Plastic of Smile: Adhesive Fixed Dental Prosthesis, Fiberglass Post Restoration, and Direct Veneers in Resin Composite

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Abstract: Tooth loss, darkened teeth, and disproportionate shape and size of teeth can compromise the way an individual sees themselves and their interpersonal relationships. The present study aims to report a case report of a plastic smile. After initial clinical examinations, it was proposed to perform an adhesive-fixed dental prosthesis, fiberglass post-restoration, and direct veneers in resin composite. For tooth 11, which had extensive coronary damage, a fiberglass post-restoration was performed. The fiberglass post was cemented with dual resin cement and the tooth was sculpted using the indirect resin composite technique. For the tooth loss (13), an adhesive fixed dental prosthesis was made of fiberglass, with wear of the abutment teeth (12 and 14) to support the prosthesis. From teeth 14 to 24, wear to veneers was performed. The veneers were implemented with resin composed by the direct hands-free technique. Treatment was completed with occlusal adjustments, finishing, and polishing. Rehabilitation treatment performed emphasizes the importance of associating adequate planning, dentist dexterity, and the choice of materials and techniques used.

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Introduction

Direct restorative treatments aim to restore form, function, and aesthetics with conservative tooth wear (Espíndola-Castro et al., 2019). Materials can be used to repair and improve the appearance of healthy teeth, such as composite resins. These materials have excellent aesthetic properties, due to biomimetic and functional characteristics similar to dental tissues (Espíndola-Castro et al., 2019). In addition, they are very versatile, which can be used in direct or indirect restorations (Dias et al., 2020).

However, in situations with significant coronal destruction, resin composite restorations may not have sufficient adhesion areas. Fiberglass posts (FGP) are indicated for rehabilitation to promote intraradicular retention in cases of fractured teeth or coronary loss (Goracci and Ferrari, 2011). FGPs have a modulus of elasticity close to dentin, reducing the possibility of fractures and a clear colour, which is easily masked by the composite resin restoration (Ruschel et al., 2018).

Furthermore, in the case of unitary dental absences, a therapeutic option is adhesive prostheses. The main advantage of this treatment is that can be performed in a short clinical period, besides that, this technique also has a lower cost and good durability (Wolff et al., 2018).

The durability of resin composite restorations is still considered inferior when compared to ceramic restorations (Fan et al., 2021). However, resin composites are excellent options that require less preparation time, do not require laboratory steps, are repairable, and have a lower cost (Korkut and Özcan, 2022). They therefore present a viable alternative for use in public services or when the patient does not have the financial means to pay for a longer-lasting treatment.

Thus, the present study aims to report a clinical case of aesthetic rehabilitation that was performed with a fiberglass post restoration, an adhesive fixed dental prosthesis, and composite resin veneers.

Case report

A 38-year-old male with a non-remarkable medical history and no known drug allergies came to the dentistry clinic complaining of dissatisfaction with his smile (Figure 1A). After clinical and radiographic examinations, unsatisfactory restorations of tooth 21, absence of tooth 13, and significant coronal destruction of tooth 11 were observed (Figure 1B and C).

After clinical examinations, the proposed treatment was approved by the patient and was divided into four clinical sessions.

Session 1: Replacements of unsatisfactory restorations

Restorative treatment was started with the removal of unsatisfactory restorations (teeth 21 and 22), followed by rubber dam isolation (Figure 1D). Due to unsatisfactory restoration overcontouring and gingival inflammation, the restorations were initially replaced to induce periodontal healing. The teeth were restored using the direct technique of composite resin layering.

