

## Amalgam Bonding: Sealing Better in the Long Run? (12/03)

Amalgam type, adhesive system, and storage period as influencing factors on microleakage of amalgam restorations. Ziskind D, Venezia E, Kreisman I, Mass E. J Prosthet Dent 2003;90:255-260.

Using dentin bonding agents with amalgam restorations is still a debatable topic. Laboratory studies are equivocal regarding restoration microleakage, reduction of cusp flexure, and restoration of tooth strength. Some short-term clinical reports support amalgam bonding; however, longer clinical studies have reported no difference between bonded and conventional amalgams in terms of post-operative sensitivity, marginal integrity, and restoration success. The purpose of this study was to evaluate the effect of amalgam type, adhesive system, and storage period on amalgam restoration microleakage. Eighty premolars and molars were randomly placed in eight groups of ten teeth each. Standardized Class V preparations were made on both facial and lingual surfaces of each tooth with an enamel occlusal margin and a dentin gingival margin. Prior to restoration, the preparations were treated with either One Step and Resinomer (Bisco, Schaumburg, IL) or High-Q-Bond (Silmet, Or Yehuda, Israel). The preparations were then restored with either a high-copper single-composition spherical or admixed-amalgam alloy. The lingual preparation on each tooth was not treated with a dentin-bonding system and served as a control. The restored specimens were thermocycled and stored for either 14 or 180 days in modified Fusayama solution - a corrosive medium designed to replicate intraoral amalgam corrosion. At the end of each storage period, specimens were coated with nail polish, wax and submerged in basic fuchsin for 24 hours. Specimens were embedded in acrylic and sectioned three times - mid-preparation, mesial and distal. Extent of microleakage was recorded in millimeters under microscopic evaluation and mean results were compared with a three-way analysis of variance (bonding system, amalgam type, and time) and Wilcoxon paired signed rank test. Overall results indicated that bonded amalgam preparations had less microleakage at 14 days. However, no difference between bonded and unbonded amalgams was observed at 180 days. **The authors conclude that the effect of the adhesive does not appear to be the dominant factor in long-term reduction of microleakage.**



**DIS Comment: Bonded amalgam restorations have been widely reported in the literature, often with equivocal results. In laboratory tests, bonded amalgam restorations have shown conflicting results in regard to reduction of cuspal flexure and strengthening prepared teeth. Long-term clinical studies have demonstrated no benefit of bonded amalgam restorations in regards to marginal integrity, post-operative sensitivity, and overall restoration survival. However, one clinical study has shown that bonding may offer similar retentive benefits with that of intracoronal pins in complex amalgams. Concerning microleakage, laboratory studies have demonstrated possible short-term benefits with bonded amalgams and this study reinforces those reports. This study is unique because the design used a corrosive storage medium that facilitated amalgam corrosion. These conditions may replicate long-term intraoral conditions. Nevertheless, the overall results suggest that amalgam corrosion provides the best long-term marginal seal with bonded amalgams. Therefore the additional cost of the use of an adhesive bonding agent for the reduction of long-term microleakage may not be necessary.**

### References

- Browning WD, Johnson WW, Gregory PN. Clinical performance of bonded amalgam restorations at 42 months. J Am Dent Assoc 2000;131:607-611.
- Diefenderfer KE, Reinhardt JW. Shear bond strengths of 10 adhesive resin/amalgam combinations. Oper Dent 1997;22:50-56.
- El-Badrawy WA. Cuspal deflection of maxillary premolars restored with bonded amalgam. Oper Dent 1999;24:337-343.
- Gorucu J, Ozgunaltay G. Fracture resistance of teeth with Class II bonded amalgam and new tooth-colored restorations. Oper Dent 2003;28:501-507.

- Kennington LB, Davis RD, Murchison DF, Langenderfer WR. Short-term clinical evaluation of post-operative sensitivity with bonded amalgams. *Am J Dent* 1998;11:177-180.
- Korale ME, Meiers JC. Microleakage of dentin bonding systems used with spherical and admixed amalgams. *Am J Dent* 1996;9:249-252
- Lindemuth JS, Hagge MS, Broome JS. Effect of restoration size on fracture resistance of bonded amalgam restorations. *Oper Dent* 2000;25:177-181.
- Mach Z, Regent J, Staninec M, Mrklas L, Setcos JC. The integrity of bonded amalgam restorations: a clinical evaluation after five years. *J Am Dent Assoc* 2002;133:460-467
- Mahler DB. The amalgam-tooth interface. *Oper Dent* 1996;21:230-236.
- Mahler DB, Engle JH. Clinical evaluation of amalgam bonding in Class I and II restorations. *J Am Dent Assoc* 2000;131:43-49.
- Meiers JC, Turner EW. Microleakage of dentin/amalgam alloy bonding agents; results after 1 year. *Oper Dent* 1998;23:30-35.
- de Morais PM, Rodrigues AL, Pimenta LA. Quantitative microleakage evaluation around amalgam restorations with different treatments on cavity walls. *Oper Dent* 1999;24:217-222.
- Neme AM, Evans DB, Maxson BB. Evaluation of dental adhesive systems with amalgam and resin composite restorations: comparison of microleakage and bond strength results. *Oper Dent* 2000;25:512-519.
- NG BP, Hood JA, Purton DG. Effects of sealers and liners on marginal leakage of amalgam and gallium alloy restorations. *Oper Dent* 1998;23:113-120.
- Ozok AR, De Gee AJ, Wu MK, Wesselink PR. The influence of resin composite and bonded amalgam restorations on dentine permeability in Class II cavities in vitro. *Dent Materials* 2001;17:477-484.
- Santos AC, Meiers JC. Fracture resistance of premolars with MOD amalgam restorations lined with Amalgambond. *Operative Dentistry* 1994;19:2-6.
- Setcos JC, Staninec M, Wilson NH. A two-year randomized, controlled clinical evaluation of bonded amalgam restorations. *J Adhes Dent* 1999;1:323-331.
- Smales RJ, Wetheral JD. Review of bonded amalgam restorations, and assessment in a general practice over five years. *Oper Dent* 2000;25:374-381.
- Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. The performance of bonded vs. pin-retained complex amalgam restorations: a five-year clinical evaluation. *J Am Dent Assoc* 2001;132:923-931.