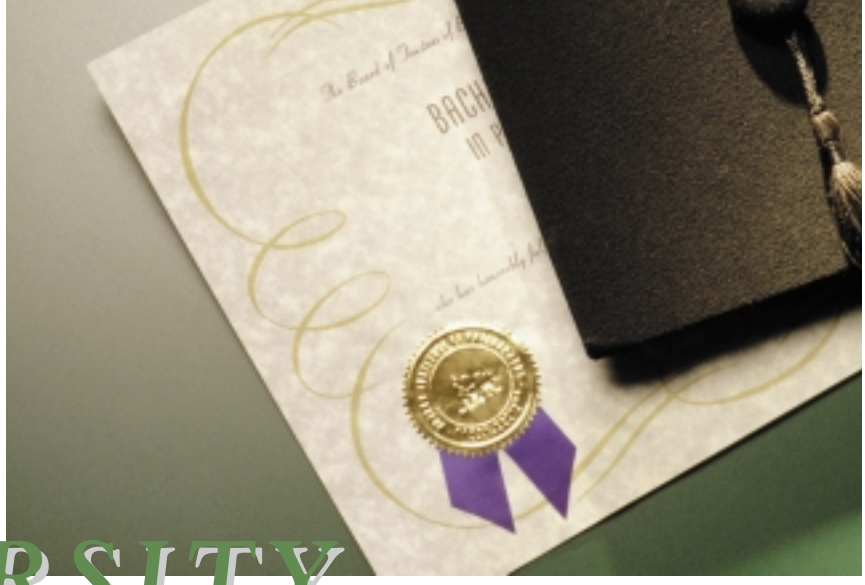

UNIVERSITY NEWS

Creating Tight Anatomically Contoured Proximal Contacts in Class II Direct Composite Resin Restorations

by Robert J. Yetto, D.D.S.

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The articles published in this section may range in topic to include clinical cases from professors in restorative dentistry, dental students with a special interest in esthetic dentistry, or articles from University Advisory Council members. Please send your submissions to: The Journal of Cosmetic Dentistry, University News, 5401 World Dairy Dr., Madison, WI 53718.

This article was written as part of the requirement for the Certificate of Proficiency in Esthetic Dentistry program offered at the State University of New York at Buffalo. Dr. Yetto received his Certificate of Proficiency in December 2001. The program includes didactic, research, and clinical components. You can learn more about the program at www.buffaloce.org/EDEC/.

ABSTRACT

Creating tight proximal contacts in posterior composite resin dentistry has been a major issue since materials were developed for this application. This article describes an effective, easily learned technique for multiple adjacent proximal contacts that is applicable in nearly every clinical situation. The result will be anatomically correct contours and consistently tight proximal contacts.

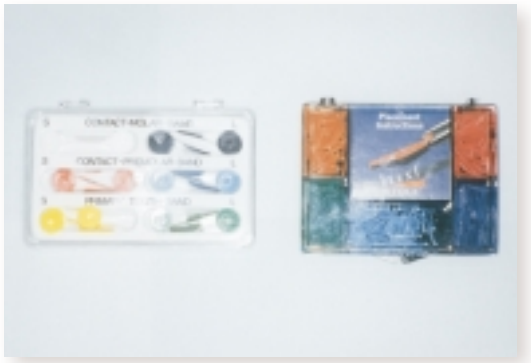

Figure 1: Left: Contact Molar Bands (Ivoclar/Vivadent) Right: Flexi-Wedge (Common Sense Dental Products).

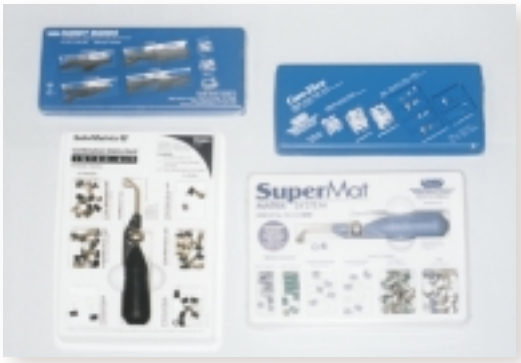

Figure 2: Clockwise from upper left: Handy Bands, Cure-Thru, Super Mat (Premier), and AutoMatrix II (Dentsply).

