

A resin-bonded connector with a cast bolt incorporated with an existing adjacent pontic: a case report

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This clinical report describes the procedure to fabricate a continuous anterior-posterior fixed partial denture incorporated with an existing adjacent pontic on a cantilever fixed partial denture using a resin-bonded connector. The partial denture was made of silver-palladium-copper-gold alloy. The cast bolt was made of the same alloy and inserted to gain additional mechanical retention. Consequently, a continuous five-unit fixed partial denture was created. The continuous five-unit fixed partial denture has functioned sufficiently for more than seven years. (Asian Pac J Dent 2013; 13: 1-4.)

Key Words: cast bolt, connector, continuous fixed partial denture, silver-palladium-copper-gold alloy

Introduction

When it is determined that one of the abutment teeth of a long-spanned fixed prosthesis cannot be conserved, dental practitioners must dislodge the entire prosthesis, extract the tooth and then fabricate a new larger prosthesis. However, this process requires a long treatment period, many appointments, and the cost is generally high. If only the abutment tooth is removed with one restoration and the remaining portion of an existing fixed prosthesis can be used as a part of the new prosthesis, the above problems of conventional large-scale treatment can be eliminated. The present clinical report describes the procedure to fabricate a continuous fixed partial denture incorporated with the remaining portion of cantilever fixed partial denture using a resin-bonded connector with a custom-made cast bolt. A combination of a silver-palladium-copper-gold alloy, a thione-phosphate metal conditioner, and 4-META/MMA-TBB resin were used.¹

Case Report

A 60-year-old man was seen with the chief complaint of occlusal pain and pus coming out of the left maxillary second premolar, which served as one of the abutment teeth of a posterior fixed partial denture and replaced the missing first molar. Examination revealed that the root of the second premolar had fractured, and conservative treatment appeared to be impossible. He agreed to the tooth extraction but did not want an implant, which would involve surgical treatment along with a removable partial denture; he preferred the fixed prosthetic treatment. However, he was not happy about the long treatment period. Therefore, the addition of a resin-bonded connector to the two existing fixed partial dentures with minimal vital tooth reduction was proposed, and he chose this treatment option. The posterior fixed partial denture was cut at the juncture between the second premolar and the pontic of the first molar, and then the second premolar was extracted. The remaining posterior cantilever fixed partial denture was left as it was.

After allowing the wound to heal for two months, the treatment was restarted. The first premolar was vital and was one of the abutment teeth of the existing anterior fixed partial denture replacing the missing canine. The preparation along the palatal and buccal surfaces of the first premolar up to the central buccal and palatal

grooves, respectively, was made with an occlusal strut approach involving minimal preparation.² For the pontic of the remaining posterior cantilever fixed partial denture, reduction of the palatal and buccal surfaces up to the central buccal and palatal grooves was made with an occlusal strut approach and retentive hole (Fig. 1).



1



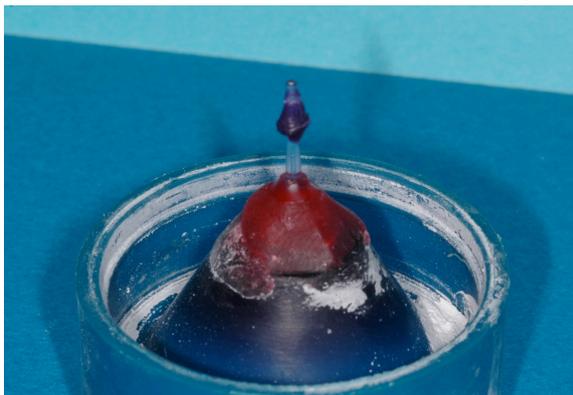
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Fig. 1. Missing left maxillary second premolar and preparation of the first premolar and the existing adjacent pontic of cantilever posterior fixed partial denture

Fig. 2. Definitive cast showing the preparations

Fig. 3. Resin-bonded connector on the definitive cast

Fig. 4. Seated resin-bonded connector

Fig. 5. Pattern for a cast bolt using burnable plastic rod and inlay wax

Fig. 6. Cast bolt tried-in

Fig. 7. Completed fixed partial denture incorporated with the existing denture blends well

A master impression was made using a reversible hydrocolloid (Aromaloid, GC Corp., Tokyo, Japan), and a definitive cast was formed using high-strength stone (Fujirock, GC Corp.) (Fig. 2). 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.) was cast in the mold by means of a centrifugal casting machine. A resin-bonded connector was fabricated with an indirect composite material (Solidex, Shofu Inc., Kyoto, Japan) (Fig. 3).

