

## Resin-bonded casting used as an anterior fixed partial denture retainer: A clinical report

Hideo Matsumura, DDS, PhD,<sup>a</sup> Hiroyasu Koizumi, DDS, PhD,<sup>a</sup> and Naomi Tanoue, DDS, PhD<sup>b</sup>

<sup>a</sup>Department of Crown and Bridge Prosthodontics, Nihon University School of Dentistry, Tokyo, and <sup>b</sup>Department of Specialized Dentistry, Nagasaki University Hospital of Medicine and Dentistry, Nagasaki, Japan

This report describes the technique and clinical outcome of an anterior fixed partial denture (FPD) bonded with two different luting agents. The FPD was fabricated to replace a missing maxillary lateral incisor. The FPD was cast from silver-palladium-copper-gold alloy (Castwell), and the canine retainer and pontic were veneered with indirect composites (Cesead opaque and Dentaclor). The incisor retainer was primed with a metal conditioner (V-Primer), and seated with tri-*n*-butylborane initiated adhesive resin (Super-Bond), whereas the canine retainer was cemented with a glass-ionomer luting agent (Fuji Ionomer). After an observation period of 10 years, the FPD was functioning satisfactorily. The adhesive materials and technique reported here are applicable to vital abutment teeth with sufficient enamel bonding area.

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**Key Words:** adhesive, fixed partial denture, noble metal, primer, retainer.

### Introduction

Resin-bonded fixed partial dentures (FPDs) are applied to abutment teeth with sufficient enamel structure. Clinicians frequently encounter FPD cases with both vital and non-vital abutments. For patients, it is preferable to keep the reduction of sound tooth structure to a minimum during preparation of vital abutment teeth. Considerable tooth reduction, however, is required in fabrication of conventional three-quarter, porcelain-fused-to-metal (PFM), and composite veneered cast retainers. Since the development of a noble metal adhesive system, the use of various types of resin-bonded retainers and restorations has been reported.<sup>1-6</sup>

Although the design of retainers varies with many factors, limited information is available about the luting materials, technical procedure, and clinical outcome of such FPDs. This report describes the technique and clinical performance of a FPD seated with different luting agents. Also, differences among conventional restorations and a resin-bonded retainer are discussed.

### Clinical Report

A 48-year-old female patient presented with the complaint of masticatory and esthetic disturbances as a result of missing maxillary right lateral incisor. On examination, endodontic treatment for the maxillary right canine had been completed. The central incisor adjacent to the missing tooth was hardly decayed. Several treatment options were proposed: 1) a conventional FPD with tooth-colored facing; 2) a resin-bonded FPD with minimal tooth reduction of the central incisor; 3) a removable partial denture including the posterior missing teeth; and 4) a single-tooth implant. The patient chose the second of the proposed procedures. The treatment was then explained in detail and consent was obtained from the patient.

A dowel core made from a silver-palladium-copper-gold alloy (Castwell M.C. 12, GC Corp., Tokyo, Japan; Fig. 1) was seated on the canine with a glass-ionomer luting agent (Fuji Ionomer, GC Corp.). After examination of occlusion, the area and thickness of tooth reduction were determined. The canine with dowel core was prepared to form a facing crown abutment. Reduction of the central incisor was limited to lingual enamel, with a thickness less than 1 mm. An additional retentive hole approximately 1 mm in depth was prepared at the cingulum for stabilizing the retainer as well as for mechanical retention (Figs. 2-3).

A combined impression of the maxilla was made with addition silicone elastomeric materials (Exafine Putty and Injection, GC Corp.) using a stock tray. A stone cast was prepared and mounted on a semi-adjustable articulator with an opposing cast. The wax pattern of the FPD was fabricated, invested with a cristobalite material, and a metal framework consists of two retainers and a pontic was then cast from a silver-palladium-copper-gold alloy (Castwell M.C. 12). The canine metal substructure was formed for a composite veneered restoration, and the pontic was of a ridge-lap type. The facial surfaces of the canine retainer and pontic were veneered with a dual-polymerized opaque resin (Cesead, Kuraray Co. Ltd., Osaka, Japan) and an indirect tooth-colored composite material (Dentacolor, Wehrheim, Germany; Fig. 4).

The completed FPD was tried-in, and the inner surface of the canine retainer and the intraoral canine abutment surface were wiped with an alcohol swab. The inner surface of the incisor retainer (Fig. 5) was air-abraded with alumina (Hi-Aluminas, Shofu Inc., Kyoto, Japan) using an air-borne particle abrader (Micro Blaster MB102, Comco Inc., Burbank, CA, USA), and conditioned with a single liquid primer (V-Primer, Sun Medical Co., Ltd., Moriyama, Japan). The incisor enamel surface was etched with 40% phosphoric acid (K-etchant, Kuraray Co. Ltd.), washed with water, and air-dried. The FPD was then cemented with two different luting agents. The canine retainer was seated with glass-ionomer luting agent (Fuji Ionomer), whereas the incisor retainer was bonded with tri-*n*-butylborane (TBB) initiated adhesive resin (Super-Bond C&B Opaque, Sun Medical Co., Ltd.) using a brush-dip technique (Fig. 6).

