

Clinical Showcase

Clinical Showcase is a series of pictorial essays that focus on the technical art of clinical dentistry. This section features step-by-step case demonstrations of clinical problems encountered in dental practice. This month's article is by Dr. Tony Pensak, one of the featured speakers at the Pacific Dental Conference, presented in partnership with the Canadian Dental Association. The conference will take place in Vancouver, B.C., from March 4 to 6. If you would like to propose a case or recommend a clinician who could contribute to Clinical Showcase, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

Get in the Groove

Dr. Tony Pensak, BSc, DDS, FAGD

Many dentists are aware of the challenges inherent in placing Class I composites. These seemingly simple restorations often cause the most perplexing postoperative sensitivity complaints. The problem is most likely due to the fact that Class I restorations have only 1 free, unbonded surface that is able to deform as polymerization shrinkage occurs, causing a great deal of stress at the cavosurface margin. This is referred to in the literature as a very high C-factor (defined as the ratio of bonded to unbonded walls), and was originally described by Feilzer and others¹ in 1987. In 1999, Milicich² proposed a solution to reduce the stress caused by polymerization shrinkage. In my opinion, Milicich's technique has not received enough attention. What follows is a brief overview of this technique.

Enamel is especially vulnerable to fracturing when tensional stress is high. A white line is often visible either immediately after curing or a few minutes later, once the finishing procedures are completed (Fig. 1). This white line is clearly not a failure at the cavosurface interface, but rather a cohesive fracture within the enamel structure itself (Fig. 2). Although this white line may stain prematurely, in all likelihood it will not lead to premature failure of the entire restoration. On those rare occasions when the white line does not appear, the entire cusp may have sustained a catastrophic fracture that could ultimately cause the tooth to become nonvital.

With minimal equipment and time, it is possible to significantly reduce this risk and create a more beautiful restoration. The procedure involves simply placing a series of narrow grooves, approximating the developmental grooves, down the middle of the restoration *before* polymerization. This will provide additional unbonded surfaces that can distort during polymerization, thus reducing the stress on the cavosurface margin. A sealer should be applied after polymerization and occlusal adjustment.



Figure 1: Visible white line around polymerized Class I restoration. Photo courtesy of Bisco Dental Products.

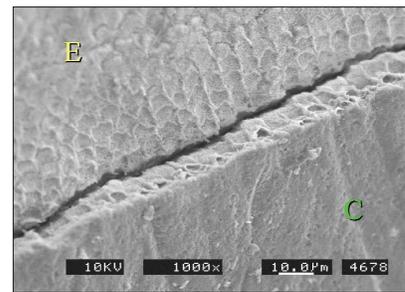


Figure 2: Scanning electron microscopy ($\times 1000$) indicates white line is fractured enamel. E = enamel, C = composite. Photo courtesy of Bisco Dental Products.

Getting in the groove simply means using a sculpting technique that reduces strain or, to be more formal, using a “prepolymerization composite contouring technique to reduce the C-factor.” It doesn't matter what you call it, the end result is the same: an easier way to control post-cure shrinkage. ♦



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Correspondence to: Dr. Tony Pensak, Suite 202, 83 Deerpoint Rd. SE, Calgary AB T2J 6W5. E-mail: tmj@dentist.org. Dr. Pensak will be presenting 2 seminars at the joint PDC/CDA conference: “Making Sense of Today's Methods and Materials: Separating Myth from Reality” and “Technology 2004: Integrating Digital Imaging into Your Practice.” Both seminars are sponsored by Bisco Dental Products. For more information on the conference, visit www.pacificdentalonline.com.

References

1. Feilzer AJ, De Gee AJ, Davidson CL. Setting stress in composite resin in relation to configuration of the restoration. *J Dent Res* 1987; 66(11):1636-9.
2. Milicich G. Direct restorative technique. The effect of cavity configuration on restoration stress. Available from: URL: www.tiads.com/ppt/ACFactorwebpage.ppt.



Figure 3: Pretreatment view of teeth 36, 37 and 38.



Figure 4: Teeth are etched and bonded before placement of self-cure composite (Bisfil II, Bisco Dental Products, Richmond, B.C.).



Figure 5: Initial increment of Bisfil II surface sealer is placed and chemically cured.



Figure 6: An enamel replacement (Microneur, Bisco Dental Products) is placed in the first molar, but not cured.



Figure 7: Grooves placed in uncured composite. Groove depth should be 1 mm.



Figure 8: Groove placement completed in first molar.



Figure 9: Groove placement completed in all 3 molars and cured.



Figure 10: Initial marginal detailing completed.



Figure 11: Occlusal adjustment completed.



Figure 12: At this stage, only the surface of the first molar has been sealed with Biscover (Bisco Dental Products).



Figure 13: Post-treatment view.



Figure 14: Very thin instrument (Interproximal Carver IPC, N-5110P, Bisco Dental Products) used for groove placement (top) compared with instrument of normal thickness.