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Alternative Technique for Class V Resin Composite Restorations with Minimum Finishing/ Polishing Procedures

CR Perez

Clinical Relevance

Class V restorations are a common challenge to clinicians. These restorations involve problems, including isolation, adhesion, insertion technique, finishing and polishing. In order to solve these problems, several techniques have been developed. This article describes a new technique for the restoration of Class V cavities, one that eliminates rubber dam isolation and avoids any contamination. If used properly, this technique also provides good cervical contour, reducing or eliminating finishing and polishing procedures.

SUMMARY

Class V restorations are a very common occurrence in clinics. Some reasons include an increase in non-carious cervical lesions (NCCL), root caries and the elderly population. Unfortunately, Class V restorations also represent one of the less durable types of restorations and have a high index of loss of retention, marginal excess and secondary caries. Some causes for these problems include difficulties in isolation, insertion, contouring, finishing and polishing procedures. This technique demonstrates an alternative isolation and insertion method using photocured gingival barrier in association with a flowable resin and hybrid resin composite to recreate the gingival wall with minimum or no excess.

*Cesar Reis Perez, PhD, School of Dentistry of State University of Rio de Janeiro, Rio de Janeiro, Brazil

*Reprint request: Rua Albano de Carvalho 300/302, Rio de Janeiro, Rio de Janeiro 22795-380, Brazil; e-mail: cesarperez@superig.com.br

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INTRODUCTION

The restoration of cervical defects is a common procedure in restorative practice. Access to fluorides, effective preventive programs and enhanced dental care has increased the patient's prospects for keeping their natural teeth longer. The population also has become proportionally older. Root caries and cervical defects have become more prevalent as a result of aging, gingival recession and dentin exposure.[1-5] Resin composites are the material of choice for the restoration of these cavities, demonstrating esthetics and adequate physical properties.[6-10] Class V restorations also present a challenging and technically demanding situation, because the gingival margin, usually located in dentin or cement, is considered a critical factor in governing the marginal adaptation. Despite their wide use, resin composites still present relevant drawbacks, such as inher-

ent polymerization shrinkage, which results in contraction gaps at the tooth/restoration interface that leads to microleakage.[11-12] Microleakage is characterized by the penetration of acids, enzymes, ions, bacteria and their products into the margins of the restoration and is responsible for marginal discoloration, postoperative sensitivity, secondary caries and pulp damage.[13] Microleakage can be prevented if bonding at the interface withstands the stresses generated during polymerization of the composite and function of the restoration, preserving marginal adaptation. The bond itself depends, among other factors, on the control of contamination, placement technique and the capacity to withstand stresses concentrated in the cervical region as a result of abfraction.

One of the difficulties in Class V restorations is tooth isolation. Intrinsic anatomical and morphological characteristics of the cervical region create limitations in placement of the rubber dam and clamp.[14] Proper isolation is very difficult, sometimes impossible, when lesions extend proximally or under the gingiva. Sometimes, part of the structure cannot be isolated and the dam promotes restorative material accumulation and excess. Access is also limited, causing problems related to insertion of the restorative.

Another challenge is eliminating or reducing gap formation on the gingival wall. Several restorative techniques have been proposed to minimize shrinkage due to polymerization and to also achieve better marginal adaptation in Class V cavities. Because bond strength to enamel is usually greater than bond strength to dentin, it was suggested that cavities could be restored in multiple layers, starting with incremental placement in the occlusal wall of the preparation. This would minimize leakage into the dentin margin. It has also been suggested that the contraction gap at the gingival margin caused by polymerization shrinkage could be prevented by the incremental placement of a composite material starting in the dentin portion of the preparation. Regarding the possibility of bulk placement, it has been stated that this often results in open dentin margins, thus increasing microleakage.[15-28] These challenges are verified by the number of articles written about adhesion in the cervical area which focus on adhesive types, beveling, cavity configuration and different materials.