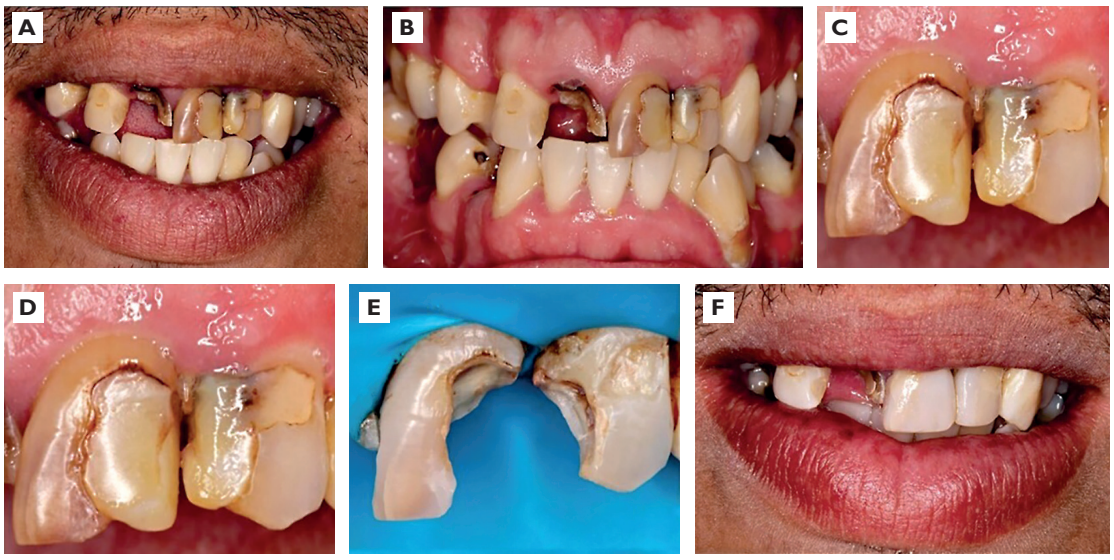

Figure 1: Initial stages. (A) Clinical appearance of the smile. (B) Detailed view of dental structures. (C) Unsatisfactory restorations. (D) Removal of restorations and rubber dam isolation. (E) Confection of resin composite restorations. (F) Immediate final clinical appearance.

The finishing and polishing protocol was performed at the end (Figure 1E).

Session 2: Fiberglass post restoration

For tooth 11, the root canal was opened with gates and largo drills, preserving 4 mm of apical obturator material (Figure 2A). Then, fiberglass post was proved in root canal and was cut in half of the clinical crown (Figure 2B and C). After stages, the conduit was cleaned with pumice paste, conditioned with 37% phosphoric acid, washed with water and completely dried. The fiberglass post surface was cleaned with 37% phosphoric acid, treated with silane for a minute (Figure 2D), and a thin layer of universal adhesive was applied, followed by light cured (Figure 2E). For the fiberglass post cementation process, self-adhesive dual cement was used (Figure 2F). Subsequently, the post was covered with resin composite, and a single crown wear was performed.

Session 3: Adhesive fixed dental prosthesis

For this step, after rubber dam isolation, proximal occlusal wear was performed on teeth 12 and 14 using diamond tips #3131 to adapt and fix the reinforced glass fiber (Figure 3A).

