# Restoration of an Anterior Edentulous Space with a Unique Glass Fiber-Reinforced Composite Removable Partial Denture: A Case Report

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## ABSTRACT

The loss of anterior teeth can be hurtful to the patient both psychologically and socially. In adolescent patients, temporary replacement of the teeth can minimize these concerns. Many approaches have been described for this temporary replacement. This article presents an alternative approach for the oral rehabilitation of the preadolescent male who has edentulous space including sutura palatina media in the anterior maxilla. High expectations regarding esthetics by the patient were successfully met by utilizing a glass fiber-reinforced composite temporary removable partial denture. The restorations remained intact, with no discoloration or deterioration at the 16-month recall.

# CLINICAL SIGNIFICANCE

As growth and development of the jaws continue in the preadolescent patient, a glass fiberreinforced composite temporary removable partial denture can be an esthetic and conservative option for replacement of missing anterior teeth.

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#### INTRODUCTION

**P**rosthetic replacement of the edentulous areas in the anterior maxilla always presents an esthetic challenge to the clinician.<sup>1</sup> A variety of therapeutic modalities, from implants to conventional fixed partial dentures or even removable partial dentures, has been used for the replacement of missing anterior teeth. The glass fiber-reinforced composite materials offer an attractive alternative treatment for the replacement of missing teeth especially in the anterior maxillary region.<sup>1–4</sup>

The reinforcement of composite resins by fibers improves both their fracture toughness and resistance.<sup>5</sup> The glass fiber-reinforced composite material offers a restorative solution that produces minimally invasive, esthetic, and cost-effective metal-free tooth replacements. Saving of time, ease of application, absence of metal allergy, and ease of cleaning are other advantages of this technique. Moreover, the use of glass fiber composite framework can potentially overcome the problem of debonding of composite luting cement to the frame of the resin-bonded fixed partial denture and the esthetic liability of the underlying cast metal frameworks.<sup>6</sup>

Growth and development of the maxilla continues usually up to the

\*Research Assistant, Department of Prosthodontics, University of Cumhuriyet, Sivas, Turkey †Assistant Professor, Department of Prosthodontics, University of Cumhuriyet, Sivas, Turkey ‡Research Assistant, Department of Prosthodontics, University of Cumhuriyet, Sivas, Turkey age of 17 years in males.<sup>7</sup> This growth of the maxilla in a transversal direction limits fixed restoration in a patient who has edentulous space crossing the sutura palatina media.

This clinical report presents the treatment for a young male, who has edentulous space in the anterior maxilla, by the replacement of a glass fiber-reinforced composite temporary removable partial denture.

#### CLINICAL REPORT

A 13-year-old young boy was referred for treatment of an anterior maxillary edentulous space expressing extreme dissatisfaction with his appearance. Two years previous, he had fallen down while he was riding his bicycle, resulting in the loss of both his central incisors and right lateral incisor. Prior to the treatment, detailed dental,

medical, and social histories were obtained from the patient. On examination, the patient had good periodontal health. No evidence of bruxism or wear facets on the occlusal surfaces of the teeth was found. Diastemas between right canine and first premolar, left lateral incisor and canine, and canine and first premolar were observed. The patient had a normal horizontal and vertical overlap and canine-protected occlusion (Figure 1A,B). There was not any presence of root fragment or any pathology in the radiograph (Figure 2).

To address the patient's primary concerns, a treatment plan was developed that included placement of a glass fiber-reinforced composite temporary removable partial denture. Implants are not indicated at this age, as the premaxilla continues to grow down and forward. Also, the patient was not interested in a conventional removable partial denture. The patient and his parents were informed about the usage of the glass fiber-reinforced composite temporary removable partial denture and they accepted this treatment plan option. For both arches, silicone impressions (Durosil L, PD President, Munich, Germany) were made, an interocclusal registration in maximal intercuspal position was obtained, and the shade was selected.

## LABORATORY PROCEDURE

Cast models were poured with a hard dental stone and mounted on a semi-adjustable articulator (Hanau Articulator, Teledyne Hanau, Buffalo, NY, USA). A separating agent (Isolant, Dentsply, Surrey, UK) was applied to the retainer teeth on the stone cast. Woven glass fibers (everSTICK, StickTech Ltd, Turku, Finland) were adapted to the left lateral





Figure 1. Pretreatment view of edentulous space. A, Occlusal view (mirror image). B, Frontal view.