It was tried-in, adjusted and polished, and the intaglio surface to be bonded was air-abraded with 50 µm grain-sized aluminum oxide (Aluminous Powder WA 360, Pana Heraeus Dental Inc., Osaka, Japan) using a grit blaster (DUOSTAR Z2, BEGO, Bremen, Germany). Just before insertion, a thione-phosphate metal conditioner (Alloy Primer, Kuraray Medical Inc., Tokyo, Japan) was applied to the intaglio surfaces of the retainers. The first premolar was cleaned and etched with 65% phosphoric acid, whereas the prepared metal surface of the pontic was air-abraded with 50 µm aluminum oxide using a portable air-abrader (Microetchblow, Morimura Dental Co., Tokyo, Japan), and the same metal conditioner was applied. The resin-bonded connector was then seated with an adhesive luting agent (Super-Bond C&B Ivory, Sun Medical Co., Ltd., Moriyama, Japan) (Fig. 4). The next day, a horizontal hole was palatobuccally prepared on the palatal surface of the connector of the first molar, and the pattern for a cast bolt was made directly using a combination of a burnable plastic rod and inlay wax (Inlay wax medium, GC Corp.). The pattern was sprued (Fig. 5), invested and cast using the same alloy. The bolt was tried-in, air abraded, treated with the same metal conditioner, and cemented with a dual cure-type self-adhesive cement (Clearfil SA luting, Kuraray Medical Inc.) (Fig. 6) using a portable light-curing unit (G-Light Prima, GC Corp.). The surface of the bolt was smoothed and polished (Fig. 7). The patient then followed a regular check-up program every 6 months. The continuous five-unit fixed partial denture has functioned sufficiently for more than seven years, and the patient has been satisfied with the results.

Discussion

The advantages of the present procedure are 1) relief of the patient's discomfort due to the removal of the existing fixed prosthesis, 2) time savings, 3) simplified laboratory work, and 4) reduction in the amount and cost of materials required. The design of the resin-bonded connector described in the present report is similar to that of a posterior resin-bonded fixed partial denture, which is composed of a groove, plate, and strut and involves minimal preparation to receive the retainer.² A long-term follow-up study indicated that the mobility of the abutment teeth was one of the decisive negative prognostic factors for successful resin-bonded prostheses.³ In the present situation, the pontic of the remaining posterior cantilever fixed partial denture was equivalent to a mobile tooth. Therefore, additional retentive preparation forms are definitely required. The cast bolt should be fabricated and inserted with a dual-cure type self-adhesive cement⁴ because of its rapid hardening, and the cement must be sufficiently set just before grinding and polishing the bolt.

V Primer,^{1,5-7} and Metaltite,⁷ which are the thione metal conditioners used for noble metal alloys as well as Alloy primer¹ applied in the present case and other situations,^{8,9} can also be used with a combination of a silver-palladium-copper-gold alloy and 4-META/MMA-TBB resin.

References

1. Koizumi H, Ishii T, Naito K, Yoneyama T, Tanoue N, Matsumura H. Effects of triazine dithione and hydrophobic phosphate monomers on bonding to Ag-Pd-Cu-Au alloy and titanium with a methacrylic resin-based luting agent. *J Adhes Dent* 2010; 12: 215-22.
2. Chow TW, Chung RW, Chu FC, Newsome PR. Tooth preparations designed for posterior resin-bonded fixed partial dentures: a clinical report. *J Prosthet Dent* 2002; 88: 561-4.
3. Pröbster B, Henrich GM. 11-year follow-up study of resin-bonded fixed partial dentures. *Int J Prosthodont* 1997; 10: 259-68.
4. Muraguchi K, Minami H, Minesaki Y, Suzuki S, Tanaka T. A study of self-adhesive resin cements for bonding to silver-palladium-copper-gold alloy -- effect of including primer components in cement base. *Dent Mater J* 2011; 30: 199-205.
5. Matsumura H, Tanaka T, Atsuta M. Bonding of silver-palladium-copper-gold alloy with thiol derivative primers and tri-n-butylborane initiated luting agents. *J Oral Rehabil* 1997; 24: 291-6.
6. 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.
7. Koishi Y, Tanoue N, Yanagida H, Atsuta M, Nakamura M, Matsumura H. Evaluation of 2 thione primers and 3 resin adhesives for silver-palladium-copper-gold alloy bonding. *Quintessence Int* 2006; 37: 395-9.
8. Shimizu H, Tsue F, Takahashi Y. Resin-bonded cast splints for loosened abutment teeth to anchor a removable partial denture: a case report. *Eur J Prosthodont Restor Dent* 2009; 17: 22-5.
9. Shimizu H, Takahashi Y. A resin-bonded overcasting with highly filled composite resin to salvage a broken metal-ceramic fixed partial denture: a case report. *J Calif Dent Assoc* 2009; 37: 115-7.

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