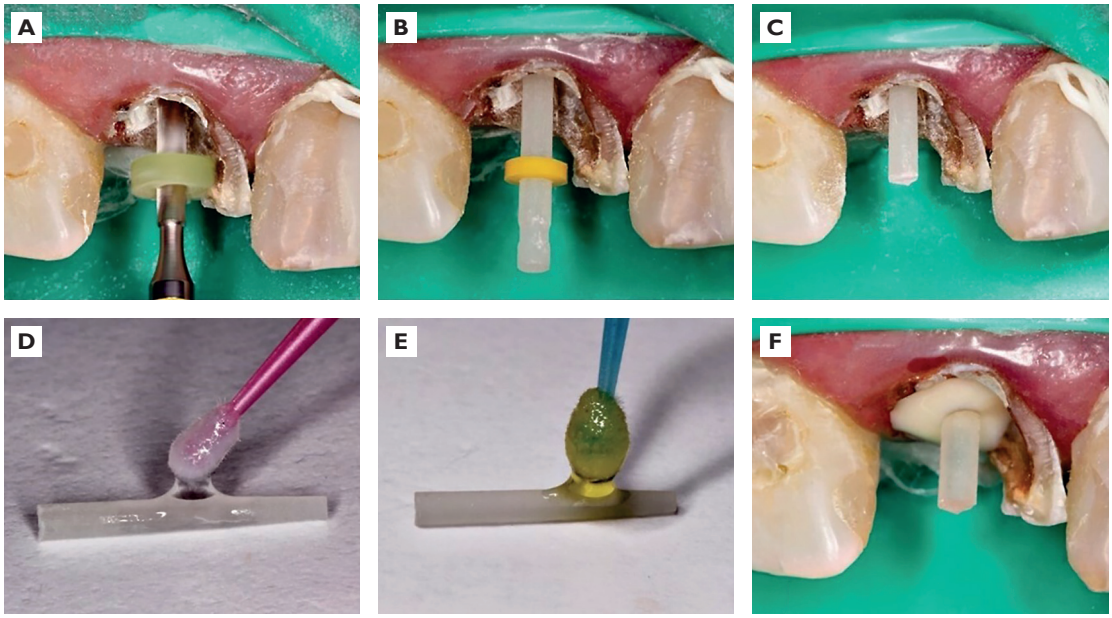

Figure 2: Fiberglass post restoration. (A) Removal of gutta-percha with gattes drills. (B) Proof of stability of the selected pin. (C) Cut of the post at the height of half of the clinical crown. (D) Silanization for 1 minute. (E) Application of universal adhesive. (F) Cementation with dual resin cement.

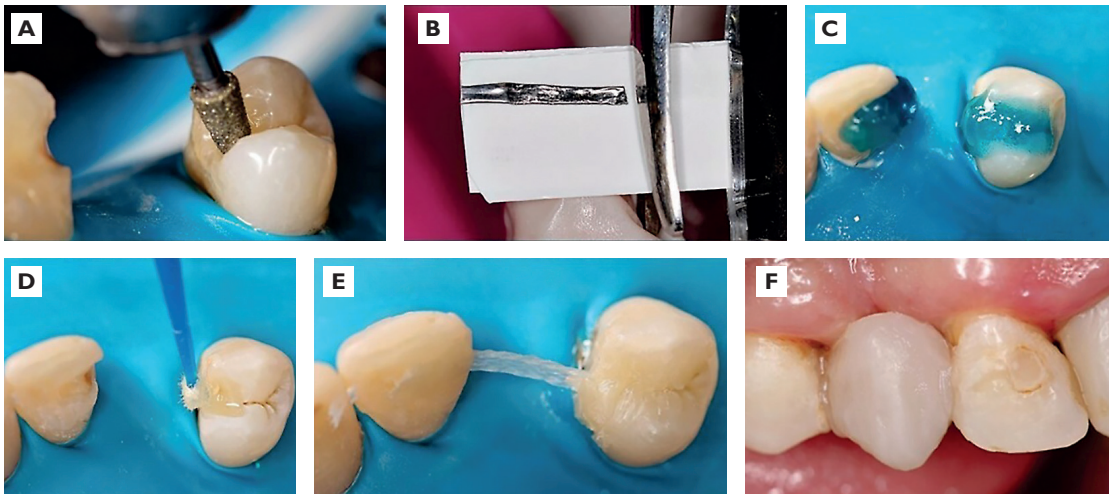

Figure 3: Adhesive fixed dental prosthesis. (A) Dental wear to supports with diamond tip #3131. (B) Measurement of the size of the fiberglass with lead film (radiographic film). (C) Acid etching. (D) Adhesive system application. (E) Fixing the fiberglass with resin composite. (F) Fabrication of the pontic with resin composite.

