Inlay fixed partial denture as a conservative approach for restoring posterior missing teeth: A clinical report

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Inlay fixed partial dentures luted by use of adhesive procedures offer a clinical alternative for the restoration of single missing posterior teeth. The introduction of ceromers and fiber-reinforced composites and the continuous improvement of adhesive systems and luting agents make this type of restoration possible, offering good aesthetic and functional results. The procedure is minimally invasive and conservative. This clinical report reviews the factors influencing the diagnosis and the clinical indications for an inlay fixed partial denture. In addition, a patient treatment is presented to illustrate the clinical procedures involved. (J Prosthet Dent 2003;89:443-5.)

Inlay fixed partial dentures (FPDs) luted via adhesive procedures offer an alternative for the restoration of single missing teeth in posterior quadrants. The development of dentin adhesive systems has led to simpler and minimally invasive preparations.[1] Ceromer technology[2] and fiber-reinforced composites (FRC)[3] have added further advantages to these procedures, because of their easy handling, natural color matching, marginal integrity, and resistance to component wear and fracture.

Patient selection for an inlay FPD technique is an essential requirement for clinical success.[1,4] Each situation must be evaluated to determine whether the location (replacement of a single posterior tooth[5,6]), available room (a space of 20 mm or less between remaining teeth[6]), and the healthy clinical condition[2] of remaining abutments are present.

The occlusion of the intended treatment must be assessed on an individual basis, because a higher incidence of debonding has been observed in patients with parafunctional habits.[7,8] Consequently, this treatment approach may not be the first choice in such situations. The ceromer-FRC combination has been noted to be contraindicated when the preparation involves subgingival finish lines and impedes adequate rubber dam isolation.[2]

Because the inlays are often hidden from view in the proximal zones, it is not necessary to hide the gingival finish line and margin beneath the gingiva for esthetic reasons. The use of supragingival margins provides lower risk of periodontal inflammation and therefore increased health of supporting tissues.[9]

Inlay FPDs prepared with FRC and ceromers constitute a treatment option deserving special consideration in view of its multiple advantages, particularly its conservative preparation approach.[1] No long-term data are presently available on the durability of these restorations, underscoring the importance of careful patient selection, adequate planning of the design, precision preparation, correct choice of materials, and meticulous bonding techniques as important factors that influence the success of this type of restoration. This clinical report presents a situation that illustrates the advantages of inlay FPDs.

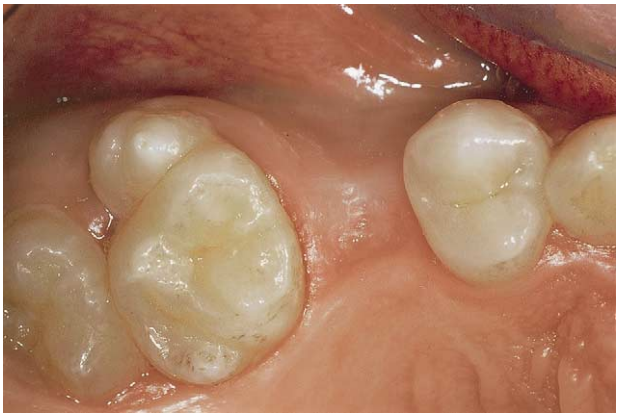

Fig. 1. Pretreatment view of missing maxillary left second premolar. Note buccal paramolar cusp in maxillary left first molar.

CLINICAL REPORT

A 26-year-old man was initially seen missing a maxillary left second premolar (Fig. 1). After radiographic evaluation and occlusal analysis[10] with articulator-mounted casts, the patient was offered different treatment options. The patient rejected the placement of a single-tooth implant for the maxillary left second premolar because of the duration of therapy and requirement for surgical intervention. Likewise, a conventional FPD was refused because of the presence of a buccal paramolar cusp or tubercle on the maxillary left first molar that would have required removal of healthy dental tissue and involved a higher risk of pulp exposure.

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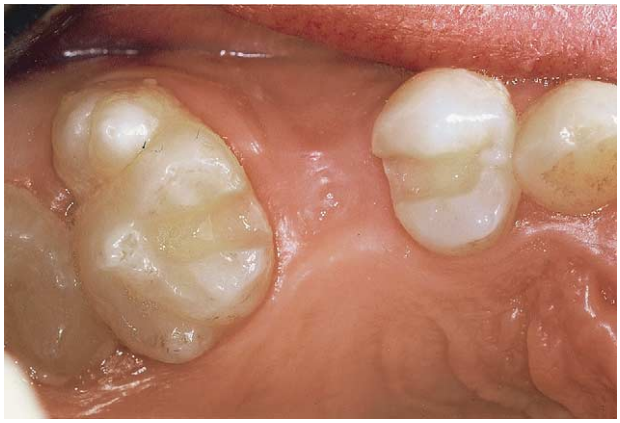

Fig. 2. Preparation for class II inlays in maxillary left first premolar and maxillary left first molar.

Fig. 3. Vinyl-polysiloxane impression. Note accurate reproduction of line angles and surfaces.

Because the occlusal factors were favorable (absence of bruxism, good occlusal stability, and presence of all remaining teeth), the patient selected a conservative approach to restore the missing maxillary left second premolar with a ceromer-FRC inlay FPD.

