Short Communication

Bonded Orthodontic Retainer and Fixed Partial Denture Made with Fiber Reinforced Composite Resin

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ABSTRACT

Retention is the phase of orthodontic treatment which maintains teeth in their orthodontically corrected positions, following the cessation of active orthodontic tooth movement. Development of resin-impregnated, fiber-reinforced composite materials has provided the potential to develop new approaches for stabilizing teeth and replacing teeth conservatively. This case report describes the rehabilitation of a patient with orthodontic and prosthetic problems. The long-term behavior of glass fibers splint must be evaluated in clinical studies. (Eur J Dent 2011;5:237-240)

Key words: Fixed partial denture; Orthodontic retainer; Fiber reinforced composite resins; Remineralization; Resin infiltration.

INTRODUCTION

Orthodontic retainers resist the tendency of teeth to return to their pre-treatment positions under the influence of periodontal, occlusal and soft tissue forces, and continuing dentofacial growth.[1]

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Fixed retainers are indicated for long-term retention of the labial segments, particularly when there is reduced periodontal support, and for retention of a midline diastema.[2] Retention is the phase of orthodontic treatment which maintains teeth in their orthodontically corrected positions, following the cessation of active orthodontic tooth movement.[3]

The most current edition of The Glossary of Prosthodontic Terms[4] defines a splint as "a rigid or flexible device that maintains in position a displaced or movable part; also used to keep in place and protect an injured part". A secondary definition of splint used in this glossary is "a rigid or flexible material used to protect, immobilize, or restrict motion in a part".

Splints may be constructed of many materials. They may be as simple as a bonded composite resin button from one tooth to another. This stabilization is transient in nature, due to the inability of composite resin to accommodate shear forces.[5] Development of resin-impregnated, fiber-reinforced composite (FRC) materials has provided the potential to develop new approaches for stabilizing teeth and replacing teeth conservatively.[6]

This case report describes the rehabilitation and 2-year follow-up of a patient with orthodontic and prosthetic problems.

CASE REPORT

A 16-year-old boy patient referred to Ege University, School of Dentistry, Department of Prosthodontics with esthetic complaints after his orthodontical treatment. Clinical examination of the patient revealed an old scar tissue due to cleft lip and palate, together with a missing maxillary right lateral incisor tooth. A severe damage on the crown of maxillary right central incisor tooth was also observed (Figure 1).

Primarily, the damaged incisor tooth was restored by using composite resin material (Filtek Supreme, 3M-ESPE). After receiving patient's consent, maxillary and mandibular impressions were made with a silicone based impression material and working casts were prepared in the laboratory. A combined restoration with pontic which would replace missing maxillary right lateral incisor, and a splint from maxillary right first premolar to maxillary left first premolar teeth was fabricated with a laboratory composite resin (Dialog, Schütz Dental, Germany). A thin layer of flowable composite resin (Filtek Flow, 3M ESPE, USA), together with the polymer resin-impregnated uni-directional glass fiber reinforcement material (everStick C&B, Stick Tech, Finland) was applied to the palatinal surfaces of the adjacent teeth (Figure 2). The restoration was intraorally tried-in and it was continued with cementation procedures. Bonding surfaces of the retainer parts of FRC FPD were roughened using a green stone finishing bur (Diatech, LLC, USA) with low-speed handpiece, followed by application of bonding agent (Scotchbond, 3M-ESPE, USA) and storage in a dark place for 5 min. Meanwhile, the abutment teeth were cleaned with pumice using a prophylaxy brush on a low-speed handpiece. Enamel surfaces were etched with 37% orthophosphoric acid for 60 sec, the restoration was cemented with dual-cure composite resin luting cement (RelyX ARC, 3M-ESPE, USA) according to manufacturer's directions and light-cured from every aspect for 40 sec (Elipar Freelight, 3M ESPE, USA) (Figure 3). After occlusal adjustments, self-assessment of oral hygiene was described and the patient was recalled every 3 month on a periodical basis.

A FPD rehabilitation made with glass FRC which does not necessitate any preparation on abutment teeth and would be satisfactory both esthetically and functionally, was considered to be the ideal treatment approach for the patient. The fabricated denture had a considerably higher esthetic appearance, when compared with the retentive apparatus on the patient's mandibular arch made by using an orthodontic wire, and it was observed to exceedingly meet the patient's esthetic and functional requirements with replaced missing tooth.

Figure 1. Preoperative occlusal view of the patient.

Figure 2. FRC splint on master model.

DISCUSSION

With the acceptance and clinical predictability of adhesive procedures, the use of conservative bonding techniques for tooth splinting offers a useful alternative to more invasive restorative procedures. Using an adhesive technique, there were clinical reports of embedding wires, pins, nylon, and stainless steel mesh into restorative resins.[6-9] The inherent problem with these materials was their inability to be chemically incorporated into the dental resin. Clinical failures of splints fabricated using these techniques were prevalent because these materials could not support the repeated loading stressed placed on the splint with the placement of composite resin splints with submerged wires and grids to protect against breakage was that more bulk of composite resin was necessary.[8-10] This overbulking of the restoration led to an increase in food and plaque retention and resulted in making it more difficult to clean around the restoration and maintain good oral health. In addition composite splints are good adhesion on enamel and dentin. Due to these reasons, glass FRC splint was employed in this study.

The esthetical properties of the FPD with translucent FRC framework were considerably superior to that of FPDs with a metal framework as analyzed subjectively by the dentists. In addition, the possibility of extending the retentive parts of FPD even to the labial/buccal surface of the abutment without causing esthetic problems seems to offer new possibilities in FPD treatment.[5,11] Using minimal invasive treatment, treatment costs can be lowered to some extent. In some instances, the cost of a treatment with fixed glass FRC restoration may cost as low as an acrylic removable partial denture.[12] According to clinical 42 months follow-up studies, the success rate was found to be 76% for metal adhesive bridgeworks while it was 93% for FRC FPDs for the same duration.[13] As the patient had esthetic problem and the area of rehabilitation involved anterior region, a FRC FPD was considered for this treatment.

Figure 3. Postoperative view of the patient.

FRC bridges can be fabricated directly chairside and via the dental laboratory. The indirect technique of producing multiple units of fiber reinforced laboratory fabricated restorations readily ensures for the perfection of occlusal contour and contacts, surface polish of the pontic fitting surface, adequate coverage of the fiber component of the bridge and proximal contact areas that can be contoured into the required emerging profile of the restoration.[14,15]

Since glass FRC FPDs have esthetic and economic superiorities, are easy to repair and require no preparation on sound teeth, they present an alternative treatment choice both for patient and the clinician.[15] However, it should not be forgotten that fabrication of FRC FPD requires a meticulous work. Stabilization of loose teeth to restore the patient's psychological and physical well-being- a patient may be refrain from eat properly because of a severely loose tooth or multiple teeth. Splinting may restore occlusal stability, restore a sense of a solid occlusion, and improve aesthetics. The long-term behavior of glass fibers splint must be evaluated in clinical studies.

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