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RESEARCH ARTICLE

RESTORATION OF FRACTURED TEETH WITH CUSTOMIZABLE GC EVERSTICKGLASS FIBER POST AND COMPOSITE CROWN: 2 CASE REPORTS

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ABSTRACT

In this innovative era of material science, newer methods and materials which were facilitated to overcome the shortcomings of the traditional methods have been articulated for the restoration of grossly destructed teeth. As such a material is Customizable fiber post, Everstick post. Two clinical case reports ofrestoring form and function using this novel material are documented here. In the first case minimal preparation was carried out without enlarging the canal and in the second case an anatomic post was fabricated in a wide and flared root canal. These techniques can be used as substitutes to conventional methods of rehabilitation.

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INTRODUCTION

A substitute to metallic and prefabricated fiber posts, fiber reinforced composite (FRC) materials have been suggested for making customized postin the recent times. The fiber bundles can be adjusted directly into the post space, so as to attain a custom-made post. Numerous in Vitro studies have studied the mechanical properties and indications of this FRC materials (Cagidiaco et al., 2008). Everstick post is an example of customizable fiber posts which are flexible duringmanipulation and rigid after light curing (Priti, 2016). This resin-impregnated, uncured glass fiber post with an Interpenetrating Polymer Network (IPN) resin matrix can be cured to the anatomic shape of the root canal (Vidhya, 2006). Everstick postshave adhesive surface and are flexible before curing therefore can be shaped individually (Vilkinis, 2016). EverStick posts are individually formed glass fiber post which is soft, flexible and can becustomized to adapt the morphology of the canal hence reducing enormous root preparation.The flexural strength (after light curing) and elasticity of Everstick posts are very similar tonatural elasticity of the dentin. The risk of root fracture can be minimized since stresses of occlusion will be evenly dispersed on the root surface (Pratik, 2016).

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Since the modulus of elasticity is similar to dentin there isfavorable stress distribution of Everstick post along the root which prevents catastrophic root fractures.Satisfactory long-term performance of bonded custom made posts has also been confirmed clinically (Erkut, 2006). Further precisely, the alteration in the polymer matrix of everStick compared to the matrices of other tested FRCs is based on the presence of poly methyl methacrylate (PMMA) chains in the crosslinked polymer matrix. PMMA chains plasticize the cross-linked bisGMA based matrix of the everStick FRC, and therefore minimize stress developed in the fiber-matrix interface during deflection. This may be assumed to contribute to the improved strength of everStick post (Lassila et al., 2004). The purpose of this article is to describe a customizable glass fiber post–core and a direct composite crown strong enough to be used to restore an anterior tooth. Rehabilitation of two alternate cases of anterior teeth that had undergone trauma are presented here.

Case report 1

A 36 year old male patient reported to the department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, with the chief complaint of fractured upper front teeth from the past one week. On clinical examination, 22 revealed Elli's Class III fracture and there was tender on percussion in relation to 21(Figure 1). To confirm the clinical findings, an intra oral periapical radiograph was taken (Figure 2).

After thorough clinical and radiographic examination a detailed treatment plan was chalked out and discussed with the patient and the consent was obtained.

Figure. 1. Preoperative View

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Figure 2- Preoperative Radiographs

Figure 3- Radiograph showing obturation irt 21 and 22

In the first visit, single visit root canal treatment was carried out in relation to 21 and 22 (Figure 3). In the next visit post space preparation was done irt 22 keeping in mind not to enlarge the canal. 5 mm of guttapercha was left at the apex of the root (Figure 4). The canal was cleanedby rinsing with saline and paper points were use toair dry. The depth of the prepared canal and the estimated height of the coronal structure to be buildup were measured. The root canal walls were etched with 37% phosphoric acid for 15 seconds, washed with spray, and then air dried. To fit with the diameter of the canal, GC EverStick Post with a diameter of 1.2 mm was used (Figure 5). With the help of sharp scissors, the EverStick fiber was cut (Figure 6) to a suitable length and the posts were manipulated with tweezers to adapt to the canal walls (Figure 7). Later, two consecutive coats of bonding agent were applied to the canal with a microbrush and air dried, and then cured with LED light curing unit was used to cure the same. 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 was appliedwith a lentulo spiral into the post space as a luting agent. The post was then inserted into the canal. Excess resin cement was removed and the cement was light cured for 40 seconds (Figure 8).