Flowable restorative resins are used for the restoration of minimally invasive preparations, especially cervical Class V lesions, due to their low viscosity and increased elasticity. The filler loading of flowables is lower than microfilled resins, resulting in an enhanced flow and a reduced elastic modulus. An improved flow is likely to facilitate adaptation, and the reduced elastic modulus may provide the material with stress-absorbing ability.[29,31-32]

Restorations in close proximity to gingival tissues require surface smoothness for optimal gingival health. The use of flowable restorative resins in cervical locations requires special attention to create smooth surfaces in order to avoid plaque retention, surface discoloration and gingival inflammation.[33-34]

The proper finishing and polishing of cervical restorations are important procedures that enhance esthetics, gingival health, periodontal integrity and longevity of restored teeth. The smoothest surfaces are achieved when resin material is cured against Mylar strips. However, properly contoured restorations are seldom achieved without the need to remove excess material.[35-37] Specifically, in Class V restorations, finishing and polishing procedures frequently lead to iatrogenic damage to the soft and hard tissues.

DESCRIPTION OF MATERIALS AND TECHNIQUE

This case involves a 32-year-old patient with three NCCL in teeth #2, 3 and 4 (Figure 1). After the patient answered health questions and received an oral examination, it was concluded that the lesions has multiple causes (occlusal factors, abrasion due to incorrect tooth brushing, and possible acid erosion due to the high consumption of cola soft drinks). The lesions were not very sensitive but did prevent good oral hygiene. Since the margins of the cavities extended subgingivally and were not ideal for the fixation of an isolation clamp, the new Class V restorative technique was performed.

All operative procedures were carried out by the author. Local anesthesia was used with 3% Prilocaine solution (Citanest/Dentsply, Petropolis, RJ, Brazil). The enamel margins were beveled to improve adhesion and esthetics. The teeth to be restored were first cleaned with a non-fluoridated prophylaxis paste (Prophy jet, Septodont, St-Maur, France) in a rubber cup and subsequently rinsed with water. The tooth color was matched to shade A3.

Figure 1. *Clinical aspect of NCCL lesions.*

Figure 2. *Photocurable gingival barrier placement around the matrix/wedges complex.*

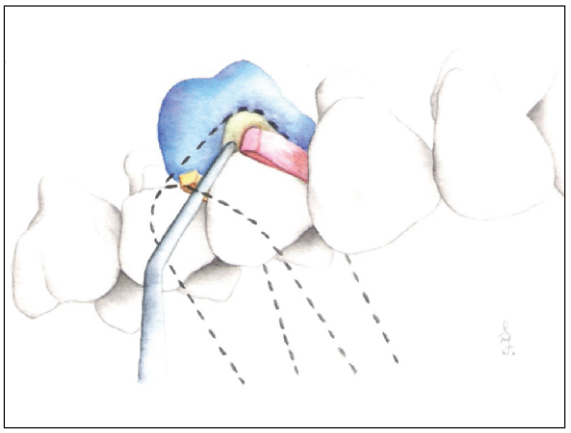

Figure 3. *Illustration of the insertion of flowable resin with a needlepoint.*

The next step was relative isolation and acid etching of the surrounding enamel for 15 seconds using 35% phosphoric acid (UltraEtch/Ultradent Products, South Jordan, UT, USA). The etchant was removed and the cavity was sprayed with water for 30 seconds, then carefully dried using the blot drying method to maintain a moist surface. Relative isolation with cotton was again performed, and a small, non-impregnated retraction cord (Ultrapak 000/Ultradent Products) was used to keep the area isolated.

The next step is key to the success of this technique: the Mylar matrix positioning and fixation. The Mylar matrix was previously cut to fit the restoration and facilitate the insertion of flowable resin into the cavity. Matrix cutting is not always required. The matrix was inserted into one side of the cavity and fixed into place with a wood wedge. It was then carefully inserted into the gingival sulcus, involving the entire cervical wall of the cavity. The unattached side of the matrix was positioned by inserting another wedge into the opposite side of the cavity. A photocured gingival barrier (TopDam/FGM, Joinvile, Santa Catarina, Brazil) was injected around the Mylar matrix in order to stabilize it (Figure 2). This procedure is not difficult to perform but has to be done with precision in order to form a large enough opening between the matrix and tooth to allow the point insertion of the flowable resin. This procedure will also allow the necessary volume of restorative material to be inserted without any excess and adequate penetration between the gingiva and tooth, forming an angle that provides enough aperture to the flowable resin point insertion. Some authors recommend contouring of the gingival aspect of the matrix by stretching the middle gingival portion over the shaft of an explorer to gain a shape consistent with the emergence angle on the cement-enamel junction of the tooth prior to securing the matrix against the tooth.