INTRODUCTION

The use of composite resin for Class II restorations has increased significantly over the past decade.[1-4] However, most dentists have been trained to place amalgam fillings, which can be pushed and condensed into proximal contact. The development of unique matrix armamentarium more suitable to non-condensing composite resin was an important development. Nevertheless, the consistent creation of tight, anatomically correct proximal contacts can be elusive. As public demand for the superior esthetics afforded by these materials increases, the competitive practitioner must develop the skills needed to place multiple restorations in a single visit, without compromising the quality of the final restorations.

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Composite resin matrix systems began with those developed for use with amalgam.[5] Due to the fact that composite resins for posterior use could not be condensed into contact, early attempts at their placement often resulted in poor form and open contacts. At best, using the amalgam-based matrix and wooden wedge, as with Class II amalgam fillings, the proximal contour of the final result was most often flat, with a high contact point. Observation of natural dentition reveals the presence of a broader contact area, where the proximal height of contour of two adjacent teeth meet. This contact area lies in the upper-middle-third of most teeth.[6] Furthermore, the contour of the proximal surface follows the emergence angle, widening in an occlusal direction until the contact area, after which the curvature rolls inward on the tooth to form the marginal ridge. Even with an ultra-thin, dead soft burnished metal matrix and the condensing force of amalgam, such a contour is difficult—if not impossible—to achieve.

Early modifications of the existing matrix systems included notching of a standard Tofflemire band,[7] the creation of a hybrid matrix band,[8] and the use of a slotted metal sectional band with shim stock.[9] The introduction of clear matrices, both circumferential mylar (Contact Molar Band, Ivoclar/Vivadent, Amherst, NY; Cure-Thru & SuperMat, Premier Dental, King of Prussia, PA; Translite Automatrix, Dentsply/Caulk, Milford, DE; Cleartrix, Parkell, Farmingdale, NY; Omnimatrix Clear, Ultradent Products, South Jordan, UT), circumferential metal/mylar hybrid (Window-Matrix, FS-Dental Engineering, Prospect, CT; Handy Bands, Premier; Automatrix II, Dentsply), and sectional mylar (Cervical Matrix, Centrix, Shelton, CT), used with clear or light-reflecting wedges, improved the ability of light to penetrate the depths of the proximal box (Figs 1 & 2).[10,11] Those that were anatomically correct in their proximal contour, such as the Contact Molar Band, helped to establish proper emergence form, but in and of themselves did not ensure tight contacts. Techniques such as the "plunging ball," the prepolymerized composite cylinder,[12] and the prepolymerized custom contact[13] have been described. Specialized materials and systems such as Sonicsys (Ivoclar/Vivadent),[14] the MX ceramic insert (SDS [D-Rendsburg; Germany]),[15] the intracoronal wedge,[16] and even a bondable matrix band (BondAband, Jazz Dental Products; Princeton, NJ)[17] have met with limited success. The development of contact-forming instruments such as the Belvedere CCF (VLA Techniques; Edina, MN), the Trimax Composite Instrument (AdDent;

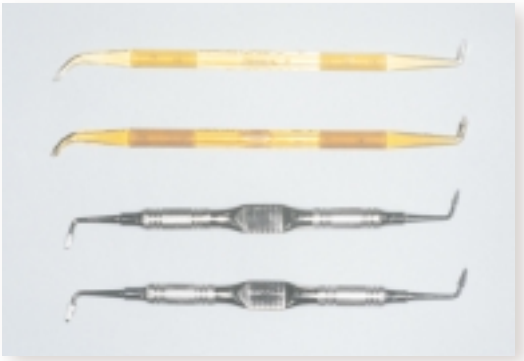

Figure 3: Top: Contact Pro (C.E.J. Dental) Bottom: Belvedere CCF (VLA Techniques).

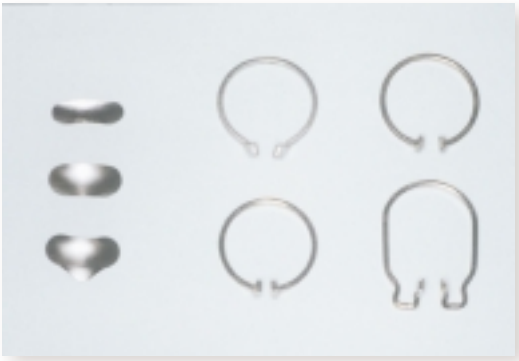

Figure 4: Left (top to bottom): 30µ thin sectionals, narrow, regular, and cervical (Garrison Dental Solutions). Center: Contact Matrix rings (Danville Engineering). Right: BiTine and BiTine II rings (Palodent).

