Clinical Solutions to Common Problems Faced When Placing Class II Direct Composites

Procedure/Study by
Dr. Robert A. Lowe, DDS, FAGD, FICD, FADI, FACD

Composi-Tight 3D

FenderWedge

WedgeWands

Garrison
Dental Solutions

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Dr. Robert A. Lowe received his Doctor of Dental Surgery degree from Loyola University School of Dentistry in 1982, where he graduated magna cum laude and second in his class. After graduating, he completed a one-year residency program at Edward Hines Veterans Administration Hospital. He received postgraduate training in different areas of dental care, including restorative and rehabilitative dentistry, cosmetic dentistry, endodontics, prosthodontics, periodontics, oral surgery, and sedation dentistry, completing a rotation in surgical anesthesia. He served for 10 years in a full and part time capacity as an Associate Clinical Professor of Restorative and Rehabilitative Dentistry at Loyola.

Dr. Lowe went into private practice in Chicago after completing his residency, at which time he began to pursue another passion: clinical teaching. While running his own practice, Dr. Lowe served as a part-time lecturer of restorative and rehabilitative dentistry at Loyola University School of Dentistry. In 2000, he relocated to Charlotte.

Dr. Lowe's dedication to educating the dental professionals of the future has led to a number of honors, and he continues to be in demand for professional dental care lectures given his expertise and insight. Dr. Lowe has lectured at all of the major dental meetings in the United States, including the American Dental Association Annual Meeting, the American Academy of Cosmetic Dentistry, and the American Society of Dental Aesthetics. In 2005, he was nominated to receive Diplomate status on the American Board of Aesthetic Dentistry. This is an honor shared by fewer than 50 dentists in the entire United States.

Introduction

The "Class II Challenge"

Direct composite restorations that involve posterior proximal surfaces are still a common finding in many dental patients. Unlike dental amalgam, which can be a very forgiving material technically and can be condensed against a matrix band to create a proximal contact, proper placement of composite restorative materials present a unique set of challenges for the operative dentist. The adhesion process itself is well understood by most clinicians as far as isolation and execution, however, there are some steps in the placement process that cause difficulty and ultimately lead to a less than desirable end result.

In this article we will look at three specific areas:

1) Management of the soft tissue in the interproximal region
2) Creation of proximal contour and contact and
3) Finishing and polishing of the restoration

Management of the Interproximal Gingival Tissue

The most common area for the adhesion process to fail is the proximal gingival margin. Compounding this problem is the inability to gain access to the area to affect a repair without removal of the entire restoration. As stated by Dr. Ron Jackson, bonded restorations are unique in that minor defects (decay or microleakage) at the marginal interface can often be "renewed", or repaired by removal of the affected tooth structure and repair with additional composite restorative material. Because of the bond of the restorative material to enamel and dentin, the recurrence is usually self limiting. This is not true with metallic restorations that are not bonded to tooth structure. However, if the defective area is at the proximal gingival margin or line angle, access is not possible. Therefore precise marginal adaptation of the direct composite restorative material and the seal of this margin in the absence of moisture or sulcular fluid contamination is of paramount importance! However, whether due to the subgingival level of decay and/or gingival inflammation, it can be hard to seal the gingival margin with a matrix in the presence of blood.

Proximal Contact and Contour

Another challenge for the dentist has always been to recreate contact to the adjacent tooth and at the same time, restore proper interproximal anatomic form given the limitations of conventional matrix systems. The thickness of the matrix band and the ability to compress the periodontal ligaments of the tooth being restored and the one adjacent to it can sometimes make the restoration of proximal tooth contact arduous at best. Anatomically, the posterior proximal surface is convex occlusally and concave gingivally. The proximal contact is elliptical in the bucco-lingual direction and located approximately one millimeter apical to the height of the marginal ridge. As the surface of the tooth progresses gingivally from the contact point toward the cementoenamel junction, a concavity exists that houses the interdental papilla. Conventional matrix systems are made of thin, flat metallic strips that are placed circumferentially around the tooth to be restored and affixed with some sort of retaining device. While contact with the adjacent tooth can be made with a circumferential matrix band, it is practically impossible to recreate the natural convex/concave anatomy of the posterior proximal surface because of the inherent limitations of these systems. Attempts to "shape" or "burnish" matrix bands with elliptical instrumentation may help create non-anatomic contact, but only "distorts", or "indents" the band and does not recreate complete natural interproximal contours. Without the support of tooth contour, the interdental papilla may not completely fill the gingival embrasure leading to potential food traps and areas for excess plaque accumulation. Direct Class II composite restorations can present even more of a challenge to place for the dentist because of the inability of resin materials to be compressed against a matrix to the same degree as amalgam making it difficult to create a proximal contact.