Little information about adequate tooth preparation design for an inlay FPD is available to the clinician.[11] The clinical procedures began with proximal cavity preparations for the inlays that would facilitate a well-aligned path of insertion (Fig. 2). All internal line angles were rounded to facilitate fitting and to reduce the stress concentration.[6] The occlusal portion of the cavity preparation should allow for sufficient space to place the FRC and ceromer to ensure a good esthetic result and adequate intracoronal resistance.[12] This was achieved by preparing the isthmus to a width of 1.5 to 2.0 mm in premolars and 2.5 to 3.0 mm in molars, with reduction of the occlusal surface to a minimum depth of 2.0 to 2.5 mm.[3] The proximal boxes extended gingivally to improve the stability of the restoration, leaving the cervicoproximal cavity margin located in supragingival enamel. To optimize acid etching, the proximal boxes should present cavosurface angles of 60 to 80 degrees.[6] After cavity preparation, impressions were made by means of the double impression technique[12] using a standard tray and heavy and light viscosity vinyl-polysiloxane (Aquasil; Dentsply, Milford, Del.) (Fig. 3). Color shade selection was then made, and the preparations were provisionally restored with a direct technique and composite (Point 4; Kerr Corp, Orange, Calif.).

The inlay FPD was fabricated in the laboratory with FRC used as a framework (Fibrekor; Jeneric/Pentron Inc, Wallingford, Conn.) and an overlay of a ceromer (Sculpture; Jeneric/Pentron Inc) built over this framework with a layering technique. After fabrication of the restoration in the laboratory, the provisional restorations were removed, and the preparations were cleaned with hydrogen peroxide and cotton pellets, rinsed, and dried. The restoration fit was evaluated with an explorer and a silicone-based material (Fitchecker; GC America, Chicago, Ill.). The occlusion was evaluated with articulating paper (Arti-Fol BK-25; Bausch KG, Köln, Germany) and adjusted as necessary until multiple bilateral simultaneous opposing tooth contacts were achieved. The esthetics were evaluated visually. Although the color of the try-in paste does not always achieve a precise match of the composite material (particularly after polymerization), try-in paste (Variolink II Try In; Ivoclar Vivadent, Amherst, N.Y.) was used to assess the color of the restoration before final cementation.

Isolation with a rubber dam was performed, followed by luting of the restoration by use of an adhesive technique.[3] To facilitate cementation, pontic inlays and cavity preparations were air particle abraded with 50-μm aluminum oxide (Microetcher II; Danville Engineering, San Ramon, Calif.). Phosphoric acid 35% (Ultra-Etch; Ultradent, South Jordan, Utah) was applied to cleanse the pontic inlays, which were subsequently rinsed and dried. The tooth preparations were etched with phosphoric acid for 40 seconds, rinsed, and dried. A single component adhesive (Single Bond; 3M, St. Paul, Minn.) was applied to the pontic inlays and the dentin tooth structure of the cavity preparations, and the pontic inlays were bonded into place with a shaded dual-polymerized resin luting agent (Variolink II; Ivoclar Vivadent), which was placed in a thin layer on the tooth preparations. The restoration was prepolymerized for 10 seconds with a 4-mm turbo light guide (Optilux 500; Demetron/Kerr Corp.) to allow the removal of the occlusal excess luting agent with an explorer or a brush[13] and interproximal excess using dental floss.[14] Glycerine was applied over the entire restoration. After this brief initial polymerization to secure the position of the restoration, it was firmly maintained in its definitive posi-

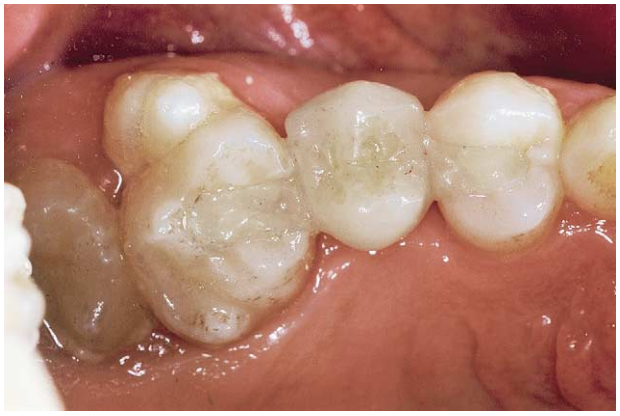

Fig. 4. Inlay FPD on maxillary left first premolar and maxillary left first molar for restoring maxillary left second premolar.

tion, and polymerized with a 13-mm light guide (Optilux 500; Demetron/Kerr Corp.) for an additional 60 seconds through all the restoration aspects. A sharp number 12 scalpel blade (Swann-Morton Ltd, Sheffield, England) was used to shear off the gingival excess of polymerized cement. Once all excess luting agent was removed, occlusal contacts were evaluated and verified; at this stage, any additional occlusal adjustments were made until multiple bilateral simultaneous opposing tooth contacts were achieved. The margins were finished with rotary instruments (ET nr. 3; Brasseler USA, Savannah, Ga.) and polishing discs (Soflex; 3M). Finally, polishing was carried out with rubber polishers (Top Finisher; Cosmedent, Chicago, Ill.) with diamond paste (TPS Truluster; Brassler USA) (Fig. 4).

SUMMARY

Inlay FPDs can be a conservative alternative for the restoration of single posterior missing teeth. Diagnosis and clinical indication assessment are required for this technique. The use of ceromers, FRC, and adhesive procedures allows for esthetic and functional restorations.

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