

Use of resin-bonded fixed partial dentures as permanent retainers: A clinical report

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This report describes the clinical performance of resin-bonded fixed partial dentures (FPDs) bonded symmetrically to the maxillary anterior dentition. The FPDs were fabricated with the aim of replacing missing incisors as well as permanent retention after orthodontic treatment. Two FPDs were cast from a silver-palladium alloy (Castwell), and the pontics were veneered with an indirect composite material (Axis). The retainers were primed with a metal conditioner (V-Primer), and seated with a tri-*n*-butylborane initiated adhesive resin (Super-Bond). After an observation period of four years, the FPDs were functioning satisfactorily without periodontal rebound. The materials and techniques reported here are applicable to retention after the orthodontic treatment of adolescent patients. (*Int Chin J Dent* 2004; 4: 40-43.)

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

Introduction

The replacement of missing teeth in anterior areas is important for recovering tooth anatomic form as well as oral functions. After dentition alignment, it is necessary for patients to wear retainers for stabilizing their teeth and periodontal tissues. Various types of retainers are used according to the location and number of teeth to be retained. Resin-bonded castings are being used for both retainers after orthodontic treatment and resin-bonded fixed partial dentures (FPDs).

Noble metal alloys are more desirable than base metal alloys because of their adaptability to abutments and their laboratory handling properties. In addition, single liquid primers have been developed for bonding noble metal alloys to enamel surfaces. The vinyl-thiol primer (V-Primer, Sun Medical Co., Ltd., Moriyama, Japan) is a pioneering material capable of bonding noble metals to other substrates. Both laboratory and clinical evaluations, except for two papers,^{1,2} have demonstrated the effectiveness of the V-Primer material when combined with a tri-*n*-butylborane (TBB) initiated adhesive resin (Super-Bond C&B, Sun-Medical).³⁻¹⁶ Although a number of prosthodontic applications of the V-Primer and Super-Bond materials have been reported, only limited information is available about the combined prosthodontic and orthodontic application of this bonding system.

This clinical report describes the four-year clinical performance of resin-bonded fixed partial dentures seated symmetrically to the maxillary incisors for the purpose of recovering esthetics and oral functions after orthodontic treatment.

Clinical Report

The patient was a 17-year-old female with esthetic disturbance as a result of congenitally missing

maxillary lateral incisors. On first examination, orthodontic treatment had been completed and the patient wore a Hawley retainer (Figs. 1 and 2). Several treatment options were therefore proposed: 1) single-tooth implants; 2) resin-bonded FPDs with minimal tooth reduction; 3) direct-bonding of artificial pontics; or 4) a removable partial denture similar to the removable retainer. The patient chose the second of the proposed procedure. The treatment was then explained in detail and consent was obtained from the patient.



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Fig. 1. A Hawley retainer used for retention after orthodontic treatment.

Fig. 2. Pre-operative facial view.



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Fig. 3. Pre-operative anterior maxillo-mandibular contact at the intercuspital position.

Fig. 4. Lingual view of the resin-bonded FPDs seated with the Super-Bond adhesive.



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Fig. 5. Facial view of the composite resin veneered FPDs.

Fig. 6. The FPDs four years after seating.

Occlusion was examined intraorally with pieces of articulating paper and extraorally using a study cast

(Fig. 3). After examination of the maxillo-mandibular relation, the areas and thickness of tooth reduction were determined. Since limited proximal areas were covered with the retainers, the cast metal frameworks were not detectable from a frontal direction. However, the bonding area of the retainers was extended as much as possible within the lingual surfaces. Additional retentive grooves or holes were not sunk because the retentive characteristics of the retainers appeared satisfactory.

A combined impression of the entire maxilla was made with addition silicone elastomeric materials (Exafine Regular and Injection, GC Corp., Tokyo, Japan) using a custom tray. The die stone was poured into the impression, and a working cast was prepared. The stone cast was then mounted in a semi-adjustable articulator with an opposing cast. The pattern of the retainer and pontic was fabricated using an inlay wax material (Blue Inlay Wax, GC Corp.), invested with a cristobalite material (Cristobalite Micro, GC Corp.). Two metal frameworks, each consisting of two retainers and a pontic, were then cast from a silver-palladium-copper-gold alloy (Castwell M.C. 12, GC Corp.). The pontic was a ridge-lap type, the buccal surface of which was veneered with an indirect composite material (Axis, GC Corp.).

The completed FPDs were tried-in, and the inner surfaces of the retainers were air-abraded with 70- μ m grain aluminum oxide (Hi-Aluminas, Shofu Inc., Kyoto, Japan) using a particle abrader (Micro Blaster MB102, Comco Inc., Burbank, CA, USA), and conditioned with a single liquid primer designed for noble metals (V-Primer). The abutment lingual enamel surfaces were etched with 65% phosphoric acid (Red Activator, Sun Medical), washed with water, and air-dried. The FPDs were then separately seated with a tri-*n*-butylborane (TBB) initiated adhesive resin (Super-Bond Opaque, Sun Medical) using a brush-dip technique.

The patient entered a maintenance program and was examined once a year (Figs. 4-6). After an observation period of four years, the resin-bonded FPDs were still functioning satisfactorily.

Discussion

After orthodontic treatment, it is necessary for patients to use retainers. The influence of destabilizing factors such as periodontal rebound, subsequent growth, and resting soft-tissue pressures can be minimized with either removable or bonded retainers. Due to the continuous rebounding force applied to the abutment roots, the probability of retainer detachment is greater than that of FPD detachment. Therefore a noble metal adhesive system combined with enamel etching using phosphoric acid was conducted to achieve durable bonding between the FPDs and abutments. This is a simple technique that minimize tooth reduction. The patient's esthetic appearance was facilitated by using cast retainers with limited proximal coverage and an opaque luting agent. This technique is especially useful for adolescent patients because their tooth attritions are generally not apparent, and the clinical crown/root ratio is unpredictable at this age. Although regular check-ups are essential, the techniques and materials described in this report are a useful orthodontic-prosthetic approach for adolescent patients.

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Received January 7, 2004. Revised March 5, 2004. Accepted March 10, 2004.

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