Finishing and Polishing Composite Restorations

Direct composite material does not carve like amalgam, although many clinicians wish that it did! Unfortunately this means that most posterior composites are carved with a bur. This is not part of the finishing and polishing of the restoration. It must be remembered that cuspal forms are convex and cannot be carved with a convex rotary instrument that imparts a concave surface to the restorative material. Composite should be incrementally placed and sculpted to proper occlusal form prior to light curing. The finishing and polishing process is done to accomplish precise marginal adaptation and make minor occlusal adjustments. Rubber abrasives further refine the surface of the composite, and surface sealants are used to gain additional marginal seal beyond the limitations of our instrumentation.

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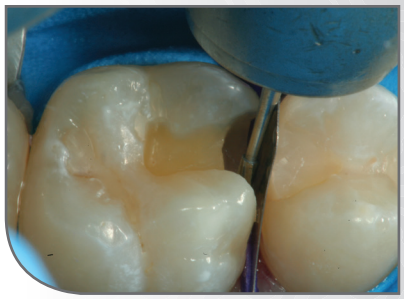
Figure 1:
This occlusal preoperative view shows a maxillary molar that has radiographic decay on the mesio-proximal surface.

The patient shown in Figure 1 presented with radiographic decay on the mesial proximal surface of tooth number 3. The operative area is isolated using an OptiDam (Kerr Hawe). Next, a unique piece of armamentarium called a FenderWedge® is placed in the mesial proximal area prior to preparation with a 330 carbide bur. The decay is minimal, so the operative plan is to keep the preparation very conservative. The Fender Wedge will protect the adjacent proximal surface from the accidental excoriation by the bur while preparing the proximal box of the cavity preparation.

Figures 2–5:
2) An occlusal view during cavity preparation. 2a) Note how the FenderWedge® protects the adjacent proximal surface while the proximal box is refined with a 330 carbide bur. 3) After the cavity preparation is completed, bleeding is seen in the proximal area. 4) Expa-syl (Kerr Corporation) is placed into the proximal area with the delivery syringe then tapped to place using a dry cotton pellet. 5) After rinsing away the majority of the Expa-syl, (note that a small amount of Expa-syl remains sub marginal for additional hemorrhage control) the proximal tissue is deflected away and bleeding is absent allowing for easy placement of the sectional matrix band.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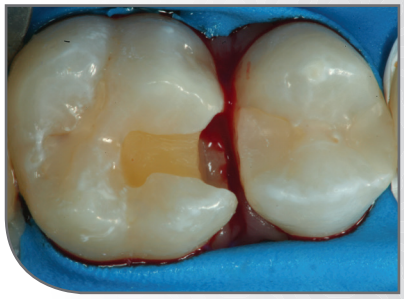
After removal of the decay, and completion of the proximal and occlusal cavity form, the operative area is isolated with a rubber dam (Figure 2) in preparation for the restorative process. Figure 3 clearly shows that the proximal gingival tissue was abraded during cavity preparation and there is evidence of hemorrhage. It is not advisable to try and "wash" the hemorrhage away with water and quickly apply the matrix band. Even if this is successful, it is likely that blood will infiltrate into the preparation in the gingival area and make etching and placement of the dentin bonding adhesive without contamination impossible. An excellent way to manage the proximal tissue hemorrhage quickly and completely to apply Expa-syl (Kerr Corporation) to the area, tap it to place with a dry cotton pellet, and wait 1 to 2 minutes (Figure 4). Using air-water mixture, rinse away the Expa-syl leaving a little bit of the material on top of the tissue, but below the gingival margin of the preparation (Figure 5). The Expa-syl will deflect the tissue away from the preparation margin, maintain control of any hemorrhage, and facilitate placement of the proximal matrix without the risk of contamination of the operative field.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Class II preparations that need a matrix band for restoration will require rebuilding of the marginal ridge, proximal contact, and often a large portion of the interproximal surface. The goal of composite placement is to do so in such a way that the amount of rotary instrumentation for contouring and finishing is limited. This is especially true for the interproximal surface. Because of the constraints of clinical access to the proximal area, it is extremely difficult to sculpt and correctly contour this surface of the restoration. Proper reconstitution of this surface is largely due to the shape of the matrix band and the accuracy of its placement. After removal of caries and old restorative material, the outline form of the cavity preparation is assessed. If any portion of the proximal contact remains, it does not necessarily need to be removed. Conserve as much healthy, unaffected tooth structure as possible. If the matrix band cannot be easily positioned through the remaining contact, the contact can be lightened using a Fine Diamond Strip (DS25F - Komet USA).


