**Fifteen-year clinical performance of a resin-bonded fixed partial denture seated with a thione primer and a tri-n-butylborane-initiated luting agent**

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**Abstract:** This article reports the clinical performance of a resin-bonded fixed partial denture (FPD) made of type IV gold alloy. The retainers were air-abraded with alumina particles and primed with a single-liquid thione priming agent (Metaltite). The FPD was then seated with a tri-n-butylborane-initiated adhesive resin (Super-Bond). After 15 years, the FPD is still functioning satisfactorily. The present materials and techniques are applicable to minimally invasive fixed prosthodontic treatments.

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**Introduction**

Replacement of missing anterior and posterior teeth is a critical issue in restoring the anatomic structure of dentition and oral function. Gold alloys are extensively used in fabricating fixed partial dentures (FPDs) because of their adaptability to abutments, stability in oral environments, favorable hardening characteristics, and ideal laboratory handling properties. Fortunately, several single-liquid primers capable of bonding noble metals have been developed during the last two decades, and laboratory evaluations have demonstrated the effectiveness of single-liquid primers with organic sulfur compounds (1-5).

Although a number of prosthodontic applications have been reported for metal adhesive systems (6-9), little information is available on the combined application of a specific primer and self-polymerizing adhesive resin (7). This case report describes the long-term clinical performance of a resin-bonded FPD made of a gold alloy.

**Case Report**

A 52-year-old male patient presented with masticatory disturbance due to a missing right maxillary first premolar, which had been extracted because of root fracture. Examination revealed unilateral balanced occlusion. After being presented with the relevant treatment options, the patient selected the seating of a resin-bonded FPD. The clinical procedure was explained in detail, and consent was obtained from the patient (Fig. 1).

Fabrication of a three-unit FPD was planned. Reduction of premolar cusps was considered unnecessary. Pits and fissures, proximal surfaces, and lingual surfaces within the enamel of the abutment teeth were reduced using a high-speed diamond rotary instrument with water coolant. Three proximal retention grooves, in which dentin was slightly exposed, were prepared for the canine abutment (Fig. 2). An FPD consisting of two retainers and a pontic was cast from a type IV gold alloy (Casting Gold Type IV, GC Corp, Tokyo, Japan). The buccal surface of the pontic was veneered with an indirect composite material (Estenia, Kuraray Co, Ltd, Osaka, Japan) (Fig. 3).

The completed FPD was tried in at the next appointment. The surfaces to be bonded were abraded with...
50-µm alumina particles, using an airborne particle abrader. A single liquid primer (Metaltite, Tokuyama Dental Corp, Tokyo, Japan), which contained 6-methacryloyloxyhexyl 2-thiouracil-5-carboxylate (MTU-6) in ethanol, was applied to the blasted surfaces. The enamel surfaces of the abutment were etched with 40% phosphoric acid gel (K-Etchant, Kuraray Co, Ltd), rinsed with water, and air-dried, after which the FPD was seated with a tri-n-butylborane-initiated adhesive resin (Super-Bond Opaque Ivory, Sun Medical Co, Ltd, Moriyama, Japan) (Figs. 4-8). The patient then entered a maintenance program of regular check-ups twice per year. After an observation period of 15 years, change in anatomic form due to attrition was observed at the occlusal surfaces;
however, the FPD continues to function satisfactorily (Figs. 9-10).

**Discussion**
Several laboratory studies have shown that application of thione primers enhanced bonding between noble metal alloys and Super-Bond resin (1-5). For the current case, Metaltite was selected as a primer for retainers made of type IV gold alloy because it creates a highly durable bond with such alloys (1) and because the ethanol solvent in Metaltite is acceptable to patients and clinicians. A 40% phosphoric acid gel was used as an enamel etchant because unpublished experimental results showed that 40% phosphoric acid was superior to 65% phosphoric acid as an etchant for the enamel surface of FPD abutments.

Luting agent selection is also an important issue in the long-term success of prosthodontic treatment. Super-Bond Opaque resin was used as a luting agent in the present patient because it durably bonds to retainers made of silver-palladium-copper-gold alloy (8,9) and because it hides the metallic color of cast retainers less than 50 μm in thickness. The authors believe that the present 15-year follow up of gold alloy retainers seated with the Metaltite-Super-Bond system is the longest reported observation period. The clinical and laboratory evaluation of this bonding system is ongoing.

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**References**
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