

Clinical performance of a premolar jacket crown made of a highly loaded indirect composite and seated with an adhesive luting agent: A clinical report

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This clinical report evaluates the clinical performance of a tooth-colored composite restoration made of a highly filled prosthodontic composite (Estenia) and bonded with a composite luting agent (RelyX ARC), in conjunction with the longevity of an adjacent conventional full cast restoration cemented with a resin-modified glass-ionomer material (RelyX luting cement). After an observation period of 36 months, both restorations are functioning satisfactorily, indicating that the jacket crown seated with the RelyX ARC material can be used as an alternative to a cast restoration for restoring pulpless mandibular premolars.

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Key Words: adhesive, composite, jacket crown, resin-modified glass-ionomer.

Introduction

Porcelain-fused-to-metal (PFM) restorations have been successfully used for more than 40 years for both anterior and posterior teeth. A number of all-ceramic and all-composite restorative systems have meanwhile been developed, and some of the manufacturers claim that the metal-free system is available as an alternative to PFM systems. Composite material is generally considered to be less wear resistant than porcelain and inferior to ceramics in color stability. The wear resistance and mechanical properties of indirect composite materials have been improved considerably by increasing the inorganic filler loading.¹⁻⁵ The Estenia light- and heat-polymerized composite⁶ (Kuraray Medical, Tokyo, Japan) contains more than 90% inorganic filler. It is also important for the clinician to select an adequate luting agent for seating tooth-colored restorations in order to facilitate color stability, marginal integrity, and fracture resistance. In addition to representative inorganic luting cements, a growing number of resin adhesives and resin-modified glass-ionomer materials have been introduced.⁷⁻¹³ Although a number of researchers have evaluated the in vitro properties of composite restoratives and resin-based luting agents, limited information is available about the clinical performance of the restorative-cement system. This clinical report compares the 3-year clinical performance of a jacket crown and a full-cast restoration seated with different luting agents.

Clinical Report

A 48-year-old female patient was examined; her chief complaint was food impaction between her right mandibular second premolar and first molar. The examination revealed a considerable amount of space, more than 200 μm , with gingival inflammation between these teeth. The patient preferred a tooth-colored restoration for replacement of the premolar rather than a cast metallic restoration. Several treatment methods were proposed to the patient, including metal-ceramic restoration, porcelain jacket crown, and composite restoration. Considering the service period, appearance, restorative strength, and cost of the treatment, the patient selected a composite jacket crown for the premolar and cast restoration for the molar.

Old restorations were removed and root canal treatment of the second premolar was completed. A cast dowel core made from a silver-palladium-copper-gold alloy (Ag-Pd-Cu-Au, Castwell M.C. 12, GC Corp., Tokyo, Japan) was fabricated and cemented with a conventional glass-ionomer material (Fuji I, GC Corp.). Shoulder preparation of 1 mm width was selected for the premolar abutment in order to achieve sufficient marginal thickness as well as strength of the restoration. For the first molar, chamfer preparation was performed (Fig. 1). An impression was made with a silicone elastomeric material, poured with die stone, and a working die was prepared. A cast metallic molar restoration was made from the Ag-Pd-Cu-Au alloy.

A composite jacket crown was next fabricated from a highly filled indirect composite material (Estenia, Kuraray Medical Inc., Tokyo, Japan) according to the manufacturer's specifications (Fig. 2). An opaque composite was used to hide the metallic color of the abutment. At the patient's next visit, the restorations were tried-in, occlusion and articulation were adjusted, and the restorations were seated with different luting agents. The cast molar restoration was seated with a resin-modified glass-ionomer material (RMGI, RelyX luting cement, 3M Espe, St. Paul, MN, USA), whereas the RelyX ARC system (3M Espe) was used for bonding the premolar jacket crown.