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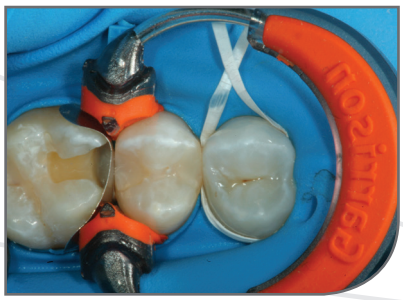

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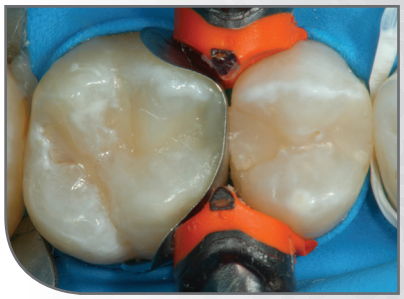
Figures 6–8:
6) A sectional matrix band gripped by Composi-Tight® Matrix Forceps, an instrument that enables precise placement of sectional matrix bands without deformation. 7) The WedgeWand® during clinical application with the wedge bent at a 90° angle to the handle. 7a) WedgeWands provide an excellent seal. 8) The Soft Face™ 3D-Ring in place. Note the precision of the cavosurface and marginal seal by the sectional matrix.

The Composi-Tight 3D™ Matrix System has been chosen to aid in the anatomic restoration of the mesial proximal tooth morphology of this maxillary first molar. The appropriate matrix band is chosen which will best correspond anatomically to the tooth being restored and also, to the width and height of the proximal surface. The height of the sectional matrix should be no higher than the adjacent marginal ridge when properly placed. Because of the concave anatomic shape, the proximal contact will be located approximately one millimeter apical to the height of the marginal ridge. The Composi-Tight® Matrix Forceps is used to place the selected sectional matrix band in the correct orientation in the proximal area. The positive grip of this instrument will allow for more exact placement than a cotton plier, which could damage, or crimp the matrix band. The sectional matrix band (Garrison Dental Solutions) is positioned and placed using the Composi-Tight Matrix Forceps to the mesial proximal area of tooth number 14 (Figure 6). The orientation of the band and the positive fit in the makes precise placement possible, even in posterior areas with tight access. Next, the gingival portion of the band is stabilized and sealed against the cavosurface margin of the preparation using the appropriate size WedgeWand® flexible wedge (Figure 7). The size of the WedgeWand flexible wedge should be wide enough to hold the gingival portion of the matrix band sealed against the cavosurface of the preparation, while the opposite side of the wedge sits firmly against the adjacent tooth surface. To place the wedge, the Wedge Wand is bent to 90 degrees where the wedge meets the handle. The flexible wedge can now be placed with pressure conveniently, without the use of cotton forceps, that often times can be very clumsy. Once the wedge is in the correct orientation, a twist of the wand releases the wedge. The G-Ring® forceps is then used to place the Soft Face™ 3D-Ring into position. The feet of the Soft Face 3D-Ring are placed on either side of the flexible wedge and the ring is released from the forceps. The force of the 3D-Ring causes a slight separation of the teeth due to periodontal ligament compression and the unique pads of the Soft Face 3D ring hug the proximal morphology of the buccal and lingual surfaces of the adjacent teeth while at the same time creating a unbelievably precise adaptation of the sectional matrix to the tooth cavosurface margins! (Figure 8).

Figures 9–9a:
9) The composite restoration in completed prior to removal of the matrix band. Placement of the matrix precisely reconstructs the proximal tooth form. 9a) The restoration immediately after matrix removal. The Composi-Tight™ 3D-Ring reduces flash to a minimum.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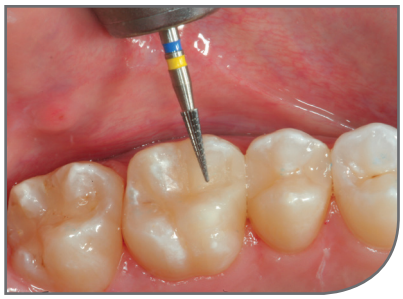
The goal of the perfect proximal matrix is to eliminate the need to have to use rotary instruments to remove overhangs due to a poorly adapted matrix. Once the sectional matrix is properly wedged and the Soft Face 3D-Ring is in place, the restorative process can be started. A 15 second total etch technique, 10 seconds on enamel margins and 5 seconds on dentin surfaces is performed using a 37% phosphoric etch. The etchant is then rinsed off for a minimum of 15 to 20 seconds to ensure complete removal. The preparation is then air-dried and rewet with AcQuaSeal desensitizer (AcQuaMed Technologies) to disinfect the cavity surface, create a moist surface for bonding, and begin initial penetration of HEMA into the dentinal tubules. A fifth generation bonding agent (Optibond Solo Plus: Kerr Corporation) is then placed on all cavity surfaces. The solvent is evaporated by spraying a gentle stream of air across the surface of the preparation. The adhesive is then light cured for 20 seconds. The first layer of composite is placed using a flowable composite (Revolution 2: Kerr Corporation) to a thickness of about .5 millimeters. The flowable composite will "flow" into all the irregular areas of the preparation and create an oxygen- inhibited layer to bond subsequent layers of microhybrid material. After light curing for 20 seconds, the next step is to layer in the microhybrid material. First, using a unidose delivery, the first increment of microhybrid composite (Premise: Kerr Corporation) is placed into the proximal box of the preparation. A smooth ended condensing instrument is used to adapt the restorative material to the inside of the sectional matrix and preparation. This first increment should be no more than 2 millimeters thick. After light curing the first increment, the next increment should extend to the apical portion of the interproximal contact and extend across the pulpal floor. Facial and lingual increments are placed and sculpted using a Goldstein Flexithin Mini 4 (HuFriedy). A #2 Keystone brush (Patterson Dental) is lightly dipped in resin and used to feather the material toward the margins and smooth the surface of the composite. Figure 9 shows the restoration after completion of the enamel layer prior to matrix band removal. The Composi-Tight Matrix Forceps is used to remove the sectional matrix after removal of the flexible wedge and Soft Face 3D-Ring.

