Chairside fabricated fiber-reinforced composite fixed partial denture

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Key Words: *: Fiber-reinforced composite, fixed partial denture.*

Introduction

The advances in the materials and techniques for adhesive dentistry have allowed the development of non-invasive or minimally invasive approaches for replacing a missing tooth in those clinical situations when conservation of adjacent teeth is needed. Good mechanical and cosmetic/aesthetic properties of fiber-reinforced composite (FRC), with good bonding properties with composite resin cement and veneering composite are needed in FRC devices. Some recent studies have shown that adhesives of composite resins and luting cements allow diffusion of the adhesives to the FRC framework of the bridges. By this so-called interdiffusion bonding is formed [1]. FRC bridges can be made in dental laboratories or chairside. This article describes a clinical case of chairside (directly) made FRC Bridge, which was used according to the principles of minimal invasive approach. Treatment was performed by Professor Vallittu from the University of Turku, Finland.

Clinical Case

The patient is a 33 year old female who lost the first premolar because of root fracture caused by occlusal trauma (Figure 1).

Figure 1: Lateral view of the missing tooth.

The fabrication of a traditional fixed partial denture was contraindicated due to patient's young age and intact neighbouring teeth. As replacing the missing tooth quickly is important to patient's appearance. Directly made FRC bridge was selected in order to provide quick and minimally invasive fixed solution to the patient. The treatment was completed during one visit to the dentist.

Clinical Protocol

Materials used are shown in Table 1. There were free spaces on the occlusal surface for fibers of the framework. Consequently, no cavity preparation for receiving vertical support for the bridge was needed (Figure 1).

Table 1. Materials used in the study

Brand	Manufacturer	Composition
Z100	3M ESPE, Seefeld, Germany	Aliphatic and aromatic acrylic monomer
Tetric Color	Ivoclar, Schaan, Liechtenstein	Paste of dimethacrylates, silicon dioxide and pigments
everStick	StickTeck Ltd, Turku, Finland	PMMA, Bis-GMA, E-glass fibers
Stick Resin	StickTeck Ltd, Turku, Finland	60% BisGMA-40% TEGDMA
Scotchbond (multi-purpose) Adhesive.	3M ESPE,St Paul, MN, USA	HEMA, Bis-GMA, water

PMMA: poly methyl methacrylate, M_w 220.000
BisGMA: bisphenol A-glycidyl dimethacrylate
EGDMA: triethylenglycol dimethacrylate
HEMA: hydroxyethyl methacrylate.

The rubber dam for good isolation was used. A piece of resin impregnated glass fibers was cut and spread from the ends for increasing the bonding surface area (Figure 2).

Figure 2: Placement of the fibers.

The fiber bundle was placed so that the buccal cusp of premolar was encapsulated with the

fibers. Application of acid etching (37% phosphoric acid gel). Subsequently, the gel was rinsed thoroughly and gently air dried. Adhesive resins were applied according to the manufacturer's instructions (Figure 3).

Figure 3: Bonding the tooth surfaces.

Flow composite was applied on the bonding surfaces prior placing the fiber bundle. The flow composite was not light cured before fibers were pressed tightly against the tooth surface using transparent silicone mould (Figure 4).

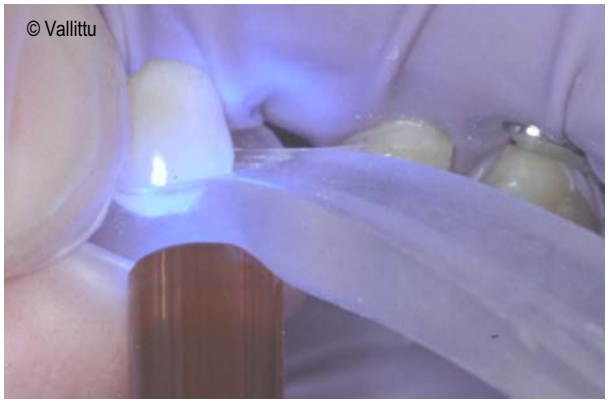

Figure 4: Pressing the fiber bundle against the tooth surface.

The resin impregnated fibers were light cured initially through the silicone mould. The purpose of the flow composite was to seal the space between the fiber frame and the enamel surface. Placement of an additional fiber bundle on the buccal surface of the canine and pressed tightly against the fiber that was applied (Figure 5).

Figure 5: Placement of an additional fiber bundle.

The fiber framework was polymerized two times for 40 seconds. Fiber-frame work was characterized by light curing paints (Tetric color) (Figure 6).

Figure 6: Applying of light curing paints.

Fiber-frame work was fully covered with a thin layer of filling composite resin and pontic was veneered with composite resin. (Figure 7).

Figure 7: Veneering the pontic area.

Care must be taken not to cut the reinforcing fibers when interproximal spaces are opened (Figure 8).

Figure 8: Opening of the interproximal spaces.

Occlusion was carefully adjusted. Figures 9 and 10 show occlusal and labial views of the finished restoration.

Figure 9: Occlusal view of the finished bridge.

Figure 10: Lateral view of the finished bridge.

Conclusion Remarks

The reported case has been followed for over five years without any major or minor problems. Based on current clinical results, it is reasonable to expect FRC-fixed partial dentures may attain longevity of 5-10 years [2-5]. However, it needs to be emphasized the importance of using high quality and proven materials with correct use of the materials.

References

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