Figure 4. Post space preparation done irt 22

Figure 5. GC Everstick post

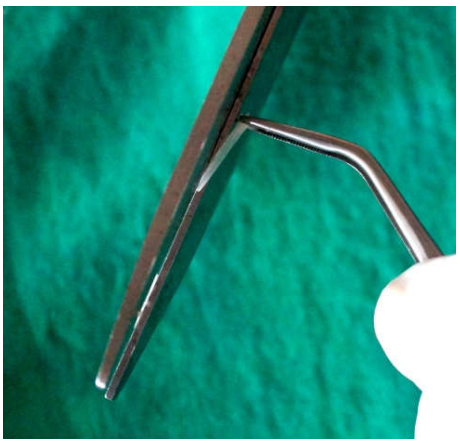

Figure 6. With the help of sharp scissors, the EverStick fiber was cut

The restorative procedure was completed by building up the tooth incrementally with a direct resin composite restoration of an appropriate shade. 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. An intraoral periapical radiograph was taken to view the same (Figure 9).

Figure 7. Adaptation of the post

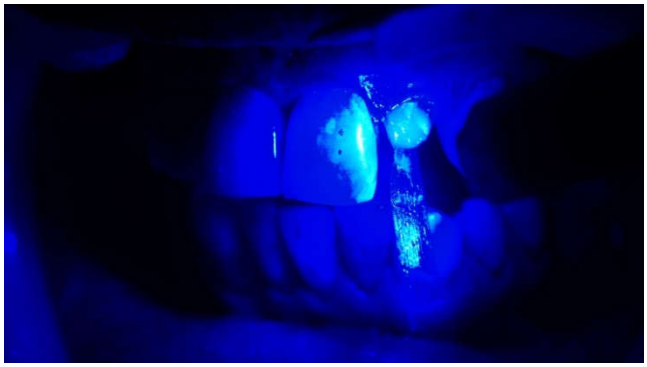

Figure 8. Curing of the post

Figure 9. Postoperative Radiograph

Figure 10. Preoperative View

Case Report 2

A 24 year old male patient reported to the department of Conservative Dentistry and Endodontics, KVG Dental Caollege and Hospital, with the chief complaint of fractured upper front teeth from an accident that occurred 2 days ago at that time (Figure 10). The root of the tooth 11 was treated endodontically and filled with guttapercha and sealer (Figure 11). Post space preparation was done in the second visit with 5 mm of guttapercha left at the apex of the root. In this case the root canal size was large. The canal was rinsed with saline and dried carefully using paper points. With the help of sharp scissors, the EverStick fiber was cut to a suitable length and the posts were manipulated with tweezers to adapt to the canal walls. Two posts were needed in this case as the root canal space available was too large.

