The paper introduces a new technique for creating Class II posterior composite restorations — the centripetal build-up. This technique replaces the lost tooth structure from the periphery towards the center of the cavity, thereby achieving better marginal adaptation to the gingival floor. Since overfilling is rare, rotary finishing is minimized. This method allows the creation of long-term aesthetic posterior composite restorations, while utilizing conventional auxiliary (i.e., metal matrix bands and wooden wedges) in operative dentistry. The learning objective of this article is to introduce this new technique to a wider segment of the dental profession.

With the introduction of hybrid composites, the composite materials now offer a promising alternative for metal and ceramic posterior restorations. The advanced light-cured composite resins not only provide superior aesthetic results, but they may also be as resistant to wear as amalgam restorations. However, a number of obstacles remain in the attempts to develop an optimal method for placing posterior composite restorations that will remain serviceable in the oral cavity for many years.

Since the material might pull away from cavity walls during polymerization due to shrinkage of the composite resin, it contributes to the formation of a microgap. This contraction gap can permit the ingress of bacteria and oral fluids that are responsible for hypersensitivity, staining at the margins, and recurrent caries. In addition, considerable stress can develop between

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Figure 1. Preoperative radiograph. Caries in several molars. A centripetal posterior composite Class II restoration is planned for the mandibular second molar.

Figure 2. After local anesthesia, a rubber dam is placed to isolate the mandibular second molar.
opposing cavity walls which are bonded to each other through the restoration material.\textsuperscript{15}

A number of methods have been employed in an attempt to reduce cervical gaps in Class II composite resin restorations. Various techniques for incremental insertion of the composite resins have been studied.\textsuperscript{16-20} The “sandwich” technique with self-cured composite,\textsuperscript{21} glass ionomer cement,\textsuperscript{22} or amalgam,\textsuperscript{23,24} combined with the composite resins, has been introduced. New methods that approximate the visible light source closer to the composite resins have also been developed.\textsuperscript{25}

The aim of the present paper is to describe a new technique that utilizes incremental insertion in combination with centripetal composite resin build-up. Since overfilling is rare, negative curving is seldom necessary. (Negative curving is a curving technique in which an intentional overfilling is performed and material is removed to expose the protruding surfaces, as in amalgam restorations; it is the opposite to positive build-up, in which a material is added to reach the final surface texture.)

**Shrinkage of the composite resin contributes to the microgap formation since the material pulls away from gingival cavity walls.**

- While the anesthesia is taking effect, carefully examine the occlusal contacts with the opposing teeth, using articulating paper, to avoid occlusal contact pressure on the composite resin/tooth structure interfacial line.
- Apply rubber dam.
- Perform a conservative cavity preparation with water-cooled, high-speed preparation diamond or tungsten carbide burs (Figures 3 through 5). Once an access to the carious lesion is gained, use a water-cooled, low-speed round carbide bur to remove all carious dentin. In this preparation, only the carious dentin is removed; the sound dentin is not removed, even if undermined. No bevels or chamfers are performed on the occlusal and gingival walls in order to avoid the creation of a thin composite layer or additional damage to the remaining enamel.

**CLINICAL PROCEDURE**
- Make radiographic (Figure 1) and clinical (Figure 2) diagnosis.
- Administer local anesthetic.
Since a chemomechanical bonded restoration is being performed, the walls can be left somewhat unsupported after removal of the caries; there is no need for extended cavity design.

- Place a light-cured glass ionomer liner (eg, Vitrebond, 3M Dental Products Division, St. Paul, MN) upon the pulpal cavity wall and light cure for 30 seconds, as per manufacturer’s instructions.
- Insert and compress firmly into place an ultrathin metal matrix strip.
- The strip is held in place with a conventional sycamore wooden wedge (Figure 6), inserted by specially designed dressing pliers (No. 820, Hawe-Neos Dental, Gentilino, Switzerland). It is essential that the wedge be strongly compressed interproximally in order to ensure temporary displacement of the adjacent teeth in their periodontal ligaments. This is important since composite resins are noncondensable materials. This procedure allows firm proximal contact areas after removal of the wedges and relocation of the adjacent teeth.

- Etch the enamel and the remaining exposed dentin using the conditioner of a new generation dentin bonding system (eg, Permagen, Ultradent Products, South Jordan, Utah) according to manufacturer’s instructions (Figure 7).

The centripetal build-up technique offers a number of advantages when composite resin posterior restorations are indicated.

- Once etching is completed, rinse away the etching gel with water and dry the tooth. Do not desiccate.
- Brush dentinal primer over the dentin and air dry. Some bonding systems require light curing the primer.
- Apply an unfilled bonding liquid resin to all internal and external aspects of the preparation and light cure for 20 seconds.
- Step 1 of the centripetal build-up: Reestablish the proximal wall. Condense a small increment of semi-transparent posterior composite (eg, Shade I, Restorative Z 100, 3M Dental Products) towards the matrix band using a composite condenser (Figure 8) and light cure for 20 seconds. A schematic drawing illustrates the cavity at this stage (Figure 9).
- The author employs a self-made transparent cylindrical extension of
the light source. The Intra-Cavity Extension Tip - ICET - is inserted into the cavity box and provides better proximity of the light. The ICET will be available commercially in the future (Tapuach Tech, Ramat-Hasharon, Israel); the author has no financial interest in the product. A currently commercially available conical curing tip (Light-Tip, Denbur, Inc., Oak Brook, IL) is also illustrated (Figures 10 through 13).

