CASE REPORT

Esthetic Rehabilitation of Fractured Maxillary Anterior Permanent Tooth Using Glass Fiber Post and Full Coverage Restoration: Case Report

Varsha M Sebastian[1], Reshma Rajasekhar[2], Azeem H[3]

Abstract

The incidence of maxillary anterior teeth being injured is very high as they are anteriorly placed in the arch, and they have a protrusive eruptive pattern. Maxillary anterior injury can cause changes in a patient's appearance as well as function and thus leading to a psychological impact. The application of intracanal post in root canal treated tooth improves the retention of eventual restoration. The fiber post has a modulus of elasticity very similar to dentin, and they strengthen the remaining tooth structure and increase tooth fracture resistance. The present case describes an Ellis class IV fracture which was rehabilitated using a fiber post and full coverage restoration.

Keywords: Crown fracture, Esthetic rehabilitation, Fiber post.

Journal of Scientific Dentistry (2021): 10.5005/jp-journals-10083-1013

Introduction

The incidence of maxillary anterior teeth being injured is 37% because of their anterior placement in the arch and they have protrusive eruptive patterns.[1] The second highest incidence of fracture is for maxillary laterals followed by mandibular central incisors. Maxillary anterior injury can cause changes in a patient's appearance as well as function and thus leading to a psychological impact. Therefore there is a demand for the restoration of lost tooth structure in a conservative manner and as natural as possible.

A good clinical assessment of endodontically treated tooth regarding the tooth structure remaining, periodontal status, and the result of root canal treatment must be considered. If the coronal structure loss is more than half, a root canal post is essential for rendering retention.[2]

The fiber post introduction in the early 1990s had a great impact on the clinical procedure for restoring endodontically treated teeth.[3] The technological evolution has enabled the manufacturers to provide superior esthetics, mechanical properties, and improved radiopacity and its availability in various shapes.[4]

The present case report illustrates Elli's class IV fracture which was restored with glass fiber post and full coverage restoration.

Case Report

A 48-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of a discolored upper anterior tooth. On examination maxillary right central incisor was found to be fractured. The patient gave a history of falls 1 year back. The vitality test is done with an electric pulp tester and the cold test did not show any response. On through clinical and radiographic examination, the diagnosis was made as Ellis class IV fracture in relation to 11 (Figs 1 and 2). Root canal treatment followed by fiber post and core and full coverage restoration was planned.

The access opening was done with an endo access bur #2 (Dentsply Maillefer, Switzerland). A glide path was prepared using a size 10K-file (Mani, Tochigi Ken, Japan) and RC-Prep (Premier dental products, Philadelphia, USA) was used as a lubricant. Working length was confirmed with radiographs at 18 mm for the apex

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How to cite this article: Sebastian VM, Rajasekhar R, Azeem H. Esthetic Rehabilitation of Fractured Maxillary Anterior Permanent Tooth Using Glass Fiber Post and Full Coverage Restoration: Case Report. J Sci Den 2021;x(x):xx–xx.

Source of support: Nil

Conflict of interest: None

Fig. 1: Preoperative intraoral photograph

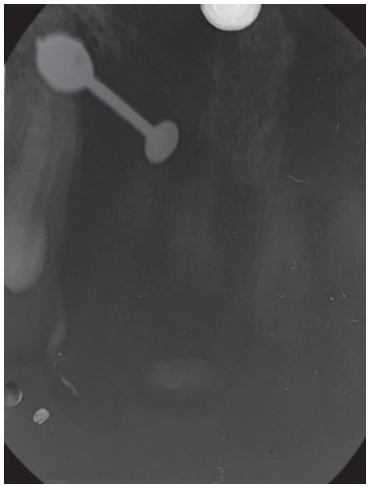

Fig. 2: Preoperative intraoral periapical radiograph

Fig. 4: Post obturation intraoral periapical radiograph

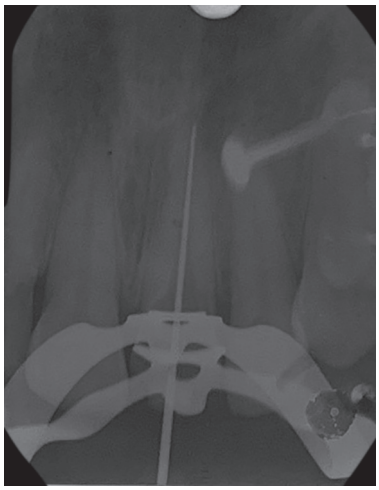

Fig. 3: Working length determination done

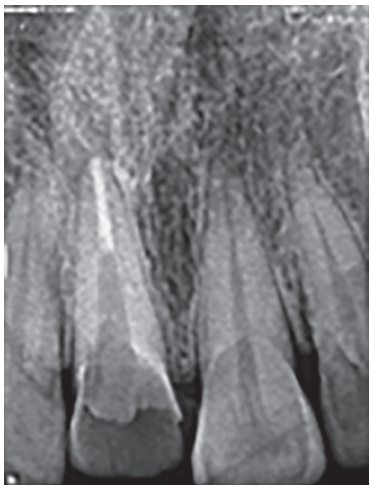

Fig. 5: Post space preparation

(Fig. 3). Cleaning and shaping of the canal were performed with hand instrumentation (passive step-back technique) (Mani, Tochigi Ken, Japan) up to master apical size 50 and step back done up to 3 sizes larger file (#70) and irrigated with 15 mL of 3% sodium hypochlorite (Percan, Septodont, India) intermittently. Calcium hydroxide paste (Metapex, Metabiomed, South Korea) was used as an intracanal medicament and temporized with Zinc Oxide Eugenol (ZnOE) temporary cement. Analgesics were prescribed to manage the pain.

