

Increasing the Predictability of Class II Restorations

Dual-cure, bulk-fill technique directs shrinkage toward the cavosurface

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Class I and II direct composite restorations are a common procedure for most general practitioners. Unfortunately, nearly 40% of these restorations, predominantly Class II, are plagued by microleakage and recurrent caries at the cervical margin.¹⁻⁴ Although light-cured, bulk-filling techniques can be a time-saving approach for larger restorations, careful attention must be paid to reduce the likelihood of incomplete polymerization due to photoelasticity, poor light positioning, and/or angulated curing.⁵⁻⁸ These factors can result in marginal microleakage, ultimately leading to recurrent decay. Another concern regarding the use of light-cured, bulk-fill materials in Class I and II preparations is that bulk-fill materials have demonstrated higher shrinkage stress when compared with incrementally layered composites.⁵ For the clinician, incremental layering and curing can be time-consuming, creating a dilemma in which it becomes difficult to charge a fee commensurate with the time required to perform the procedure. In contrast, it has been documented that chemically cured bulk-fill materials exhibit similar stress forces as incrementally layered, light-cured composites, allowing for more efficient placement without the concern of incomplete polymerization from light curing.⁵

This article will discuss the use of a dual-cure, flowable, bulk-fill resin composite to reduce the aforementioned risks, improve long-term predictability, and increase efficiency.

Case Report

A 59-year-old female presented to the office with a lower right first molar that was showing signs of marginal microleakage around her existing mesio-occlusal amalgam restoration as well as an open contact with the adjacent bicuspid (Figure 1). After removing the existing amalgam and recurrent decay, a sectional matrix system (Contact Matrix™, Zest Dental Solutions) was placed to assure a well-contoured and complete contact (Figure 2). As is the case with many posterior Class II restorations, the cervical aspect of the proximal box was 7 mm from the cusp tip (Figure 3). Assuming adequate output from the curing unit along with proper positioning and angulation of the source, this distance exceeds the depth-of-cure limitations for

most bulk-fill materials.⁹ If there are also deficiencies with the light source or the technique used, incomplete curing is nearly guaranteed.⁹ In this situation, utilization of a dual-cured, flowable, bulk material can provide assurance that the deepest and most vulnerable areas of the restoration will fully polymerize.

Once isolated, the enamel was selectively etched with a 35% phosphoric acid solution (Ultra-Etch®, Ultradent) (Figure 4). After rinsing and lightly air-drying, an 8th generation, self-etch adhesive (Prelude One™, Zest Dental Solutions) was generously applied over the entire preparation (Ball-Point Applicators™, Kerr) and gently agitated over the dentin (Figure 5). After 15 seconds, the adhesive was thinned and the carrier evaporated using a warm air dryer (Warm Air Tooth Dryer, A-dec Inc.) for 5 seconds (Figure 6).

Next, the entire restoration was completely filled with a dual-cure, flowable,



(1.) Existing amalgam restoration exhibiting marginal microleakage. (2.) Placement of sectional matrix system. (3.) Proximal box with 7 mm distance from the cervical aspect to the cusp. (4.) Selective etching with 35% phosphoric acid solution.



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bulk-fill resin composite (Bulk EZ[®], Zest Dental Solutions) (Figure 7 and Figure 8). Delaying light-curing allows the self-curing component of this material to direct shrinkage toward the cavosurface margin instead of toward the light source.¹⁰ After 90 seconds, a curing light was placed directly over the preparation to complete polymerization prior to removing the sectional matrix system (Figure 9). Gross reduction was performed using a carbide bur (ET-9, Microcopy) interproximally and a fine football-shaped diamond bur (1923F/EF, Microcopy) on the occlusal surface (Figure 10 and Figure 11). Initial polishing was completed with a polishing point (Brownie Polishers, Shofu) and a fine polish was achieved with a polishing wheel (A.S.A.P.[®], Clinicians Choice). The resulting restoration was visibly free of voids and had a firm contact with the adjacent bicuspid (Figure 12). Although the color of the material used was slightly lighter than the tooth's natural color, the patient chose not to have a veneering composite placed over the bulk-fill composite. For most posterior restorations, the shade choices allow the clinician to achieve a very good color match.

Conclusion

The idea of using a self-curing material to control the direction of shrinkage and ensure complete curing in deep preparations is not a new one. In the early 1990s, Ray Bertolotti advocated for the use of a self-cured resin composite to combat the high incidence of microleakage, sensitivity, and early failure associated with Class II composite restorations.¹⁰ Today, advanced chemistry and novel materials, such as the ones used in this article, have allowed practitioners to have more confidence in the efficiency, longevity, and predictability of their posterior composite restorations. 🌸

References

1. Opdam NJ, Bronkhorst EM, Rooters JM, et al. Longevity and reasons for failure of sandwich and total-etch posterior composite resin restorations. *J Adhes Dent.* 2007;9(5):469-475.
2. Aoyama T, Aida J, Takehara J. Factors associated with the longevity of restorations in posterior teeth. *J Dent Hlth.* 2008;58(1):16-24.
3. da Rosa Rodolpho PA, Cenci MS, Donassollo TA, et al. A clinical evaluation of posterior composite restorations: 17-year findings. *J Dent.* 2006;34(7):427-435.



(5.) Adhesive generously applied and agitated over the dentin. (6.) The adhesive was thinned and the carrier evaporated using warm air for 5 seconds. (7. AND 8.) Placement of dual-cure, flowable, bulk-fill resin composite. (9.) Light curing to complete polymerization following the self-cure phase. (10. AND 11.) Gross reduction achieved with a carbide bur and a fine, football-shaped diamond bur. (12.) The final restoration after fine polishing.

4. Manhart J, Chen H, Hamm G, et al. Buonocore Memorial Lecture. Review of the clinical survival of direct and indirect restorations in posterior teeth of the permanent dentition. *Oper Dent.* 2004;29(5):481-508.
5. Kinomoto Y, Torii M, Takeshige F et al. Polymerization contraction stress of resin composite restorations in a model Class I cavity configuration using photoelastic analysis. *J Esthet Dent.* 2000;12(6):309-319.
6. Ferracane JL, Watts DC, Barghi N, et al. Effective use of dental curing lights: a guide for the dental practitioner. *ADA Professional Product Review.* 2013; 8:2-12.
7. Strassler HE. Successful light curing—not as easy as it looks. *Oral Health.* 2013;103:18-27.

8. Ferracane JL, Mitchem JC, Condon JR, et al. Wear and marginal breakdown of composites with various degrees of cure. *J Dent Res.* 1997;76(8):1508-1516.
9. Yap AU, Pandya M, Toh WS. Depth of cure of contemporary bulk-fill resin-based composites. *Dent Mater J.* 2016;35(3):503-510.
10. Bertolotti, RL. Posterior composite technique utilizing direct polymerization shrinkage and a novel matrix. *Pract Periodontics Aesthet Dent.* 1991;3(4): 53-58.

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