- Step 2: Create the occlusal margin of the restoration, using small increments of semi-transparent posterior composite resin that are placed on the cavity margin, flattened with a dental spatula (Charisma Plasmacat, Heraeus Kulzer, Wehrheim, Germany), and light cured for 20 seconds.
- A layer of the restoration material forms in continuity with the cusp slopes (Figures 14 and 15).
- Step 3: After the creation of this external translucent envelope, place a dentin shade (CY or CG, Restorative Z100, 3M Dental Products, St. Paul, MN) in small increments, with still soft, make the internal characteristics (staining of grooves, creation of pits and fissures) with the tip of a very fine explorer and then light cure (Figures 19 and 20).
- Step 4: Apply the external occlusal layer with the tip of the fine explorer, which holds a semi-transparent posterior composite resin increment, and expose it to a light beam for 60 seconds (Figures 21 and 22).
- Once curing is complete, remove the metal matrix band, leave the wooden wedges in place, and contour the marginal ridge using flexible discs (Soflex, 3M Dental Products, No 2382P).
- Remove the wedges.
- Remove the rubber dam.
- Mark the occlusal contact points with articulating paper.
- According to the observed marks, make occlusal adjustment where necessary with high-speed fine grit...
diamond burs, followed by slow-speed rubber points.
• Apply composite polishing paste occlusally by slow-speed rubber cups and carry interproximally with dental floss.
• Apply a surface penetrating sealant (Fortify, Bisco, Lombard, IL) to the surface of the restoration.21-27 The final restoration is shown (Figure 23), and the postoperative bitewing radiograph illustrates the final results of the restoration (Figure 24).

**DISCUSSION**

The centripetal build-up technique offers a number of advantages when composite resin posterior restorations are indicated. This technique utilizes thin metal matrix bands and wooden wedges, eliminating the need for transparent matrix bands, which may not provide firm contact areas and anatomical proximal contours and are cumbersome to use for many practitioners. Further, recent studies do not indicate any disadvantage of the metal matrix bands in cervical gap formation.20

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**The formation of the occlusal surface reference ring is another significant addition of the proposed technique.**

The light-cured glass ionomer liner:
1. Provides excellent thermal isolation.
2. Releases fluoride.
3. Has a coefficient of thermal expansion closer to that of dentin.
4. Withstands a higher compressive force than all Ca(OH)₂ liners.
5. Bonds to tooth structures.

In superficial cavities, however, it is possible to skip lining the pulpal walls and use a dentin bonding agent only. There are no valid long-term substantiated data supporting discontinuation of the use of conventional liners (Ca(OH)₂ G.I.) in moderate-to-deep cavities. Clinically, the use of the glass ionomer liner eliminates postoperative sensitivity in most amalgam, gold, porcelain, and composite resin restorations.

An important benefit of the procedure is offered by the centripetal build-up steps: By first creating a very thin proximal layer, the internal curing of this layer is effected, which can strengthen the composite and reduce the cervical gap that could form.21-26,28 Furthermore, even if such a gap does develop, the next consecutive layer,
which is condensed toward the gingival floor, is likely to fill this gap, since the continuity of the space created is not occluded. Comparative microleakage tests have yet to be conducted, but the author's experience of more than 6 years with this technique has demonstrated excellent marginal adaptation, clinically and radiographically.

The formation of the occlusal surface reference ring is another significant addition of the proposed technique. By building a continuous layer to the cusp slopes, an occlusal reference surface is created, avoiding over-filling and minimizing the subsequent need for rotary burs. These finishing procedures are known to be deleterious to the outer surface of the composite.22,21

Finally, the centripetal build-up technique is very conservative. It preserves sound tooth structure, is not time-consuming,22 and is easy to apply. Once the second step of the procedure is completed and the peripheral composite envelope is created, the cavity is managed as a simple Class I cavity. The systematic use of enamel and dentin shades achieves predictable and very satisfactory aesthetic results. The centripetal build-up technique has been utilized successfully where small to medium posterior restorations are indicated. However, when directly restoring extensive stress-bearing occlusal surfaces, especially in molars, silver amalgam, when manipulated meticulously (Figure 25), is still the material of choice to achieve a long-lasting dental restoration (Figure 26).

CONCLUSION

This paper has described a new technique that employs a number of the methods used to reduce cervical gaps in Class II composite resin restorations in combination with centripetal build-up. The advantages of this technique include use of the thin metal matrix bands and wooden wedges, creation of a very thin proximal layer as the first build-up step, the formation of the occlusal surface reference ring, preservation of sound tooth structure, and ease of application. The author believes that the technique described is a worthwhile addition to the clinical procedures in the dental profession.
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