

## The use of a resin-bonded overcasting restoration adjacent to an existing metal ceramic fixed partial denture in maxillary anterior teeth: A clinical report

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A resin-bonded silver-palladium-copper-gold alloy overcasting restoration was incorporated with an existing maxillary anterior adjacent metal ceramic gold alloy fixed partial denture using a metal conditioner (Alloy Primer) and an adhesive resin (Super-Bond C&B Ivory). The resin-bonded overcasting restoration had been functioning satisfactorily for more than 5.5 years for the 49-year-old female patient. However, one of the retainers, which was bonded to the palatal surface of the metal ceramic restoration of the adjacent fixed partial denture, lost retention after six years. The resin-bonded overcasting restoration and the adjacent denture were completely removed and then replaced by a new large fixed partial denture with conventional metal ceramic restorations. This case report including a six-year clinical follow-up indicated that mobile abutments and a maxillary anterior location may be negative factors for resin-bonded prostheses.

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**Key Words:** adhesive resin, metal ceramic fixed partial denture, conditioner, overcasting, silver-palladium alloy.

### Introduction

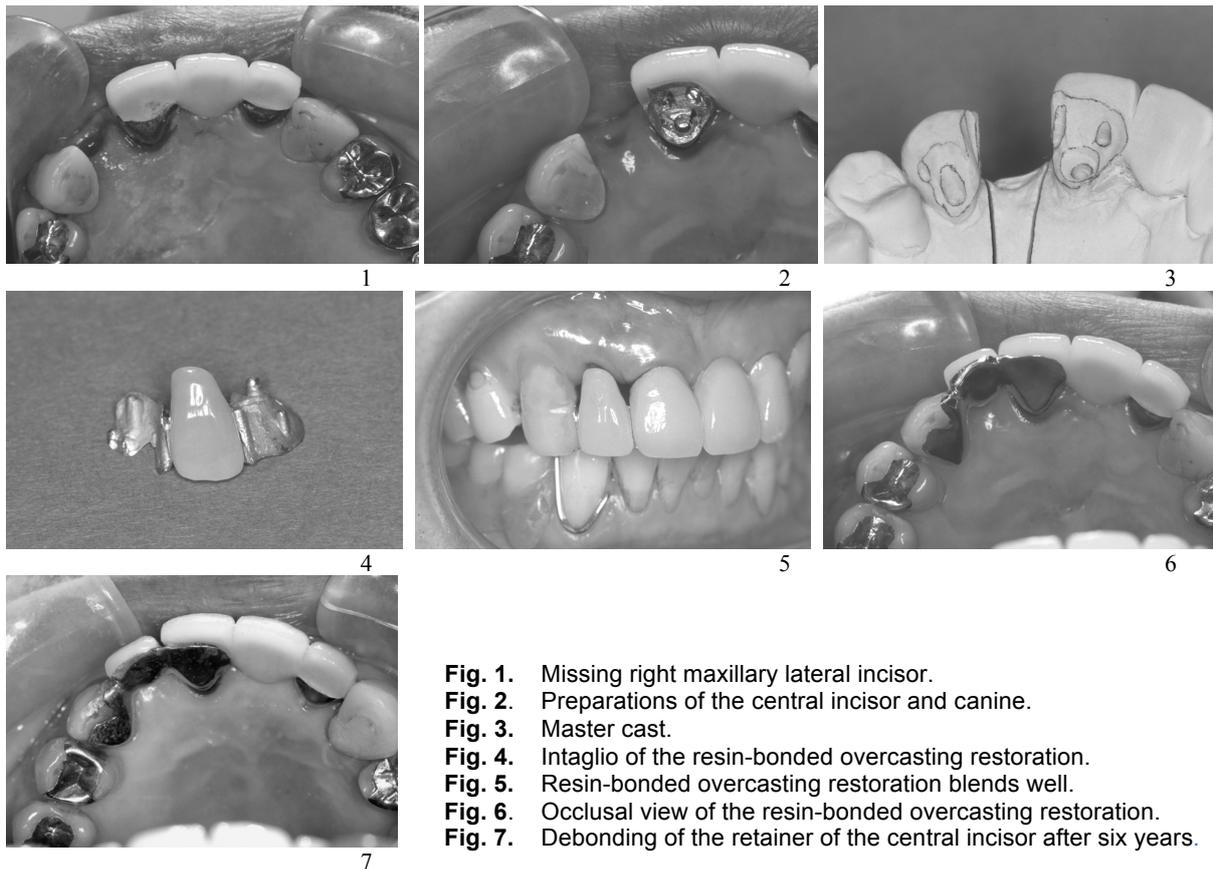
When the tooth next to an existing prosthesis is lost, the prosthesis must be removed and a new larger one that includes the missing tooth must be fabricated. Although this conventional modality is reliable, it requires a long treatment period, and the cost is high. Therefore, patients do not always wish to choose such a treatment option. The overcasting technique<sup>1-5</sup> is one of the treatment modalities offering a solution in these particular situations.