Figure 5: A typical quadrant of failing amalgam requiring replacement. Note the poor contact between the molars.

Danbury, CT), and the Contact Pro and Contact Pro 2 (C.E.J. Dental; San Juan Capistrano, CA),[18] were very significant additions to the armamentarium (Fig 3). Even the recent introduction of the so-called "condensable" composites (more accurately described as "packable" or "heavy-bodied," as suggested by Dr. Ron Jackson) was done with an eye toward making proximal contacts more consistently attainable. This may be accomplished when used with the Microband (Dental Innovations; Portland, OR), with its machined 10µ proximal surface, but the flat Tofflemire style does not replicate proper tooth form and the delicate nature of the machined area can make it difficult to handle.

Technique

Rationale

Based upon the McKean orthodontic separator of the 1950s (Rocky Mountain Dental),[19] the Palodent BiTine ring (Dentsply/Caulk) and others (Contact Matrix [Danville Engineering; San Ramon, CA]; Composi-Tight & Composi-Tight Gold [Garrison Dental Solutions; Spring Lake, MI]) have achieved one key advantage: separation of teeth independent of wedging (Fig 4). When used with an anatomically correct sectional metal matrix[20] (offered by all three ring manufacturers), this system of matricing achieves proper form and thus proper function for Class II composite resin restorations.

Because it generally is easier to pull a finishing instrument forward onto a distal surface rather than to push back on a mesial one, I believe that finishing a distal surface is easier, regardless of access.

Although all sectional matrices are thin, Garrison has the thinnest (30µ) of the three (Fig 4). Garrison also offers the widest style selection, including one with a cervical extension useful for subgingival restorations. Keogh and Bertolotti have an excellent review on the use of the separator ring/sectional matrix system.[6]

When faced with a quadrant that has several adjacent proximal surfaces to restore, the practitioner can choose from among the various matrix systems (Fig 5).

Figure 6: Isolated quadrant displaying wide disto-lingual box in rotated bicuspid.

Figure 7: A circumferential mylar matrix is applied to account for the wide box and rotated position.

Figure 8: Completed restoration of rotated bicuspid.

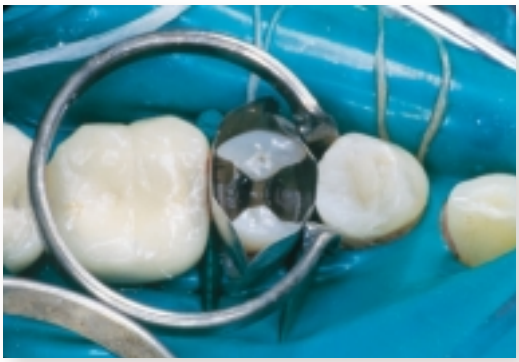

Figure 9: Both sectional matrices may be placed, but only one ring is applied to restore the mesial box.

Figure 10: Ring is moved to distal box.

Figure 11: Completed restoration of quadrant.

Figure 12. Quadrant isolated with rubber dam.

Figure 13: After preparation, sectional matrices are placed in the mesial boxes only.

Figure 14: Upon completion of mesial box restoration, the distal boxes are matrixed and the separating ring applied.

Figure 15: The separating ring is moved to the next distal box.

In some cases, a combined approach may be employed, using both circumferential and sectional bands, with either forming instruments or separating rings, or both (Figs 6–11).

Procedure

After applying the rubber dam and ligating it securely around those teeth involving proximal surfaces, preparation is accomplished (Fig 12). When the bucco-lingual width of each proximal box is finalized, the appropriate system(s) can be selected. Unlike other authors who have suggested that placing two thicknesses of matrix material adjacent to each other does not affect the contact tightness,[6] I feel most confident when only a single matrix is in each proximal area while being formed. To accomplish this, I first place sectional matrices in all of the mesial surfaces to be restored.

