Best practices for class II restorations

Innovative thermoviscous bulk-fill composite

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CLASS II FILLINGS are one of the most common restorations in dentistry, with interproximal decay on the rise in certain populations despite all modern preventive measures. The most prevalent cause of posterior composite failure is recurrent caries.[1] One of the weakest links in class II restorations is microleakage at the gingival margin of the proximal box, which contributes to postoperative sensitivity and a high incidence of secondary caries accounting for many clinically failed restorations.

Secondary caries is indeed considered one of the most frequent causes of restoration failure, irrespective of the restorative material used. This has a considerable impact on health-care expenditures since the replacement of restorations due to secondary caries represents a large part of the restorative work in a dental practice. Moreover, subsequent replacement or repair of a restoration leads to further tooth loss and weakening of the tooth structure. Ultimately the so-called restorative death spiral occurs, which may eventually lead to tooth loss.[2]

Secondary caries with composites is to some extent associated with the restorative material, as significantly more caries occurs with composites than with amalgam.[3] Polymerization shrinkage and subsequent microleakage, higher plaque accumulation, lack of antibacterial and acid-buffering effect, and changes in microbial composition may lead to the composite's increased susceptibility to secondary caries.[4]

When packing composite into the proximal box, the material can be sticky and pull back with the placement instrument. It may be difficult to obtain a seal at the cavosurface margin at the base of the box. Also, volumetric polymerization shrinkage of resin-based composite, being in the range of 2% to 3%, could cause various problems and result in gaps between the tooth and the restorative material.[5] Such gaps may contribute to the formation of secondary dental caries or pathologic changes in the dental pulp.[6]

To counter these issues, techniques such as placing a flowable composite or resin-modified glass ionomer (RMGI) restorative layer at the base of the box are being utilized. This is referred to as the sandwich technique. This technique is described as a layering of various restorative materials within the cavity preparation. It involves placing an RMGI restorative at the base of the cavity preparation, followed by curing and the addition of a composite restorative to complete the restoration.[7]

Bulk-fill flowable and packable composites are also being utilized to speed up the restoration process. Increments up to 4 mm or 5 mm thick can be cured in one step, thus skipping the time-consuming layering process. Moreover, the rheology of the flowable materials is thought to have changed, allowing a better adaptation to the cavity walls and resulting in a self-leveling effect.[8] Some bulk-fill composites require a capping layer of regular composite resin for occlusal surfaces.

Figure 1: Radiograph of failing class II composite restoration

Figure 2: VisCalor bulk restoration with sealed gingival margin and well-contoured and tight interproximal contact

Figure 3: Class II DO preparation of mandibular left second molar

Figure 4: Class II DO preparation banded and wedged. VisCalor bulk is heated and flowed into the distal box, adapting well to the walls, floor, and matrix band.

The second challenge with class II composite restorations that many clinicians face is obtaining contact with the adjacent tooth. Insufficient contact can lead to food impaction, periodontal issues, recurrent decay at the base of the box, and is an annoyance to patients. Utilizing sectional matrix bands can produce reliable interproximal contacts. When placing class II composite resin restorations, the use of sectional matrix systems and separation rings provides tighter proximal contacts than traditional circumferential matrix systems.[9] Flowable materials do not allow compression against the matrix band and can lead to open contacts even when sectional matrix systems are used.

This failure of class II composite restorations can cause further loss of tooth structure, endodontic pathology, and tooth loss. Failures are reported as early as two years after placement. As clinicians, we strive to improve class II restorative outcomes.

VisCalor bulk (Voco), the first thermoviscous bulk-fill composite, has the viscosity of a flowable composite and the sculptability of a packable composite all in a single material. Prior to placement, this material is warmed in a modified caps warmer or the VisCalor dispenser. The material is flowable as it is placed in the prep and becomes sculptable as it cools to body temperature. This gives the advantage of being able to flow into the corners and margins of the box and preparation. As the material rapidly cools to body temperature, it becomes packable against the matrix band for adequate interproximal contact and sculpted into functional anatomy. VisCalor bulk satisfies the sealing of the proximal box as well as attains the desired anatomy in a single bulk-cure product. The product saves time for the clinician, produces a successful restoration, and overcomes common clinical challenges of class II restorations.

CLINICAL CASE NO. 1

The upper left second molar has a failing class II mesial-occlusal restoration (figure 1). As seen on the black and white radiograph, there is an open mesial contact and recurrent decay at the base of the proximal box. This is typical of a class II composite restoration's

Figure 5: VisCalor bulk becomes sculptable as it cools to body temperature, allowing compression against the matrix band for tight contact and carving of the anatomy.

Figure 6: Completed class II thermoviscous bulk-fill composite with VisCalor bulk

most common failure.

The upper left first molar has recurrent decay at the distal crown margin as well. The open proximal contact may have contributed to the failure of this crown.

The failing composite restoration was removed along with the recurrent decay. A new restoration was placed using VisCalor bulk. The flowability of the material resulted in the floor of the box being well adapted and the gingival margin being sealed. The mesial contour is anatomically correct, and the proximal contact is tight. The sculptability of the material allowed for packing against the sectional matrix and carving of anatomy.

CLINICAL CASE NO. 2

The lower left second molar was prepared for a class II composite restoration (figure 3). A sectional matrix band was placed and wedged. The preparation was etched, and adhesive was placed and cured. The VisCalor bulk was heated in the heating gun and then dispensed into the base of the box while in its flowable state. Note the complete adaptation of the material to the walls of the prep and matrix band (figure 4). The rest of the cavity was filled while the material was in its flowable state.

The composite became sculptable when cooled to body temperature (figure 5). The completed class II composite restoration is shown in figure.[6] The distal marginal ridge, distal fossa, central groove, and triangular ridges have been sculpted into the restoration. The distal proximal contact is tight and properly contoured. **DE**

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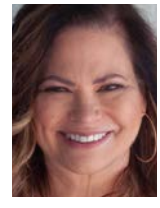

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