Restoration Of A Fractured Tooth With Dental Glass Fiber And Composite Crown: A Case Report

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Abstract

Restoration of a fractured tooth is routinely performed in clinical practice. Many factors are considered in the effort to provide optimal mechanical properties, esthetics, and longevity. Improvements in bondable dental glass fiber systems have stimulated a trend toward more conservative techniques. The aim of this clinical report is to describe restoration of a fractured maxillary lateral incisor tooth with a dental glass fiber post and composite resin without additional crown coverage. The restoration made it possible to maintain the remaining tooth structure in a good occlusion and resulted in a high level of patient satisfaction.

INTRODUCTION

Glass fiber posts bonded to root canal dentine via resin cement are now very popular for the restoration of endodontically treated teeth ([1,2,3]). The similarity in modulus of elasticity of glass fiber posts and resin cement with that of dentine have been advantageous in improving the performance of these kinds of restorations, as compared with cast metal post and core restorations ([1,4,5]). It is thought that fiber posts can distribute stresses between the post and dentine by their flexibility under load, resulting in favorable clinical behavior ([6,7]). Thus if excessive loads are applied to the tooth, the post will be able to absorb stresses, reducing the possibility of root fracture ([6]). The use of a post–core crown to restore the tooth has been reported to play a significant role in resistance of the tooth ([8]).

Improvements in composites and the development of dentine bonding systems have stimulated a trend toward more conservative techniques of tooth restoration, which afford increased opportunities to preserve badly broken permanent incisor teeth ([9]). Currently used glass fiber post systems are designed to be corrosion resistant, are able to bond to tooth structure, are esthetically pleasing, and allow retrieval when the post core system fails ([6]).

Glass fiber is a biocompatible, inert, translucent, and durable material that includes free radicals that can form chemical connections. Fibers for reinforcement are silanized electrical glass (E-glass) fibers and are impregnated with polymer by the manufacturer. EverStick (continuous unidirectional E-glass fiber bis-GMA with PMMA–bis-GMA matrix, impregnated with light-polymerizing resin, Stick Tech Ltd, Turku, Finland) offers a long-term, easy-to-use, reliable, and cost-effective material with a scientifically documented background ([6,10,11,12,13]).

The purpose of this study was to describe a glass fiber post–core and a direct composite crown strong enough to be used to restore an anterior tooth. The influence of fiber reinforcement, esthetics, conservation, and cementation technique on the resistance of the anterior composite post crown was also evaluated.

CLINICAL CASE

An 28-year-old male patient was initially examined for acute pain in the maxillary right lateral incisor. Clinical examination revealed that her maxillary right lateral incisor tooth was fractured at the cementoenamel junction. The root of the tooth was treated endodontically and filled with gutta percha and resin sealer in the normal manner, followed by gingivectomy in the labial region (Fig. 1). Afterward, the gutta percha was removed with Gates drills (Antaeos, VDW GmbH, Munchen, Germany) without enlarging the canal. At least 3–5 mm of gutta percha was left at the apex of the root. The depth of the prepared canal was measured using a periodontal probe, and the root canal drilled according to general principles until it measured the estimated depth required for the post. The inside of the root was rinsed and dried carefully, and the working area was isolated from moisture by cotton plugs.

The root canal walls were etched with 37% phosphoric acid for 15 seconds, washed with spray, and then air dried. The excess water was removed from the post space using paper points. Subsequently, two consecutive coats of bonding agent (Single Bond 2, 3M ESPE, St Paul, MN, USA) were applied with a microbrush and air dried, and then cured with LED light source of 1000 mW/cm ^{2} intensity (Elipar Free Light 2, 3M ESPE, St. Paul, MN, USA) for 20 seconds. To fit with the diameter of the canal, an EverStick Post (Stick Tech Ltd, Turku, Finland) with a diameter of 1.2 mm was used. The post was inserted into the root canal to the appropriate depth, and the coronal section of the post was shaped by hand to improve support for the crown, and then shortened to an appropriate length with sharp scissors.

Prior to cementation, a layer of light-curing resin adhesive (Stick Resin, Stick Tech Ltd, Turku, Finland) was applied to the surface of the post by gently blowing the surface of the post with dry, oil-free air and curing with light for 10 seconds. After checking the fit of the glass fiber post inside the root canal, the post was also light cured for 20 seconds.

A dual-resin cement (Rely X Unicem, 3M ESPE, Seefeld, Germany) was used as a luting agent for the glass fiber post. The cement was applied with a lentulo spiral into the post space, and the post was inserted into the canal (Fig. 2). Excess resin cement was removed with a clean microbrush and the cement was light cured for 40 seconds. The restorative procedure was completed by building up the tooth incrementally with a direct resin composite restoration (Gradia Direct, GC Corporation, Tokyo, Japan) of an appropriate shade (Fig. 3a,3b). The occlusion was carefully adjusted to avoid any primary contacts or traumatic occlusal forces to the restored tooth. Finally, the composite resin crown restoration was polished with a composite polishing kit (Soflex, 3M ESPE, St Paul, MN, USA) (Fig. 4).

The patient was recalled at three months for clinical evaluation of the restored tooth. During the recall appointment, an assessment of the stability and longevity of the restoration was performed. Color stability, surface staining, and retention due to fracture of the post or fracture of the composite build-up material were evaluated and found to be acceptable. The patient had no complaints about the restoration.

Figure 1

Figure 1: Clinical situation of a 18-year-old patient whose maxillary lateral incisor was fractured

Figure 2

Figure 2: Fiber post adjusted and luted

Figure 3

Figure 3a: Composite build up

Figure 4

Figure 3b: Composite crown

Figure 5

Figure 4: Postoperative clinical result

SUMMARY

A fractured tooth restored with a glass fiber post and direct resin composite crown restoration exhibited a favorable clinical result after three months of service. Although the long-term durability of this adhesive post–core restoration is still unknown, it was evaluated as successful.

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