The use of resin-bonded prostheses has recently become a well-accepted clinical technique. Dental bonding techniques have long been restricted to the tooth hard tissue (enamel and dentin) but the development of metal conditioners and clinical techniques expanded their applications. A time-saving procedure, enabling a fixed splint to be made without removing the adjacent full cast crowns with the particular abutment preparation of the metal surfaces, was reported.<sup>6</sup> The present clinical report describes the fabrication and 6-year clinical follow-up of a resin-bonded overcasting restoration incorporated with an existing adjacent metal ceramic fixed partial denture using a metal conditioner and an adhesive resin.

### Clinical Report

A 49-year-old woman was seen with the chief complaint of poor esthetics resulting from a missing right maxillary lateral incisor (Fig. 1). The right maxillary canine was vital and almost intact except for a labial composite restoration. The right maxillary central incisor was endodontically treated and served as one of the abutment teeth of the existing adjacent metal ceramic fixed partial denture (FPD). Examination revealed a slight mobility of the two abutments of the FPD, whereas the bone support around the canine was clinically sufficient to receive the applied occlusal force. The patient did not want a single-tooth implant with a single-tooth removable partial denture, and preferred the fixed prosthetic treatment. In addition, she strongly hoped that it would not be necessary to remove the existing FPD, mainly due to the discomfort of removal as well as for economic reasons. Therefore, the addition of a resin-bonded overcasting restoration to replace the missing tooth with minimal tooth reduction of the right maxillary canine and particular abutment preparation to the palatal

metal surface of the right maxillary central incisor were proposed, and she chose this treatment option.



**Fig. 1.** Missing right maxillary lateral incisor.  
**Fig. 2.** Preparations of the central incisor and canine.  
**Fig. 3.** Master cast.  
**Fig. 4.** Intaglio of the resin-bonded overcasting restoration.  
**Fig. 5.** Resin-bonded overcasting restoration blends well.  
**Fig. 6.** Occlusal view of the resin-bonded overcasting restoration.  
**Fig. 7.** Debonding of the retainer of the central incisor after six years.

Partial reduction was limited to the palatal and proximal surfaces. Vertical grooves at the proximal surfaces and a pinhole in one of the palatal rest seats were sunk for mechanical retention (Fig. 2). An impression was made with a combined agar/alginate hydrocolloid impression material, and a working cast was prepared (Fig. 3). A wax pattern was fabricated, sprued, and invested into a cristobalite mold material. A silver-palladium-copper-gold alloy (Castwell M.C. 12, G-C Corp., Tokyo, Japan) was cast in the mold by means of a centrifugal casting machine. The overcasting restoration was fabricated using an indirect composite material (Solidex, Shofu Inc., Kyoto, Japan) (Fig. 4). It was tried-in, adjusted and polished, and the surface to be bonded was air-abraded with 50  $\mu\text{m}$  grain-sized aluminum oxide (Aluminous Powder WA 360, Pana Heraeus Dental Inc., Osaka, Japan) using a grit blaster (Micro Blaster MB102, Comco Inc., Burbank, CA, USA). Just before insertion, a thione-phosphate metal conditioner (Alloy Primer, Kuraray Medical Inc., Tokyo, Japan) was applied to the inner surfaces of the retainers with a sponge pellet. The canine was cleaned and etched with 37% phosphoric acid, whereas the prepared metal surface of the metal ceramic restoration of the central incisor was air-abraded with 50  $\mu\text{m}$  aluminum oxide using a portable air-abrader (Microetchblow, Morimura Dental Co., Tokyo, Japan), and the same metal conditioner was applied. The overcasting restoration was then seated with an adhesive luting agent (Super-Bond C&B Ivory, Sun Medical Co., Ltd., Moriyama, Japan) (Figs. 5 and 6). Then the patient began a regular program of check-ups every 6 months.

The resin-bonded overcasting restoration functioned satisfactorily for more than 5.5 years, including the retainer on the canine, and the patient was satisfied with the service period of the overcasting restoration. However, six years after seating, loss of retention of the retainer of the central incisor was detected (Fig. 7)

although the patient did not realize it or feel anything wrong at all. The patient chose the treatment option of having the resin-bonded overcasting restoration and the adjacent FPD completely removed, and a new large FPD with conventional full-coverage metal ceramic restorations substituted.

## Discussion

The use of a resin-bonded overcasting restoration incorporated with an existing adjacent metal ceramic FPD was presented in this case report. The overcasting technique was originally a technique designed to avoid removal of restorations, such as fractured metal ceramic fixed partial dentures<sup>1,2,4</sup> or adjacent FPDs.<sup>3</sup> The technique remarkably developed through the use of an adhesive resin cement with metal conditioners.<sup>2,5,6</sup> An overcasting restoration may provide faster treatment, fewer appointments, less discomfort, simpler laboratory procedures, and lower cost compared to replacement of the restoration.