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After the support teeth were worn out, the fiberglass size was measured with a lead sheet (radiographic film). The lead sheet was placed over the fiber package and cut with scissors (Figure 3B). Prophylaxis was performed in the cavities with pumice paste. Etching was performed with 37% phosphoric acid for 30 seconds (Figure 3C). After washing and drying, the universal adhesive was applied and light cured for 40 seconds each (Figure 3D). For the adaptation and fixation of the glass fiber-reinforced, a nanoparticulate resin composite was used (Figure 3E). The tooth 13 was sculpted in composite resin over fiberglass using a freehand direct technique with nanoparticulate resin composite (Figure 3F).

Session 4: Direct veneers in resin composite

The teeth 14 to 24 were prepared for resin composite veneers using the silhouette technique. Initially, the marginal channel delineation in the cervical and proximal areas was performed with a spherical diamond tip #1014 (Figure 4A). Vertical channels were made with the cylindrical diamond tip #1141 (Figure 4B). The appearance after this wear can be seen in Figure 4C. All grooves were marked with a graphite pencil (Figure 4D) to level the entire preparation using the #3080 conical diamond tip (Figure 4E). The proximal contacts were removed to adjust for tooth width differences (Figure 4F).

To perform the direct veneers in resin composite, modified rubber dam isolation was performed, and a #000 retractor wire was inserted into the gingival sulcus (Figure 5A). Prophylaxis was performed with pumice stone paste, and acid etching was performed for 30 seconds (Figure 5B). After washing and drying with a light air jet, the adhesive was applied and light cured for 40 seconds (Figure 5C).

For faceting using the direct technique, the palatal shells were made with a high translucency resin composite (Trans) (Figure 5D). Then, a layer of resin composite with high opacity (dentin to bleaching teeth) was applied to the buccal surface, followed by the mamelus sculpture (Figure 5E). Finally, a resin layer with translucency compatible with enamel was applied (Figure 5F).

Finishing with sanding discs was followed, and polishing was performed with felt discs impregnated with a polishing paste (Figure 6A and B). The final clinical appearance can be seen in Figure 6C and D.

Discussion

In the case presented, procedures were proposed using resin as the main restorative material. Dental reanatomization with resin composite using the direct technique is considered a simple technique with less clinical time, low cost, and satisfactory aesthetic results (Araújo et al., 2018; Espíndola-Castro et al., 2019).

To obtain the clinical success of direct composite restorations, the correct execution of the adhesive procedure is essential (Collares et al., 2017). Current dental adhesive systems can be classified according to the strategy that they bond to dental tissues in etch-and-rinse or self-etch adhesives, which do not require prior treatment (Cardoso et al., 2019). Universal or multimode adhesives are supposed to promote