Using either plastic wedges (Flexi-Wedge, Common Sense Dental Products, Spring Lake, MI) or cotton pellets (Fig 1), the cervical part of each matrix is "snugged" against the gingival floor of the proximal box (Fig 13). The entire preparation is rinsed and then scrubbed with chlorhexadine (Consepsis [Ultradent]).

After this, the mesial box and occlusal portion of the preparations are etched (Ultraetch [Ultradent]). I do not etch the distal boxes at this time, so that those dentinal tubules are not open until after distal box isolation. Dentin primer/bonding resin (Excite! [Ivoclar/Vivadent]) is applied according to directions only to the mesial boxes and that portion of the occlusal surface nearest the mesial box. Care must be taken to avoid contact with unetched dentin; this is readily accomplished by confining the "working area" to the mesial box only. The box is filled incrementally, starting with a flowable composite resin (Flow-It! Accelerated Light Cure, Jeneric-Pentron; Wallingsford, CT) followed by composite resin of choice (Tetric-Ceram, Ivoclar/Vivadent) in appropriate shade(s), applied in layers to the

Figure 16: Completed quadrant. Note the excellent contour of the contact areas and marginal ridges.

Figure 17: Quadrant showing failed amalgam and rotated bicuspid.

Figure 18: To facilitate formation of anatomically correct contact, a Contact Pro instrument is used to push the mylar matrix into proper form.

mesio-buccal and mesio-lingual walls. Again, care is needed to avoid contact with disto-occlusal surfaces. Although light-curing is beyond the scope of this article, my protocol is as follows.

I use trans-enamel polymerization whenever possible, especially with circumferential mylar matrices (see MODIFICATIONS). Curing units are checked daily for output (>/= 500mW/cm2, Optilux 401 [Kerr-Demetron; Orange, CA]; >/= 750mW/cm2, Hilux 200 [First Medica; Greensboro, NC]; >/= 900mW/cm2, Kreative Kuring [Welch-Allyn/Kreative; San Diego, CA]). The curing time will depend upon which unit is used, and variables such as composite shade, distance from light source, and thickness of composite and of remaining tooth structure. Customarily, I double the light or composite manufacturers' recommended curing times (whichever is greater), either by using two conventional lights together for 20 seconds or the high-speed light for 10 seconds. I also place incrementally to reduce potential polymerization stresses.

Once the mesial marginal ridges are constructed, the wedges and sectional pieces are removed. I choose to complete the mesial boxes first because access is easily gained at this time. They are finished with a #12 BD Bard Parker scalpel blade (Becton, Dickinson & Co.; Franklin Lakes, NJ) or the CR-21 esthetic trimming knife (Hu-Friedy; Chicago, IL), followed with finishing strips or disks of choice. Because it generally is easier to pull a finishing instrument forward onto a distal surface rather than to push back on a mesial one, I believe that finishing a distal surface is easier, regardless of access. Therefore, I prefer to finish the more difficult mesial box when access is enhanced by the absence of the approximating distal surface.

When mesial finishing is complete for all teeth in the operative field, I place the distal sectional matrices, wedges (or cotton pellets), and the separating ring(s). When possible, I prefer to place one ring and reposition it from box to box (Figs 14 & 15). There is now solid structure (the completed mesial boxes) against which to place the ring. Then I rinse and rescrub the distal boxes, apply etchant to all remaining structure to be restored (i.e., the distal box and remaining unrestored occlusal surfaces), rinse, and place dentin primer/bonding resin. After that, I

build the distal boxes and occlusals in the same incremental layering technique, taking special care to blend the flowable composite into the previously polymerized occlusal and marginal ridge areas.

In cases of wide proximal boxes, it may be necessary to restore to within the buccal and lingual proximal line angles first, which can be achieved with (or in some cases, without) the sectional matrix in place.

Then I remove the matrices and finish accordingly (Fig 16). This approach eliminates ring stacking, which, while made possible by the Garrison and Danville rings, most often limits access to the occlusal portions of adjacent teeth. Contrary to Geiger's recommendation that multiple adjacent Class II restorations should be placed in separate visits,[21] this technique allows the practitioner to provide quadrant work in a single visit, without concern for the thickness of the sectional matrix system. This technique also eliminates the problem of replicating defective marginal ridge heights associated with the multiple-visit approach.

