"Case Report"

**Adhesive Resin Cementation of Posterior Hybrid-type Retainer Porcelain Fused to Metal Fixed Dental Prostheses**

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**Abstract**

Porcelain fused to metal (PFM) of fixed dental prostheses (FDP) remains the gold standard for rehabilitating partial edentulous. However, conventional PFM FDP requires lengthy and costly procedures to achieve optimum retention, resistance, and esthetics, such as the geometry and depth of preparation. Adhesive technology could minimize the complexity of cementation to achieve retention and resistance by minimizing the preparation area, thus ruling out the geometry of preparation consideration. The optimal geometry of preparation is achieved by the preparation of a tooth structure with significant depth and geometry. Thus, abandoned preparation geometry increases the use of minimally invasive prosthodontics. Minimally invasive prosthodontics could minimize the possibility of future endodontic treatment. One option for treating partially edentulous patients with a minimally invasive approach is the hybrid PFM FDP, consisting of an inlay-bonded retainer with the vital tooth in one of the abutments and a conventional retainer with the non-vital tooth in the other. As a result, this report showed the reasoning and technology for cementation of hybrid-type retainer PFM FDP using adhesive technology in the posterior area. Findings uncovered that using adhesive technology, the cementation FRC FDP of hybrid-type retainer PFM FDP could minimize the preparation and cementation procedure without compromising retention and resistance. Therefore, future usage of hybrid-type retainer PFM FDP should be encouraged from a minimally invasive point of view.

**Keywords:** Adhesive resin, cementation, porcelain fused to metal, fixed dental prostheses

**INTRODUCTION**

In Indonesia, the prevalence of partial tooth loss is still high, at 51.4% of the population due to its possibility of caries.\(^1\) The community research in Bantul, Indonesia showed the mean of respondent DMFT index was 8.0.\(^2\) However, the percentage of fixed partial denture users is relatively low at 0.8 percent.\(^1\) Fixed dental prostheses (FDP) should be encouraged in Indonesia. Nevertheless, the high price and lengthy procedure of FDP is probably one of the reasons for the limited usage of FDP in Indonesia.

The golden standard for FDP remains porcelain fused to metal (PFM) FDP.\(^3\) Full crown coverage PFM is considered quite expensive for some patients. The hybrid PFM FDP is an economical option with reasonable long-term results due to modifying one of the retainers into an inlay-type retainer.\(^4\) The most common failures of FDP are chipping or fracture of porcelain and loss of retention.\(^5\) The responsible reason for retention loss in PFM FPD is the unsuccessful bonding of the retainer with the tooth abutment.\(^4\) The unsuccessful restoration needs replacement or rebonding into the tooth structure.\(^6\)

The extensive preparation of tooth structure also develops for future endodontic treatment possibilities. Thus, minimally invasive treatment should be encouraged.\(^7\) However, minimizing the removal of vital tooth structure also increases the possibility of debonding FDP; optimizing cementation could improve the bonding quality.\(^8\)

This report showed the reasoning and technology for cementation of hybrid-type retainer PFM FDP using adhesive technology in the posterior area. The protocols are needed to avoid future unsuccessful bonding of the PFM FDP retainer.
CASE REPORT

Male, 45-year-old patient came to the dental clinic to continue his dental treatment. The patient came with missing posterior teeth 45 and 46, extraction was carried out due to the hopeless molar caused by caries. Tooth 44 post endodontic treatment, already with fiber post restoration and full crown preparation. The abutment of tooth 47 was inlay-type preparation (Fig. 1 and 2).

CASE MANAGEMENT

The metal surface of hybrid PFM FDP was sandblasted using a chairside sandblasting handpiece (SPTA Air Micro Blaster, Artspa Dental) with 50μm size aluminium oxide at 2 bar pressure until matte finished surface (Fig.3 and 4). Continued with soaking the PFM FDP in the alcohol solution and air dried.

The tooth abutment of 44 and 47 were prepared using 37% phosphoric acid etchant (Hexaetch, Hexa Dental) for 20 s, cleaned with water for 10 s, and dried using cotton pellet (Fig.5). Tooth was then isolated and etched surfaces were coated with layer of 10-Methacyrloyloxydecyl dihydrogen phosphate (MDP) contained bonding (Ambar, FGM Dental) and cured with LED light cure for 20s (Fig. 6).
Fig. 6. Tooth coated with MDP-contained bonding

The fitting surfaces were coated with MDP-contained self-adhesive resin cement (U-Cem Premium, Vericom), and seated into the tooth abutment (Fig. 7). Continued with 5s tack cure of resin cement using LED light cure and cleaned the cement excess. Finally, cured using LED light cure for 20s (Fig. 8).

Fig. 7. PFM FDP seated into tooth abutment

Fig. 8. Final curing of cemented PFM FDP

Fig. 9. PFM FDP final result buccal side

Fig. 10. PFM FDP final result occlusal side

DISCUSSION

Minimal invasive dentistry is described as more conservative approach of tooth preparation and restoration. The "golden triangle" of minimally invasive dentistry encompasses three essential factors: tissue histology, dental biomaterials, and the clinical care of both the patient and materials. Current adhesive technology is quite technique-sensitive, such as FDP surface treatment, adhesive system, and minimal tooth preparation. However, it is a necessity to fulfill all requirements for successful bonding of FDP.

The MDP monomer has demonstrated its ability to interact with hydroxyapatite. The bond formed by MDP-containing adhesive is highly durable, as seen by the minimal dissolving rate of its calcium salts in water. The combination
of aluminium oxide sandblasting and MDP metal primer could increase the shear bond strength of resin cement to metallic dental material.\textsuperscript{13} The protocol of air particle abrasion of metal surface, proper adhesive technique into the tooth structure, and MDP metal primer or MDP-containing resin cement could improve the bonding quality of resin-bonded restoration.\textsuperscript{7,14,15,16}

The survivability rate of hybrid-type retainer FPD is also high, 91.5% without debonding within 5 years of usage.\textsuperscript{17} In terms of minimally invasive FPD, rigid case selection criteria should be addressed. The absence of periodontal disease, large carious lesion, and parafunctional habits should be encouraged.\textsuperscript{18,19,20}

CONCLUSION

The hybrid-type retainer PFM FDP cementation using adhesive technology could increase the cementation quality with reasonable resistance and retention. Therefore, future usage of hybrid-type retainer PFM FDP should be encouraged from a minimally invasive point of view.

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REFERENCE