WHAT? Retention Grooves for Resins? (1/08)

Ishikiriama SK, Mondelli RFL, Kano SC, Ishikiriama A, Mondelli J. Role of additional retention on marginal adaptation and sealing of large resin composite class II restorations. Operative Dentistry 2007; 32:564—570.

The advent of dental adhesives has essentially terminated the teaching of intracoronal retentive features for placement of resin restorations. The purpose of this interesting laboratory study was to investigate the effect of internal retentive preparation features on marginal leakage and gap formation with large, resin composite Class II restorations whose gingival margins terminated on the root surface.

Standardized Class II MOD preparations with gingival cemental margins were prepared in 40 recently-extracted molars that were divided into four groups according to retention features in the proximal box: No retention; 1.0 mm vertical grooves in the buccal and lingual walls; two, 1.0 mm “pot holes” in the gingival floor, and; one 1.0 mm horizontal groove placed parallel 1.0 mm from the margin in the gingival floor. All preparations were incrementally restored using the same resin composite and two-step, total-etch adhesive. The finished samples were then immersed in dye solution and submitted to cyclic loading. Impressions of the gingival margins were made before and after loading, with epoxy resin replicas ultrastructurally evaluated for gap formation. Samples were sectioned mesio-distally after loading and evaluated for microleakage. The microleakage and gap extension data were evaluated by ANOVA and Tukey's test ($p<0.05$). Gap extension before and after mechanical loading was compared by Student's t-test.

The results indicated that all groups with additional retention features demonstrated less gingival marginal gap formation before and after mechanical cycling as compared to the control group, with no difference identified between the retentive features. After cyclic loading all groups demonstrated a marginal gap increase, however the gingival-floor, horizontal groove samples demonstrated less marginal gap opening after mechanical cycling. Microleakage results revealed that the additive retentive samples had less microleakage, with the horizontal gingival floor samples demonstrating the least microleakage. However, there was not a strong correlation between margin gap size and microleakage. **The authors concluded that although additional retentive features for resin Class II restorations did not eliminate marginal gap formation, a significant reduction was observed.**

DECS COMMENT: The advent of adhesive dentistry has fostered an almost Cavalier attitude as to attention to detail during preparation design. Even with dental adhesive improvement one of the most difficult restorative scenarios still involves the resin restoration of a proximal surface in which the gingival margin terminates on dentin. This study revived past concepts that may offer some improvement in resin Class II restorations, but no inference could be made concerning improvement with the complex phenomena of microleakage. Although the best answer may be provided by long-term clinical studies involving additional retentive features, these concepts should be given consideration.

References

1. Ben-Amar A, Metzger Z, Gontar G. Cavity design for Class II composite restorations. J Prosthet Dent 1987;58:5–8.
2. Coli P, Lixt M, Brännström M. The effect of cervical grooves on the contraction gap in Class II composites. Oper Dent 1993;18:33–36.
3. Wilson J. Effects of design features and restorative techniques on marginal leakage of MO composites: An *in vitro* study. Oper Dent 1993;18:155–159.
4. Hilton TJ. Can modern restorative procedures and materials reliably seal cavities? In vitro investigations. Part 1. Am J Dent 2002;15:198–210.
5. Hilton TJ. Can modern restorative procedures and materials reliably seal cavities? In vitro investigations. Part 2. Am J Dent 2002;15:279–289.