Glass-Fiber Reinforced Composite in Management of Avulsed Central Incisor: A Case Report

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ABSTRACT

Reimplantation failure of avulsed anterior tooth in an adolescent patient requires removal of the failed tooth and consideration of restorative options. These options may include a removable partial denture, conventional 3-unit fixed partial denture, implant, or a resin-bonded appliance with a metal substructure (Maryland bridge). The glass-fiber reinforced composite material (everSTICK, StickTech Ltd, Turku, Finland) offers a restorative solution that is conservative and esthetic when compared to other restorations. Advantages include reduction of cost compared to conventional bridges, saving of time, elimination of second visit, ease of application, absence of metal allergy, ease of cleaning, and naturalness of feel. Its limitations include occlusal factors, and the presence of unsuitable abutment teeth. Another traditional contraindication is the presence of diastemas, which may limit the potential esthetic gains. This case of an 11-year-old girl, addresses the indications, preparation guidelines, and restorative procedures for an everSTICK bridge. (*J Dent Child*. 2004;71:66-68)

KEYWORDS: SPACE MAINTAINER, PARTIAL DENTURE, TRAUMA

Restoration of a single edentulous space in the anterior maxilla presents an esthetic challenge to the clinician. Treatment options for a single tooth replacement include implant, conventional 3-unit fixed partial denture, removable partial denture, or resin-bonded appliance with a metal substructure (Maryland bridge).[1,2] The glass-fiber reinforced composite materials (everSTICK, StickTech Ltd, Turku, Finland) may be considered an ideal choice for a fixed prosthesis to replace a single missing tooth, especially in the anterior maxillary region.

The glass-fiber reinforced fixed bridge offers a conservative, esthetic, and metal-free tooth replacement. Other advantages include reduction of cost compared to conventional bridges, savings of time, elimination of second visit, ease of application, absence of metal allergy, ease of cleaning, and naturalness of feel. Indications for this type of service include: tooth loss from trauma; medically compromised patients who cannot sit for extended periods of time or tolerate local anesthesia; periodontally compromised abutments; fixed space maintainer following orthodontic movement; and fixed provisional during the post-implant healing phase before loading.[3]

Its limitations are principally due to occlusal factors, such as a deep bite or heavy interference, presence of extensively restored abutment teeth, or the presence of diastemas, which may limit the potential esthetic gains.[4]

The material is made of glass fibers, thermoplastic polymer and light-curing reinforcing resin matrix. The everSTICK is made of unidirectional fibers, which increase the strength and stiffness of the final product perpendicular to the direction of the fibers.

Replacement of missing teeth with glass-fiber reinforced composite materials is a minimally invasive prosthodontic treatment because of the acid etching of the enamel.[5] The authors describe the replacement of a patient's own tooth as a pontic with glass-fiber reinforced composite materials with good success in short-term follow-up.

CASE REPORT

An 11-year-old female patient with reimplantation failure of the avulsed maxillary right central incisor was referred to the Department of Pedodontics, Faculty of Dentistry, Marmara University, for removal of the failed tooth and restorative care. Intraoral examination revealed healthy dentition and periodontal tissues. There was no

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Figure 1. Intraoral view of the patient.

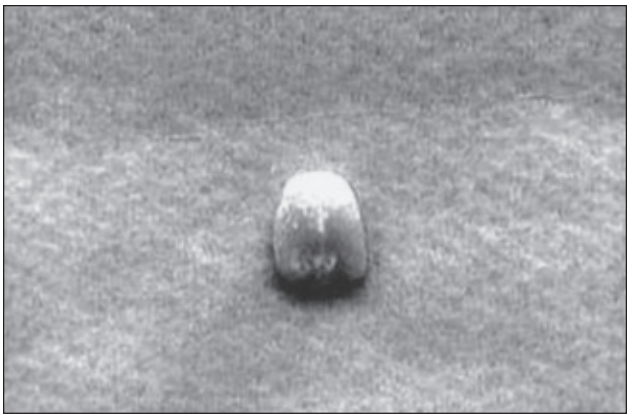

Figure 2. Pontic tooth.

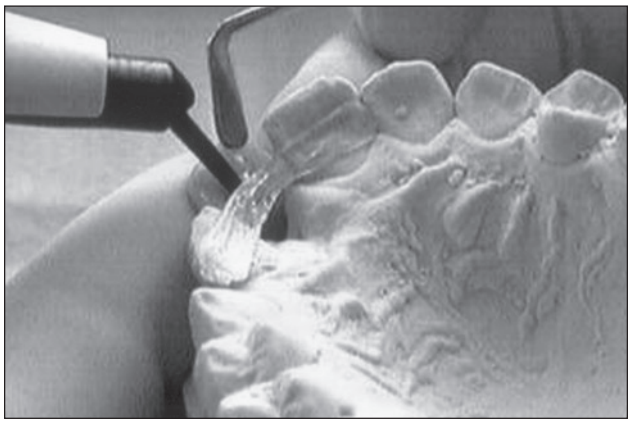

Figure 3. Application of the everSTICK to the pontic tooth.

Figure 4. Intraoral view of the everSTICK bridge.

evidence of bruxism or wear facets on the occlusal surfaces. Figure 1 shows the arch after extraction of the tooth and healing of the mucosa.

LABORATORY PROCEDURE

A post-extraction impression was made and a model was prepared. The crown and root of the patient's own tooth were separated from each other and the crown was prepared as a pontic (Figure 2). The everSTICK fibers were cut to a suitable length and applied to the model (Figure 3), and light-cured for 40 seconds. The bonding surfaces of the tooth crown were cleaned with pumice and acid etched (37% phosphoric acid) for 20 seconds before bonding was applied. Flowable composite was used to bond the crown to the everSTICK. After a thin layer of flowable composite was applied on the edges of the everSTICK, the bridge was trimmed and polished.

CLINICAL PROCEDURE

The lingual surfaces of the adjacent teeth were acid etched for 20 seconds. Bonding agent (Prime&Bond NT, Dentsply) was applied to the dried enamel and light-cured for 40 seconds. The everSTICK bridge was then adjusted and luted with a flowable composite (Tetric Flow, Vivadent) to the adjacent teeth. The occlusion was carefully checked, excess composite removed, and polishing and finishing completed (Figure 4). The patient was asked to return after 3 months. Figure 5 shows everSTICK bridge 6 months later.

Figure 5. Intraoral view of the patient after 6 months.

DISCUSSION

The resin-bonded appliance with a metal framework (Maryland bridge) is a treatment alternative for missing teeth when tooth conserving is needed. The success rate of Maryland bridges was reported to be 76% after 5 years.[6] The most common type of failure is the debonding of the cast metal framework from the luting cement or debondings of the luting cement from the enamel surface. Debonding of the framework from cement relates to the surface treatment of the cast metal alloy and rigidity of the framework. Tooth mobility

under function causes repeated tensile and compressive stresses at the interface between the framework and composite luting cement and predisposes fatigue failures of the adhesive joint.[7] This material has lower rigidity than cast metal, and diminishes stresses between the interface of luting cement and framework.[5] From this perspective, glass-fiber materials with lower elastic modules would be beneficial to reduce the stress level at the interface of the composite luting cement and enamel. Glass-fiber reinforced dental polymer with unidirectional fibers has a flexural modulus of approximately 18 GPa, which is considerably lower than the flexural modulus of a cast metal alloy, such as cobalt-chromium.[5] In addition, the dark color of a cast metal frame might cause esthetic problems in the anterior region, which are overcome by the fiber framework.

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