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# Dental Amalgam Update—Part I: Clinical Efficacy

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*Dental amalgam use has been controversial ever since the Crawcour brothers of France introduced amalgam to the United States in 1833. It has been criticized for its alleged clinical shortcomings and biologic effects. As a result, we thought that it would be useful to provide an update on dental amalgam in two parts. Part I, presented here, focuses on the clinical aspects of dental amalgam, whereas Part II will focus on dental amalgam's biologic effects.*

## Bonded Amalgam Sealants and Adhesive Resin Sealants: Five-year Clinical Results

**M. STANINEC, N. ARTIGA, S.A. GANSKY, G.W. MARSHALL, S. EAKLE**

*Quintessence International* 2004 (35:351–7)

### ABSTRACT

**Objective:** The purpose of this study was to compare bonded amalgam pit and fissure sealants on unprepared teeth with conventional resin-based pit and fissure sealants over a 5-year period.

**Materials and Methods:** Two operators sealed 57 pairs of contralateral teeth with either conventional resin sealants or with bonded amalgam (Tytin, Kerr, Orange, CA, USA). Patients ranged in age from 6 to 25 years. Rubber dam isolation was used. For the amalgam sealants, enamel was etched with 32% phosphoric acid semi-gel and primed with All-Bond 2 Primer A & B mixture (BISCO, Inc., Schaumburg, IL, USA). Liner F base and catalyst (BISCO, Inc.) were mixed and applied in a thin layer, and the amalgam was immediately condensed. Patients were scheduled for yearly recalls over the next 5 years, and sealant retention was rated “A” (complete retention), “B” (partial retention, some grooves exposed, and none at risk for caries—slight loss), “C” (partial retention, some grooves exposed at

risk for caries, and repair required), or “D” (total loss). Two trained evaluators worked together for the recall evaluations.

**Results:** Fifteen (58%) patients with 95 teeth (83%) were available for 5-year follow-up. Twelve (26%) amalgam sealants were rated A (no loss) versus 15 (30%) of resin sealants. Those rated B (slight loss) were 16 (34%) amalgam sealants versus 16 (32%) resin sealants. A C rating (repair required) was given to 19 (40%) amalgam sealants and 19 (38%) resin sealants. There were no D (total loss) ratings for either amalgam or resin sealants.

**Conclusions:** Amalgam pit and fissure sealants were retained as well as resin-based pit and fissure sealants after a period of 5 years.

### COMMENTARY

One of the criticisms of amalgam has been that it is not or cannot be bonded to enamel or dentin, but this

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study shows that amalgam can be bonded and retained even to unprepared enamel for at least a 5-year period. Other studies have confirmed that amalgam can be bonded to dentin. It therefore can be concluded that tooth preparation for bonded amalgam restorations can usually be performed exactly the same as for composite restorations. Extension for prevention and sharp line and point angles are no longer necessary for amalgam restorations, provided that they are bonded. Instead, rounded line angles, slot preparations, and minimally invasive preparation should be preferred for both bonded amalgam and resin-based composite restorations.

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## Cross-sectional Radiographic Survey of Amalgam and Resin-based Composite Posterior Restorations

**L. LEVIN, M. COVAL, S.B. GEIGER**

*Quintessence International* 2007 (38:511–4)

## ABSTRACT

**Objective:** The purpose of this study was to compare the failure rate of posterior resin-based composite proximal restorations with amalgam restorations in a young adult population.

**Materials and Methods:** One dentist evaluated bilateral bitewing radiographs in a population of 459 young adults aged 18 or 19 years and entering military service. A total of 918 bitewing radiographs and 14,140 proximal surfaces were examined. Of these, there were 650 (5%) restored interproximal surfaces.

**Results:** For amalgam restorations, 46 (8%) proximal surfaces had secondary caries, and 21 (4%) had overhanging margins. For the resin-based composites, secondary caries was observed in 40 (43%) proximal

surfaces and overhanging margins observed in 1 (1%).

**Conclusions:** Resin-based composite restorations had a significantly higher rate of secondary caries and a lower rate of overhanging margins than amalgam restorations. Overhangs were not a significant factor in restoration failure. The overall failure rate of the amalgam restorations was 12% versus 44% for the composites.

## COMMENTARY

Although there have been great improvements in resin-based composites in the last few decades, most longevity studies have shown that amalgam restorations still last longer than resin-based composite restorations. Secondary caries is the most common reason for any kind of restoration failure, but lower rates of secondary caries are associated with amalgam restorations than with resin-based composite restorations.

restorations recommended for replacement of a previously restored surface at the initial or any subsequent periodic examination. Restoration replacement was recommended due to secondary caries, defective restoration, or endodontic therapy.

**Results:** At initial examination, 964 (15.2%) of 6,341 amalgam restorations and 199 (17.4%) of 1,140 resin-based composite restorations needed replacement. Among initially clinically acceptable restorations, 14.2% of amalgam restorations and 16.7% of resin-based composite restorations required replacement during the follow-up years. Overall, replacement restorations were required for a total of 31.2% of 1,140 resin-based composite restorations and 27.3% of 6,341 amalgam restorations.

**Conclusions:** Among military recruits, amalgam restorations were five times more prevalent than resin-based composite restorations. Resin-based composite restorations needed replacement more frequently than amalgam restorations.

## COMMENTARY

Although resin-based composite use has been increasing relative to dental amalgam, dental amalgam restorations were still far more prevalent than resin-based composite in this young population.

Dentists in the United States still place more amalgam than composite for first-time posterior restorations. One reason is that the replacement rate of amalgam restorations is significantly lower than that of posterior resin-based composite restorations.

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## THE BOTTOM LINE

- Dental amalgam can be bonded to enamel and dentin successfully.
- Limited studies suggest that preparations for dental amalgam restorations can be similar to those for resin composite restorations in some cases, depending on the clinical conditions encountered.
- Dental amalgam restorations are associated with lower rates of secondary caries than resin composite restorations.
- Amalgam restorations are not associated with a high incidence of complete cusp fractures. The incidence of complete cusp fractures is the same with dental amalgam restorations as it is with resin composite restorations.
- The replacement rate of dental amalgam restorations is more favorable than the replacement rate of posterior resin composite restorations.