), or Contact Matrix Danville Engineering aid in the formation of contacts by providing separation, and some of the bands are precontoured, providing a more natural shape. An ultra-thin band is provided by Microband (Innovative Technology, Dental Innovations). A wedge such as the Flexi Wedge (Common Sense Dental Products Inc) allows close adaptation of the matrix to minimize excess. The V-shaped wedge collapses when placed, then expands to adapt the band into any concavity. The wedge is mainly used for this purpose, not for separation.

Minimizing finishing and polishing saves time and also minimizes crack formation in the composites. The Astropol System provides finisher, polisher, and high polisher in a variety of sizes and shapes. The first two contain silicon dioxide, and the high polisher contains silicon dioxide and diamond particles to achieve a smooth gloss surface.

CONCLUSION

The proper selection of materials and instruments to restore missing tooth structure is a mandatory initial step. If composite is selected, the clinician now has an armamentarium available that permits the insertion of a highly aesthetic and durable restoration in a moderate amount of time.✦

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