In the present situation, the existing adjacent FPD had been made of metal ceramic gold alloy (Degudent-Universal, Mitsubishi Metal Corp., Tokyo, Japan), according to the patient's clinical records in our hospital; the overcasting restoration was made of a silver-palladium-copper-gold alloy. The combined use of a thione-phosphate metal conditioner and an adhesive luting agent is effective at bonding silver-palladium-copper-gold alloy<sup>7,8</sup> as well as metal ceramic gold alloy.<sup>7</sup> Therefore, the bond durability of the adhesive luting agent joined to both the inner surface of the overcasting restoration and the prepared surface of the metal ceramic FPD should be enhanced. Six years after seating, however, debonding of the retainer of the central incisor was observed, whereas the retainer of the canine was fine. This failure can be attributed mainly to a slight mobility of the abutments of the existing denture and the maxillary anterior location. It is well known that the mobility of the abutment teeth is one of the decisive prognostic factors for the success of resin-bonded FPDs, as are the casting alloy, the pretreatment of the bonding surfaces, and the luting agent.<sup>9</sup> Longitudinal follow-up studies of resin-bonded FPDs and the survival rates have been reported,<sup>9-13</sup> and the conclusions with regard to location factors are sometimes conflicting. The present situation indicates that there is a possibility that the maxillary anterior location is one of the negative factors for resin-bonded prostheses because this location involves anterior-guided occlusion. The reduction of the palatal surface of the central incisor was restricted to the non-occlusal surface area in order to completely integrate the overcasting restoration without altering the original anterior guidance. Thus, only the occlusal surface areas of the original palatal surface of the existing partial denture had guided the protrusive movement of the mandible for more than 5.5 years. The repetitive functional force from the antagonistic mandibular teeth is likely to peel the retainers gradually from the abutments. In addition, the lower emission pressure of a portable air-abrader compared to a laboratory grit blaster also may affect the bond durability between the two alloys,<sup>14</sup> but further work is required to clarify this hypothesis.

The vinyl-thiol metal conditioner (V-Primer, Sun Medical Co., Ltd.)<sup>15</sup> and thiouracil metal conditioner (Metaltite, Tokuyama Dental Corp., Tokyo, Japan)<sup>7</sup> as well as the thione-phosphate metal conditioner (Alloy Primer, for both of noble and base metal alloys), used in the present situation, can also be used with a silver-palladium-copper-gold alloy and metal ceramic gold alloy.

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## References

1. Wood M, Litkowski LJ, Thompson VP, Church T. Repair of porcelain/metal restoration with resin bonded overcasting. *J Esthet Dent* 1992; 4: 110-3.

2. Matsumura H, Atsuta M. Repair of an eight-unit fixed partial denture with a resin-bonded overcasting: a clinical report. *J Prosthet Dent* 1996; 75: 594-6.
3. Szikman M, Silverstein LH, Kurtzman D. Salvaging of adjacent fixed partial dentures using an overcasting technique. *Dent Today* 1997; 16: 80, 82-3.
4. Mancuso A. Salvaging a porcelain/metal bridge with a bonded porcelain-fused-to-metal overcasting. *Gen Dent* 2003; 51: 456-7.
5. Tanoue N, Ogata T, Koizumi H, Matsumura H. Repair of an anterior fixed partial denture with a resin-bonded overcasting and a dual functional metal priming agent: a clinical report. *Int Chin J Dent* 2006; 6: 17-20.
6. Shimizu H, Takahashi Y. Fixed splinting device to be used without removing adjacent existing cast restorations. *J Prosthet Dent* 1999; 82: 231-2.
7. Matsumura H, Kamada K, Tanoue N, Atsuta M. Effect of thione primers on bonding of noble metal alloys with an adhesive resin. *J Dent* 2000; 28: 287-93.
8. Yoshida K, Kamada K, Sawase T, Atsuta M. Effect of three adhesive primers for a noble metal on the shear bond strengths of three resin cements. *J Oral Rehabil* 2001; 28: 14-9.
9. Probster B, Henrich GM. 11-year follow-up study of resin-bonded fixed partial dentures. *Int J Prosthodont* 1997; 10: 259-68.
10. Behr M, Leibrock A, Stich W, Rammelsberg P, Rosentritt M, Handel G. Adhesive-fixed partial dentures in anterior and posterior areas. Results of an on-going prospective study begun in 1985. *Clin Oral Investing* 1998; 2: 31-5.
11. Creugers NH, De Kanter RJ, Verzijden CW, Van't Hof MA. Risk factors and multiple failures in posterior resin-bonded bridges in a 5-year multi-practice clinical trial. *J Dent* 1998; 26: 397-402.
12. Zalkind M, Ever-Hadani P, Hochman N. Resin-bonded fixed partial denture retention: a retrospective 13-year follow-up. *J Oral Rehabil* 2003; 30: 971-7.
13. Ketabi AR, Kaus T, Herdach F, Groten M, Axmann-Krcmar D, Probster L, Weber H. Thirteen-year follow-up study of resin-bonded fixed partial dentures. *Quintessence Int* 2004; 35: 407-10.
14. Kajihara H, Suzuki S, Minesaki Y, Kurashige H, Tanaka T. The effects of air-abrasion on dentin, enamel, and metal bonding. *Am J Dent* 2004; 17: 161-4.
15. Matsumura H, Taira Y, Atsuta M. Adhesive bonding of noble metal alloys with a triazine dithiol derivative primer and an adhesive resin. *J Oral Rehabil* 1999; 26: 877-82.

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