*Figure 2. Periapical radiograph of anterior maxilla before treatment.* 



Figure 3. Glass fiber framework on cast.

incisor and the right canine teeth after which they were light-cured for 40 seconds. After bonding resin was applied, unidirectional glass fibers (everSTICK, StickTech Ltd) were cut to a suitable length and placed on woven glass fibers, and light-cured for 40 seconds. The glass fiber framework was adapted (Figure 3) and a thin layer of flowable composite (everSTICK, Stick-Tech Ltd) was applied on the edges of the fibers and light-cured for 40 seconds. The glass fiber framework was then checked intraorally for fit. The removable partial denture was veneered with light-polymerizing composite restorative material (Spectrum, Dentsply, Constance, Germany) and polymerized. The glass fiber framework was surrounded by composite restorative material and the teeth that were affixed to the glass fiber framework were freehand sculptured in place. It was finished by using medium

diamond burs (KG Sorensen, Barueri, Sao Paulo, Brazil) and finally polished.

## CLINICAL PROCEDURE

The completed temporary removable partial denture was checked intraorally. The accuracy of the marginal fitting and esthetic appearance of the fixed partial denture was verified. The occlusion was assessed. After occlusal and proximal contacts had been adjusted, the patient was instructed not to sleep with this temporary removable partial denture in place because of the risk of swallowing. Also, the patient was instructed to avoid biting hard foods or objects. Temporary fixed partial denture was seated on the teeth and satisfactory esthetic result was obtained (Figure 4A,B).

The patient was monitored at 3-month intervals for 15 months.

During that time, no deterioration in the prosthesis was observed. The patient's oral hygiene was satisfactory, the soft tissues healthy, and the patient expressed complete satisfaction with the temporary removable partial denture (Figure 5).

## DISCUSSION

This clinical report describes the restoration of a midline maxillary edentulous area using a conservative, esthetic glass fiber-reinforced composite temporary removable partial denture in a young prepubescent patient. The loss of anterior teeth can be psychologically and socially harmful to the patient. The trauma of which can be minimized by immediate replacement of the teeth, preferably using a fixed prosthesis.<sup>8</sup> However, when considering condylar growth of the mandible, the sutural growth of the maxilla is



Figure 4. Definite restoration of glass fiber-reinforced composite temporary bridge. A, Occlusal view (mirror image). B, Frontal view.



*Figure 5. Frontal view of the young boy after 15 months.* 

completed 2 years before. In males, condylar growth of the mandible stops at the age of 19, depending on bone age, which is determined with hand-wrist radiograph. Fixed partial denture restoration in a patient who has edentulous space, including sutura palatina media, can affect transversal growth and development of the maxilla. Björk studied the growth of the maxilla in three dimensions by implant method. He placed metal implant to the palatinal part of the maxillary central incisors and he reported that distance between these two implants increased 1 mm from the age of 10 to 18.<sup>7</sup>

On the other hand, patient's age also precludes dental implants in adolescents because at this age, the premaxilla continues to move down and forward. In adolescent patients, a flipper-type temporary prosthesis or a denture tooth attached to a Hawley retainer can be fabricated for temporary replacement of missing anterior teeth. However, this option is not very hygienic, with tissue inflammation and papillary hyperplasia as probable outcomes.<sup>9</sup>

In comparison with conventional removable denture, a glass fiberreinforced composite temporary removable partial denture is more esthetic, less costly, and offers the dentist the option of chairside repair. Saving of time, elimination of second visit, ease of application, and naturalness of feelings are other advantages of this technique.<sup>10</sup> However, taking out this temporary removable partial denture when eating can cause esthetic disadvantage.

This temporary removable partial denture could not be flexed over

deep tooth undercuts. Thus, it was applied shallow tooth undercuts. Also, woven glass fibers, which were extended to the cervical portion of the teeth, can preclude any fracture or deterioration in the cervical portion of the restoration.

Etched metal fixed partial dentures usually require some degree of tooth preparation. In this case, the glass fiber-reinforced composite temporary removable partial denture did not require tooth preparation, providing the patient with more treatment options in the future. Moreover, this temporary fixed partial denture can be easily repaired. It is most difficult to remove Maryland fixed partial denture without damage to the prosthesis or the abutment tooth.<sup>9</sup>

## CONCLUSION

Because growth and development of the jaws continue in the preadolescent patient who has high expectations regarding esthetics, the glass fiber-reinforced composite temporary removable partial denture was selected to treat a maxillary anterior tooth edentulous area crossing the midline of the face. This method can be a conservative and esthetic alternative treatment for edentulous space including sutura palatina media.

#### DISCLOSURE

The authors do not have any financial interest in the companies whose materials are discussed in this article.

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