The patient was asymptomatic during the second visit which was scheduled 10 days later. Under rubber dam isolation, calcium hydroxide was removed from the canal by irrigation with 10 mL of 3% sodium hypochlorite and H-file #50. Saline was used to flush out sodium hypochlorite. Final irrigation was done with 2% chlorhexidine (Asep-RC, Anabond, India). A radiograph with a master cone was taken to confirm the length and size. Obturation was completed using gutta-percha (Maillefer Densply, Switzerland) and AH Plus sealer (Dentsply, German) using lateral compaction technique and confirmed radiographically (Fig. 4).

Gutta-percha was removed with peeso reamer #3 (Maillefer Densply, Switzerland) leaving 4 mm of the apical seal. The post space preparation was done with a low-speed bur provided by the manufacturer (Tenax Fiber Trans Drills, Coltene, USA). The canal was irrigated with saline and dried with paper points. A radiographic evaluation was carried out, to make sure there was no residual gutta-percha on the post space preparation walls (Fig. 5). Tenax trans fiber post of diameter 1.1 mm was tried and the excess was demarcated and cut using a rotary bur. The post was then cleaned with alcohol and coated with a silane coupling agent using a micro brush and air-dried.

Dual cure resin cement Rely X U200 (3M ESPE, Minnesota, USA) was hand-mixed for 10 seconds. Post was placed into the post space and excess resin cement was removed and light-cured for 40 seconds (Figs 6 and 7). Core built-up was done with light cure composite (Filtek Z350, 3M ESPE, Minnesota, USA). Following this tooth preparation was done to receive a full coverage restoration (Fig. 8). PFM crown was cemented in relation to tooth number 11 (Figs 9 and 10).

Discussion

Root canal-treated teeth are structurally and mechanically different than vital teeth. Endodontically treated teeth have reduced fracture resistance.[5] When there is extensive loss of hard tissue, additional

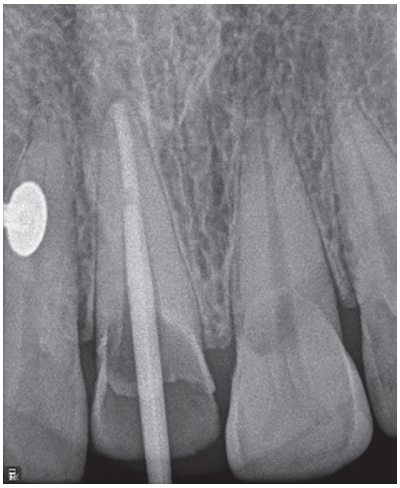

Fig. 6: Fiber post cementation done

Fig. 9: PFM crown cementation done

Fig. 7: Fiber post cementation intraoral photograph

Fig. 10: Intraoral photograph

Fig. 8: Crown preparation done

reinforcement of root canal treated tooth is achieved using intracanal posts.[6] Restoring such teeth with materials having similar elastic modulus to dentin is preferred as they are less prone to fracture.

Complicated crown fracture has been traditionally restored with a cast post. Evolution in adhesive dentistry has resulted in the use of resin-based fiber posts for reinforcing the restoration of endodontically treated teeth.[7]

Conservative preparation with minimal radicular structure removal is done when posts are indicated. Studies have shown that fiber posts are associated with an increased incidence of restoration failure when compared to metallic posts but with a lower incidence of tooth fracture.[8]

Fiber post has a modulus of elasticity similar to dentin and increases endodontically treated teeth's resistance to fracture.[9] Previously fiber posts were radiolucent but recent fiber posts are radiopaque. They even conduct light for the polymerization of resin-based luting cement. Because of these advantages, fiber post is preferred for restorations with composite resins.

Bonding of fiber posts to root canal dentin improves the distribution of forces applied along the root, thus decreasing the risk of root fracture and thereby contributing to the reinforcement of the remaining tooth structure. Studies by Gbadebo and Ajayi[10] and Uthappa and Deepika[11] concluded that fiber post presented a significantly higher survival rate than did metal post while no difference was observed in success rate or root fracture rate.

Conclusion

Tooth maintenance after traumatic episodes has a direct impact on the patient's quality of life and restoring psychological states. The use of glass fiber–reinforced root canal post and composite material for the treatment of traumatized anterior teeth provide excellent esthetic and functional results. Various factors must be considered before inserting a fiber post such as remaining tooth structure, root canal size, and configuration.

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