Another option is use of a metal matrix. Some authors think that it works better than the Mylar matrix in terms of maintaining shape and stability. This option can be especially useful in situations with intrinsic anatomical difficulties, as in molar furcation. The current author rarely uses the metal matrix; the Mylar matrix is used instead due to initial idealization of the technique, plus it brings some advantages, including less risk of damage to soft tissue during penetration into the gingival sulcus and better light transmission and visualization.

The barrier was photocured (Optilux 401, Demetron/Kerr Corporation, Orange, CA, USA), then attached to the cavity using a filled self-etch adhesive (One-Up Bond F Plus/ Tokuyama, Tokyo, Japan) to prevent future sensitivity. The adhesive was attached following the manufacturer's instructions. Previous enamel acid etching provided reliable adhesion to the restoration and use of a filled adhesive could provide some stress relief at the restorative interface.[26-28] After the barrier was in place, the flowable resin (3M ESPE Filtek Flow/3M Dental Products, St Paul, MN, USA) was inserted using a needle insertion point (Figure 3). The amount of material used was enough to cover only the gingival wall and corresponded to no more than one-third of the cavity. Flowables are low-modulus materials and will flex with the tooth.

After the flowable resin was photocured for 20 seconds, the matrix could be maintained in position until the end of the procedure (which occurred in this case) or could be removed, providing more space for the next incremental insertion of microfill or nanofill resin composite. In this case, a nanofilled resin composite (Filtek Supreme/3M Dental Products) was chosen, because of its good abrasion resistance and excellent esthetic characteristics. It was inserted in three small increments (thickness <2mm) in order to avoid any excess material and photocured for 40 seconds between each increment. After the last increment, a thin coat of a

Figure 4. *Final aspect of the restorations.*

resin polisher (BisCover/BISCO, Inc, Schaumburg, IL, USA) was carefully applied and photocured for 20 seconds to eliminate the oxygen-inhibited layer and for better polishing and wear resistance.

In the case of the specific molar involved, insertion of the matrix was done in two steps, since the cervical configuration of the cavity is different in molars. The distal portion was positioned first and the flowable resin was inserted. Next, the mesial portion was inserted to fit to the other root contour and allow for a good adaptation. A new layer of flowable resin was then inserted into this region. Even with a properly secured matrix, this situation can demand further contouring, finishing and polishing procedures. They must be carried out using maximum care to avoid damage to the surrounding hard and soft tissues. The author of the current study recommends fine and extra-fine diamond burs to finish the restorations and application of a thin coat of resin polisher to obtain a smooth surface.

The final aspect of the restorations is seen in Figure 4. No additional finishing or polishing methods were necessary.

POTENTIAL PROBLEMS

One potential problem with this technique is related to cervical lesions in molars. Due to differences in contour, this technique must be completed in two steps. It is anticipated that a learning curve will exist for this technique, especially when used on molars. An auxiliary is useful in the beginning to help place the photocured barrier, while the operator holds the matrix in ideal position.

Another disadvantage is that each tooth has to be isolated individually, even if the teeth are contiguous.

This technique is also not indicated in situations where adequate rubber dam isolation can be performed without limitations related to access and excessive retraction.

CONCLUSIONS

This technique represents an option to traditional rubber dam isolation in Class V cavities; it allows for placement of the flowable composite layer in the cervical wall, which reduces material excess and possibly eliminates the need for finishing and polishing procedures. The probability of establishing correct anatomy can be improved.

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