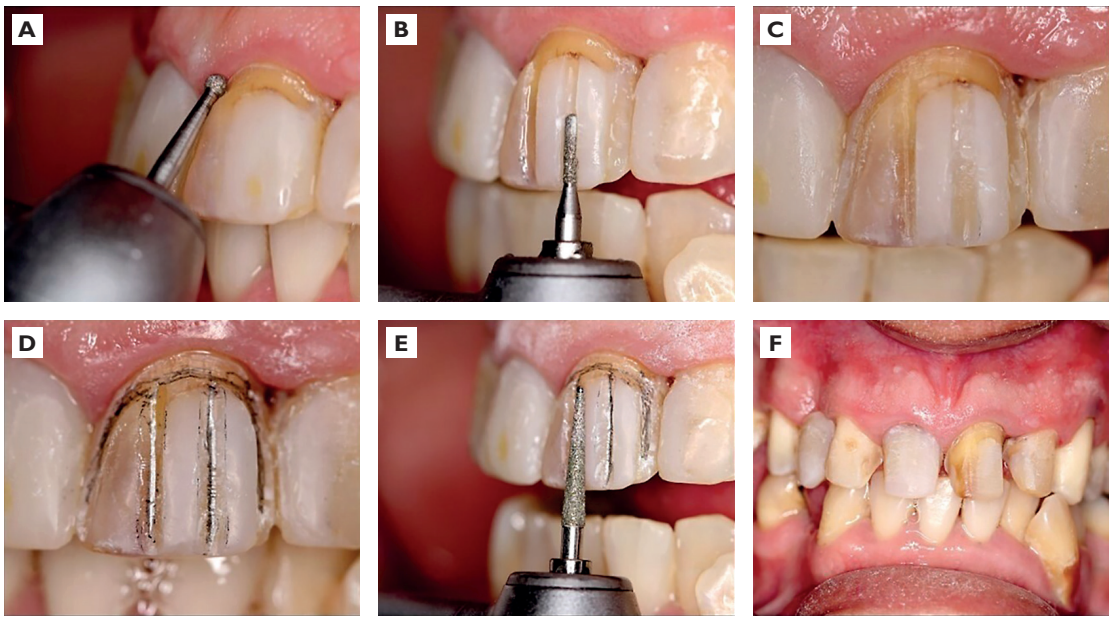

Figure 4: Wear for direct veneers. (A) Marginal channel delineation. (B) Vertical channels delineation. (C) Finished channels. (D) Marking the channels with a graphite pencil. (E) Level the entire preparation. (F) Finished wear.

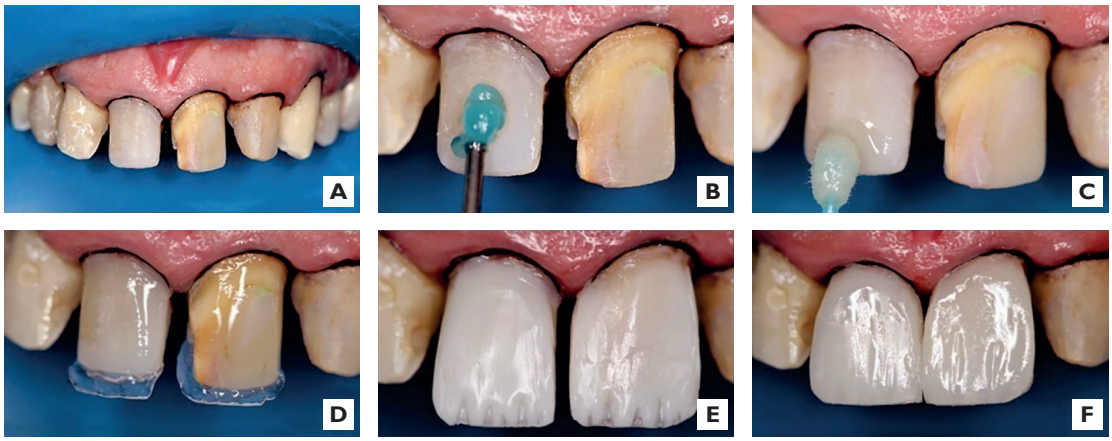

Figure 5: Production of direct veneers in resin composite. (A) Modified rubber dam isolation. (B) Acid etching. (C) Application of the adhesive. (D) Production of the palatal shell with extremely translucent resin. (E) Application of resin with high opacity. (F) Insertion of composite resin with enamel translucency.

Figure 6: Final clinical appearance. (A) Immediate clinical aspect. (B) Characterizations, finishing and polishing. (C) Final profile appearance. (D) Final clinical appearance of the smile.

adhesion to various restorative substrates, including fiberglass posts (Collares et al., 2017; El-Safty et al., 2024). These materials can also be applied to dentin as two-step, etch-and-rinse, or one-step self-etch bonding agents (Perdigão et al., 2013).