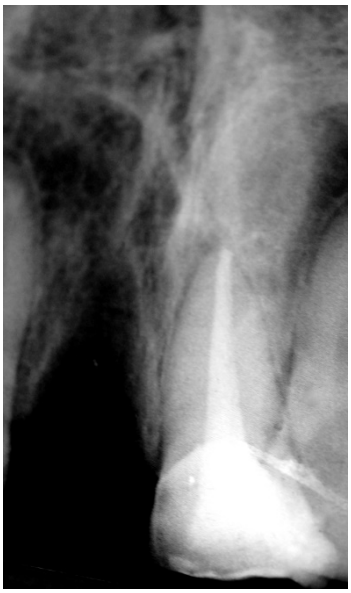

Figure 11. Radiograph show obturation irt 11

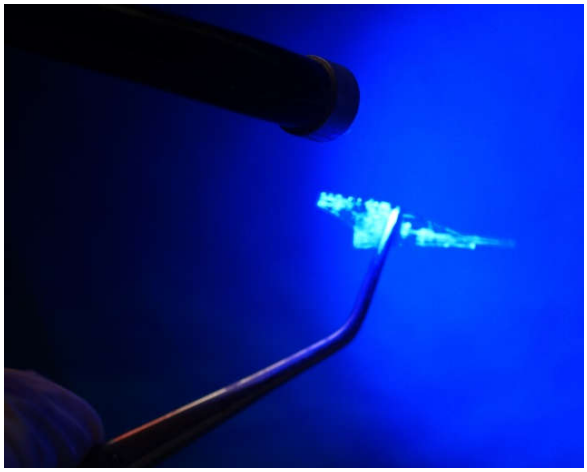

Figure 12. Light curing of the Everstick Post

After adaptation the post was cured separately (Figure 12). The canal was filled with the dual cure resin cement, and then slowly the fiber was inserted into the canal. The coronal part of the post fiber was shaped as a fan or wing while it was still soft to retain the core(Figure 13). Any excess cement, if present was removed at this point. The EverStickfibre and the cement were light cured for 40 seconds using an LED source.

Figure 13. Fan shaped Coronal portion of the Post

Figure 14. Postoperative view

When the post and cement were cured, the core was built using composite resin (Figure 14).

DISCUSSION

Better opportunities to preserve grossly broken permanent teeth with more conservative and affordable techniques are available due to developments in composites and the improvement of dentine bonding systems (Combe, 1999). Everstick posts arebiocompatible, inert, translucent, and strong customizable posts that inculcate free radicals which form chemical networks. Silanized electrical glass (E-glass) fibers are the fibers used for strengthening (Bagis, 2006). In case report 1 minimal post space preparation was done. The concept of using individually formed FRC posts is based on minimizing the preparation need to the deeper parts of the root canal, and allowing addition of higher quantity of FRC material to the coronal root canal opening of the tooth. Thus, the concept minimizes stress at the apical parts of the post and enables a stiff and fracture resistant post with larger diameter close to the core (Makarewicz, 2013). Restoring teeth with flared canals and thin dentinal walls is a challenge for any clinician. Due to absence of adequate radicular dentin the tooth experiences a higher risk of biomechanical failureas in case report 2. In the past, cast metal post-and-core was widely accepted as a treatment modality for restoring teeth with inadequate coronal tooth structure. However, due to the multiple appointments and additional laboratory procedures required as well as issues like the high modulus of elasticity of the cast metal (203.6 GPa) there was a need for alternative restorative technique and materials (Shah, 2016). According toLe Bell et al higher bond strengths of individually formed IPN post was more when compared to prefabricated fiber post (Le Bell, 2005). EverStickposts are used to reinforce weakened roots without increasing the likelihood of root fracture.

The flexible post is easy to handle and provides maximum support for the crown (Memarpour, 2013). Hence Everstick post was used to restore in casr report 2. Free radical polymerization occur between the resin matrix of the FRC post and the composite resin luting cement in situ polymerization of an individually formed FRC post (Everstick post). Free radical polymerization between the post and core-built-up composite resin occurs as a result of oxygen inhibition layer formed on the coronal part of the post (Mannocci, 2005). It can be individually adapted to the shape of the root canal before light-curing while offering high strength after light curing. EverStick Post is made up of the patented interpenetrating network (IPN) technology which consists of bundles of approximately 4000 individually silanated E-glass fibers that are fully impregnated with resin. Adhesive and micromechanical bonding to both composite cement and core composite is attributed to its IPN structure.This helps in even distribution of occlusal stresses on the root structure. It is also able to mimic the anatomy of the canal, thereby reducing the risk for root fracture tremendously (Shah, 2016).

Conclusion

Clinically it is of importance to have the best possible post-curing adaptation of the cement and post to the walls of the root canal. This is important because the physical contact of the post and the cement by the adaptation forms the basis for the dentine bonding. It is also important to receive sealing against possible microbe penetration through the gaps towards periapical region of the restored teeth.From clinical point of view, there is a lack of long-term clinical research on Everstick post. More clinical trials have to be carried out with recallsfor a better analysis of Everstick post.

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