Finishing and polishing will be accomplished using Q-Finisher Carbide Finishing Burs (Komet USA). Typically, 3 grits and correspondingly, 3 different burs are used to finish composite materials. With the Q-Finisher system, the blue- yellow striped bur with its unique blade configuration does the work of two burs with one. An excellent surface quality on composite and natural tooth is achieved due to the cross cut design of the cutting instrument.



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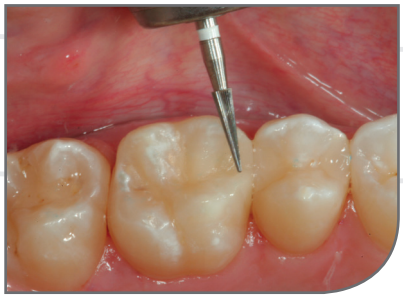

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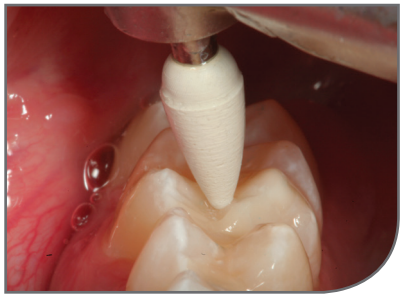

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Figures 10–13:
10) The pointed Q-Finisher carbide finishing bur is used to make minor occlusal adjustments and refine the restorative margins. 11) The ultra fine pointed composite finishing bur is used to further refine and finish the restoration's adjusted areas. 12) A fine pointed diamond composite polisher smoothes adjusted areas during polishing. 13) An occlusal view of the direct MO composite restoration after application of Seal-n-Shine sealant.

The small, pointed (H134Q - 014) Q Finisher is used to make minor occlusal adjustments on the restorative surface as needed and to smooth and refine the marginal areas of the restorative material where accessible (Figure 10). The fine, white stripe (H134UF - 014) ultra fine finishing bur is used in the adjusted areas for precise fine finishing (Figure 11). Komet Diamond Composite polishing points (Green – Polishing and Gray – High Shine) are then used to polish and refine the restorative surface (Figure 12). Once polishing is complete, the final step is to place a surface sealant (Seal and Shine:Pulpdent Corporation) to seal and protect any microscopic imperfections at the restorative marginal interface that may be left as a result of our inability to access these areas on the micron level. Remember, an explorer can "feel" a 30 micron marginal gap at best. Bacteria are 1 micron in diameter. The purpose of the Seal and Shine is to fill these areas. Figure 13 shows an occlusal view of the completed Class II composite restoration.

Conclusion

A technique has been described 1) to control proximal tissue bleeding prior to matrix placement with Expa-syl (Kerr Corporation), 2) utilize a sectional matrix system (Composi-Tight 3D™, WedgeWand®: Garrison Dental Solutions) and a nanofilled microhybrid composite (Premise: Kerr Corporation) to create an anatomically precise proximal surface, and 3) Use the Q Finisher, two bur composite finishing system (Komet USA) to finish then polish with diamond composite abrasives (Komet USA) refining marginal integrity without destroying occlusal anatomic form. The interproximal surface has been recreated with natural anatomic contour and has a predictable, elliptical contact with the adjacent tooth. With proper occlusal and proximal form, this "invisible" direct composite restoration will service the patient for many years to come.

Garrison
Dental Solutions

150 DeWitt Lane
Spring Lake, MI USA
49456
Toll free 888.437.0032

European office:
Carlstr. 50
52531 Uebach-Palenberg
Germany
Tel. +49 (0) 2451 971 409

www.garrisondental.com

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