Fiberglass post posts are an excellent alternative for endodontically treated tooth restoration (Soares et al., 2012). Despite the possibility of using universal adhesive as a pretreatment for FGP, due to the presence of silane in its composition (Cadore-Rodrigues et al., 2020), in the present case, silane was used as a pretreatment before the adhesive. Some studies show that the application of silane does not influence the bond strength to the fiberglass post, therefore, this step may be optional (Robles et al., 2020; Oliveira et al., 2021).

Traditionally, posts can be classified based on the elastic modulus, with metallic, ceramic, carbon fiber, and fiberglass posts (Soares et al., 2012). A recent systematic review showed that fiberglass posts induce less stress in endodontically treated teeth when compared to other posts (Badami et al., 2022). In this case, a fiberglass post was used; this protocol is widely used to replace metallic pins due to excellent aesthetic properties (Gallo et al., 2002).

The large loss of coronal structure of tooth 11 (Figure 1) may cause concern regarding the longevity of the treatment. However, post-restorations can

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be an alternative to tooth extraction. In a systematic review that evaluated the effect of the ferrule on the fracture resistance of teeth restored with posts, a greater fracture resistance was observed when the ferrule existed (Skupien et al., 2016). However, no difference in clinical longevity was observed when restorations were performed on anterior teeth without a ferrule. The authors concluded that the presence of the ferrule is responsible for an improvement in the fracture resistance of the restoration; however, other clinical factors besides the ferrule may be associated with survival in anterior teeth and need to be further investigated. Thus, there is no consensus in the literature on the contraindication of restorations with fiber posts in anterior teeth when the ferrule does not exist, which is why we indicate it in the present case.

After the implantation of the fiberglass post and the crown, composite adhesive fixed dental prostheses were fabricated with a double fixation system. This type of prosthesis represents a low-cost option for the rehabilitation of missing teeth and is considered minimally invasive (Ahmed et al., 2017). In some systematic reviews that evaluated the survival of adhesive fixed dental prostheses, there is an estimated average survival of 5 years (Ahmed et al., 2017; Thoma et al., 2017; Santos et al., 2023). However, technical complications such as detachment and minor chipping were frequent (Santos et al., 2023). These findings suggest that the technique used may be an alternative to more complex treatments such as implants or removable prostheses.

To make the direct facets, a composite nanoparticle resin was used. This type of composite has excellent surface smoothness that favours high clinical performance in this type of aesthetic procedure (Khurshid et al., 2015). All these favourable characteristics associated with good planning were evidenced in this case report, which proved to be a very viable procedure for interventions that seek the harmony of the smile as the main objective. In a systematic review that evaluated the longevity of resin composite veneers, an overall survival rate of 88% was observed, with a mean follow-up time ranging from 24 to 97 months. The main problems found were surface roughness, colour mismatch, and marginal discoloration (Lim et al., 2023). Resin composites were the material of choice used in the present study due to their lower cost and the possibility of performing a major rehabilitation in a few clinical sessions.

The success of restorative dental treatment is intrinsically linked to the clinician's technical expertise, the quality and appropriateness of the materials employed, and the patient's active cooperation throughout the process. The patient was thoroughly instructed on the expected longevity of the treatment and the behavioural habits essential to enhance long-term clinical success. Special emphasis was placed on maintaining rigorous oral hygiene, particularly in areas around the adhesive fixed dental prosthesis where flossing is limited or not feasible. Additional guidance included avoiding the intake of hard foods and refraining from using the teeth to manipulate objects, both of which could compromise the integrity of the restorations.

Conclusion

The therapeutic approach adopted, combining fiberglass posts, adhesive fixed dental prosthesis, and resin composite veneers, proved effective in re-establishing both the aesthetic and functional aspects of the smile. The success of the treatment highlights the importance of a multidisciplinary strategy, ensuring accurate diagnosis, comprehensive planning, and precise execution. This case demonstrates that it is possible to achieve predictable, satisfactory, and cost-effective outcomes, making advanced dental rehabilitation accessible to a broader range of patients and professionals.

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