After try-in, the inner surface of the jacket crown was treated with a 35% phosphoric acid gel (Scotchbond Etchant, 3M Espe), rinsed with water, air-dried, and a silane coupling agent (RelyX Ceramic Primer, 3M Espe) was applied. The abutment was etched with the 35% phosphoric acid gel for 15 s, rinsed with water for 10 s, and blot-dried. Next, two consecutive coats of a proprietary bonding agent (Single Bond Adhesive, 3M Espe) was applied to the abutment, dried for 5 s, and light-cured for 10 s. The RelyX ARC cement was dispensed, and was spatulated for 10 s. The crown was seated and the marginal area was exposed to light for 5 s, followed by the removal of excess material (Fig. 3). The luting agent was then light-polymerized through the restoration for 40 s per surface (Fig. 4).

The patient entered into a check-up program and oral examination was continued once or twice a year (Figs. 5-8). After an observation period of 36 months, the restorations are functioning satisfactorily without fracture, dislodgement, discoloration or gingival recession, although slight occlusal wear as well as matted facial appearance have been recognized. In addition, wear of the antagonists was not distinct and the patient was satisfied with the clinical result. Occlusal wear appeared to be comparable between the metallic molar restoration and the premolar jacket crown.



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Fig. 1. Abutments after build-up.

Fig. 2. Premolar jacket crown fabricated with the Estenia Composite.



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Fig. 3. Removing the RelyX ARC material after 5 s light exposure.

Fig. 4. Occlusal view after the seating of the restorations.



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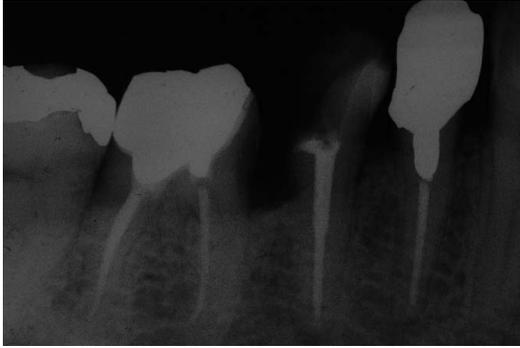
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Fig. 5. Buccal view 2.5 years after the seating of the restorations.

Fig. 6. Occlusal view after 2.5 years. A slightly frosty appearance can be detected.

Discussion

The longevity of tooth-colored restorations substantially depends upon the mechanical properties of restorative materials and the bonding characteristics of luting agents. A highly loaded composite material (Estenia) was selected for the current premolar restoration on the basis of laboratory evaluation results.¹⁻⁵ The restoration did demonstrate a favorable clinical course, except for a slight loss of smoothness.



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Fig. 7. Radiograph after root canal treatment of the premolar.

Fig. 8. Radiograph after the cementing of the restorations. Outline of the dowel core can be seen through the jacket crown.

However, the roughened appearance vanished after polishing with a diamond paste used together with a rotary felt instrument. In addition, the premolar Estenia restoration did not grind the antagonists during the three-year observation period. This is probably due to the sufficient polishing performed on the restoration surface. Suzuki et al.⁵ reported a remarkable loss of antagonist enamel surface when the Estenia material was subjected to the three-body wear simulation system. This paper, however, does not examine the influence of variations in composite surface characteristics on antagonist wear. The authors speculate that the Estenia material does not negatively affect the wear behavior of the antagonists so much, as long as the Estenia restoration surface has been properly polished. During the observation period of three years, the smoothness of the Estenia surface was reduced. Continuous check-up regarding the surface roughness of Estenia restorations is necessary as compared with the ceramic restoratives.

The surface preparations of adherends as well as the type of luting agent are critical factors for the prognosis of restorations. Due to the considerable amount (more than 90%) of inorganic filler contained in the Estenia composite, the authors used the RelyX ARC ceramic-to-tooth bonding system for seating the composite jacket crown to the abutment. This is based on the fact that the bond strength of the RelyX ARC system is excellent for bonding both dentin and ceramics.⁸⁻¹³ Although the long-term *in vitro* bonding characteristics between the Estenia composite and the RelyX ARC material have not been evaluated, the Estenia jacket crown bonded with the RelyX ARC system is a viable alternative to the conventional jacket crown as a mandibular premolar tooth-colored restorative.

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