The patient entered a maintenance program and the FPD was examined regularly. After an observation period of 10 years, gingival recession was detected around the canine retainer. The FPD was functioning satisfactorily without retainer detachment and recurrence of dental caries (Figs. 7-8).

## Discussion

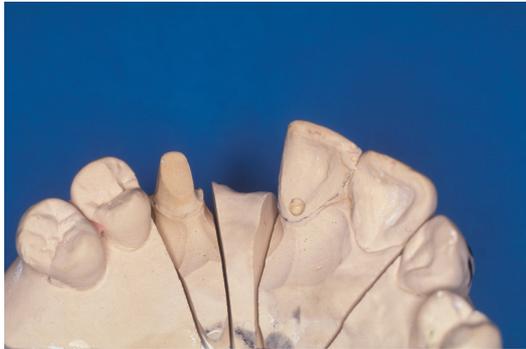
Table 1 compares the retainers applicable to vital incisors and canines. The current FPD used a resin-bonded cast retainer to minimize reduction of the vital abutment. In preparation of the central incisor, local anesthesia was not necessary. If the patient prefers a facing restoration or a three-quarter restoration as retainer, tooth reduction must be extended to dentin. In addition, a three-quarter restoration is apparently inferior in appearance to other restorations (Figs. 9-10).



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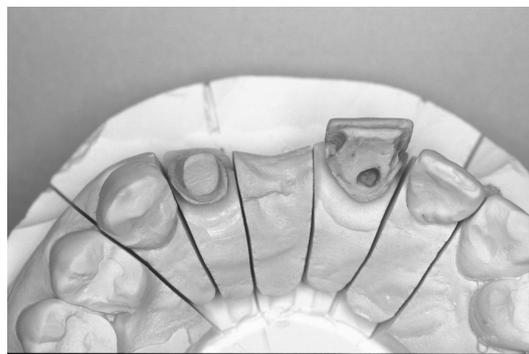
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**Fig. 1.** A canine dowel core to be seated with a glass ionomer luting agent.  
**Fig. 2.** Abutment preparation.  
**Fig. 3.** A definitive cast. Retentive hole was prepared in the singulum of the central incisor.  
**Fig. 4.** Lingual view of the FPD.  
**Fig. 5.** After try-in, the surface to be bonded was air-abraded with alumina and conditioned with the V-Primer agent.  
**Fig. 6.** Facial view. The incisor retainer was bonded with the Super-Bond C&B Opaque resin.  
**Fig. 7.** Facial view of the FPD 10 years after seating.  
**Fig. 8.** Lingual view of the FPD 10 years after seating.

Surface preparation for resin-bonded retainers is somewhat complicated. Enamel etching and air-abrasion with alumina are performed to clean the surfaces to be bonded, and to increase the surface bonding area. Chemical bonding to enamel is facilitated by using Super-Bond resin, which contains a carboxylic adhesive functional monomer (4-META). Bonding to the silver-palladium-copper-gold alloy is performed by applying V-Primer agent that contains a thione adhesive functional monomer (VTD).<sup>7-18</sup> The use of an appropriate resin-based luting agent is indispensable for bonding a non-retentive cast retainer to an abutment surface. Although two different luting agents were used for seating the FPD in the present case, the use of Super-Bond resin alone may also be acceptable.



**Fig. 9.** Reduction of central incisor for a three-quarter restoration retainer.

**Fig. 10.** Unesthetic lingual view of a three-quarter restoration seated on the central incisor.

**Table 1.** Comparison of retainers applicable to vital incisors and canines.

	PFM restoration	Three-quarter restoration	Resin-bonded retainer
Tooth reduction	Considerable	Moderate	Minimal
Local anesthesia	Necessary	Necessary	Not necessary
Provisional restoration	Necessary	Necessary	Not necessary
Surface preparation			
Tooth	Not necessary	Not necessary	Enamel etching with H <sub>3</sub> PO <sub>4</sub>
Casting	As cast	As cast	Alumina-abrasion + Primer
Luting agent	Conventional	Conventional	Resin-based
Cementing technique	Easy	Easy	Complicated
Appearance	Excellent	Not esthetic	Moderate

Regular check-ups are necessary for patients wearing resin-bonded FPD because majority of the missing teeth were extracted by dental caries, marginal periodontitis, and traumatic injury. Considering the clinical outcome of the FPD in this report, resin-bonded casting may be considered as one of the options for an anterior FPD retainer.

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**Reprint request to:**

Dr. Hideo Matsumura  
Department of Crown and Bridge Prosthodontics, Nihon University School of Dentistry  
1-8-13, Kanda-Surugadai, Chiyoda-ku, Tokyo 101-8310, Japan  
Fax: +81-3-3219-8351 E-mail: matsumura@dent.nihon-u.ac.jp

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