MODIFICATIONS

Special circumstances may call for modifications in this technique. Most commonly encountered are wide proximal boxes from defective amalgam fillings and malpositioned teeth (Fig 6). In cases of wide proximal boxes, it may be necessary to restore to within the buccal and lingual proximal line angles first, which can be achieved with (or in some cases, without) the sectional matrix in place. This is especially important when these contours are needed to support the separator ring. Alternatively, a circumferential precontoured mylar matrix band may be used (Fig 7). In most cases this is best used before placement of the sectional matrix and separator ring (Figs 8–11). In cases of malpositioned teeth, the circumferential matrix is best applied. Use of a contact-forming instrument will help to optimize proximal contours otherwise compromised by tooth alignment (Figs 17 & 18).

CONCLUSION

Techniques have been presented that describe easy-to-learn methods for providing direct composite resin Class II restorations in quadrants of multiple adjacent interproximal surfaces. Using currently available and accepted materials, they assure the operator of tight, properly contoured and finished contacts and interproximal areas in a single visit.

References

1. DeGrange M (ed.). *Minimally Invasive Restorations with Bonding*. Carol Stream, IL: Quintessence Publishing; 1997.
2. Jordan RE, Suzuki M. Posterior composite restorations: Where and how they work best. *JADA* 122(12):30-37, 1991.
3. Dietschi D, Spreafico R. *Adhesive Metal-Free Restorations: Current Concepts for the Esthetic Treatment of Posterior Teeth*. Carol Stream, IL: Quintessence Publishing; 1997.
4. Heymann HO, Sturdevant JR, Roberson TM, Sockwell CL. Tooth-colored restorations for Classes I, II and IV cavity preparations. In: Sturdevant CM, Roberson TM, Heymann HO, Sturdevant JR. *The Art and Science of Operative Dentistry* (3rd ed., 586-625). St. Louis, MO: Mosby; 1993.
5. Bauer JG, Crispin BJ. Evolution of the matrix for Class II restorations. *Oper Dent Sup* 4:1-38, 1986.
6. Keough TP, Bertolotti RL. Creating tight, anatomically correct interproximal contacts. In: *Dent Clin North Am* 45(1):83-103, 2001.
7. Hassan R. Obtaining a tighter contact on two surface composite restorations. *NY State Dent J* 51(10):655, 1985.
8. Re GJ, Kaiser DA. A hybrid matrix retainer for two surface proximal restorations. *J Prosth Dent* 57(2):252-253, 1987.
9. Kaplowitz GJ. Achieving tight contacts in class II direct resin restorations. *JADA* 128(7):1012-1013, 1997.
10. Schulein TM, Covey DA, Johnson WW. Matrix systems for posterior composite restorations. *Compend Contin Educ Dent* 8(9):668-682, 1987.
11. Dragan WB. A simplified technique for obtaining predictable contacts in posterior composite resin restorations. *Quint Int* 17(10):655-657, 1986.
12. Doukoudakis S. Establishing approximal contacts in Class II composite resin restorations. *Oper Dent* 21(5):182-184, 1996.
13. Browning DF. Alternative method for making ideal contacts when placing direct posterior composite resin. *JADA* 131(6):809, 2000.
14. Liebenberg WH. Controlling contacts and contours using preformed ceramic inserts. *Compend Contin Educ Dent* 21(2):147-168, 2000.
15. Bott B, Hannig M. Optimizing class II composite resin esthetic restorations by the use of ceramic inserts. *J Esth Dent* 7(3):110-117, 1995.
16. Maitland RI. Direct posterior class II composites. *Curr Opin Cosmet Dent* 40-46, 1994.
17. Din FM. A permanently bondable matrix band for composite restorations. *Compend Contin Educ Dent* 8(10):836-846, 1992.
18. Slone CE. New instrumentation and technique for obtaining consistent interproximal contacts of direct class II composite restorations. *Pract Periodont Aesthet Dent* 6(5): 15-22, 1994.
19. Parula N. Matrices. In: *Clinica de Operatoria Dental* (4th ed., 52-53). Buenos Aires, Argentina: ODA; 1975.
20. Meyer A. Proposed criteria for matrices. *J Can Dent Assoc* 11:851-853, 1987.
21. Geiger SB. Comparison between the sequential and simultaneous approaches for the restoration of adjacent proximal cavities. *J Oral Rehab* 24(6):473-476, 1997.