

Esthetic Rehabilitation of a Crown Fracture with Glass-Fibre-Reinforced Posts: A Case Report

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Abstract- Traumatic tooth injuries are common in children. When permanent teeth are involved, it can be a challenge to save these teeth. This case describes rehabilitation of fractured carious mandibular central incisors. Endodontic treatment was followed by the placement of a glass fibre-reinforced composite resin post and all ceramic crowns. During follow-up appointments, clinical and radiographic examinations revealed the efficacy of the treatment in retaining the fractured carious tooth.

Index Terms- Ceramic crowns, dentoalveolar trauma, glass fiber post.

I. INTRODUCTION

The healthy oral cavity is necessary for beautiful smile. Treating a child's traumatized carious permanent teeth can create difficulties for the child, the parents and the dentist as well. Studies in several countries have reported the prevalence of dentoalveolar injuries ranging from 6% to 37%.¹ More than 30% of accidents occur at home and about 25% in school.² They may be a result of sports injuries, automobile accidents etc., although falls are the most frequent cause.³ Maxillary incisors are most commonly involved in dental trauma and dental crowns are frequently damaged because of their exposed position in the dental arch.⁴ Traumatic injuries are next most frequent in the upper and lower lateral incisors and the upper canines.⁵

When there is extensive loss of coronal tooth structure, a tooth colored metal-free post may be required for retention of crown to restore the dental morphology. In recent years, various types of fiber reinforcement have come into widespread use as an alternative to cast or prefabricated metal posts.⁶ The advantages of using reinforced fiber to construct an intracanal post include resin composite crown reinforcement, translucency, and relative ease of manipulation.⁶ The lower flexural modulus of fiber-reinforced posts measures closer to that of dentin and can decrease the incidence of root fracture.

This paper presents a case report of 9-year-old girl with severely decayed, fractured mandibular central incisors that were restored with glass fibre-reinforced composite resin posts (GFRC), a new generation of fiber posts composed of densely packed silanated E glass fibers in a light curing gel matrix.

II. CASE REPORT

A 9-year-old girl presented to the Department of Pedodontics, Bharati Vidyapeeth Deemed University Dental College and Hospital, Sangli, India with a complex crown fracture of carious mandibular central incisors. She had no known allergies or systemic problems. The trauma was caused by a fall on ground about one month earlier. Intraoral examination revealed no lacerations or evidence of alveolar bone fracture or gingival inflammation (**Fig. 1,2,3**). Teeth responded to the electric pulp test and vitality test as nonvital. Radiology showed completed root development with no other fracture or injury in the adjacent teeth. However, a deep caries at lingual surface of mandibular central incisors was noted.

Considering the parents and patients esthetic demands, glass-fibre post with composite core followed by ceramic crowns for mandibular central incisors were planned. The parents were given detailed information about the whole procedure. The child was given local anesthesia, tooth was isolated with rubber dam and the root canal was instrumented and filled with calcium hydroxide-based sealer and gutta-percha using the vertical condensation technique (**Fig.4**).

The gutta-percha was partly removed leaving the apical 4 mm of the filling to maintain a good seal. The canals were prepared with standardized burs. Then close fitting posts were selected and evaluated radiographically. After etching of the coronal fragment with a 37% phosphoric acid gel for 20 seconds, the area was rinsed for 20 seconds then dried gently with air. A glass-fibre reinforced composite root canal posts were cemented using dual-curing luting composite system (Duolink) according to the manufacturer's instructions. Finally, core was build using composite resin to meet esthetic requirements for the anterior segment using the incremental technique and occlusal adjustment was performed (**Fig. 5**).

Mandibular central incisors were then prepared to receive all ceramic crowns following standard tooth preparation principles. After adequate gingival retraction, impressions were made with silicone material (Aquasil, Dentsply) using single phase technique. After evaluation of crowns in occlusion, they were luted using dual cure resin cement (**Fig.6,7**).

3 months after the treatment, clinical and radiographic examination confirmed the efficiency of using glass-fibre-reinforced posts.

III. DISCUSSION

Cast posts and cores are commonly used because of their superior mechanical properties. However, if a ceramic crown is chosen as the final restoration, the colour and opacity of the post may lead to discoloration and shadowing on the gingival and cervical areas of the tooth. To solve this esthetic problem, tooth-coloured fibre and zirconium post systems were introduced; these are capable of resisting occlusal loads and have light transmission characteristics similar to those of natural teeth.⁷ In addition, these materials allow us to restore the tooth with minimal sacrifice of additional tooth structure.

Various changes have been made to glass-fibre post composition, radiopacity and shape which allow excellent results in restoration of damaged teeth. Recently developed posts are radiopaque, thus easily seen on radiographs. Modifications in post configuration have been made to achieve better adaptation to root canal shape. The translucent glass-fibre post has a modulus of elasticity similar to that of dentin and offers adequate mechanical properties.⁸ Transmission of light through the post also makes it possible to light-cure the resin cement and the bonding system in only one clinical step, thus simplifying the clinical procedure.⁹

In the current case, we used an adhesive, dual-cure luting composite system and a glass-fibre-reinforced composite root canal post. This technique can reinforce the restored parts and increase durability and survival. With a modulus of elasticity similar to dentin, the fibre post can reduce the concentration of stress and, thus, the rate of catastrophic root fracture compared with cast posts.¹⁰

Compared with alternative techniques, such as a composite resin restoration, screw-post, cast-metal posts and dentin pins, restoration using a fibre post offers several advantages. It provides immediate esthetic and functional rehabilitation of the fractured tooth. Child's cooperation is one of the most important criteria in tooth conservation. In our case, our patient's cooperation was excellent and the endodontic treatment with post and crown therapy was successful

IV. FIGURES



Fig.1: Preoperative extra-oral view showing unaesthetic smile



Fig. 2: Intraoral view



Fig. 3: Intraoral view of mandibular arch



Fig. 4: Endodontically treated mandibular central incisors



Fig. 5: Placement of glass-fibre post



Fig. 6: All ceramic crowns cemented



Fig. 7: Postoperative facial view with smile

V. CONCLUSION

Use of glass-fibre reinforced composite root canal posts can be a simple and efficient procedure for the treatment of anterior traumatized teeth with excellent esthetic and functional results. The treatment described in the case report is simple and effective and helps to accomplish patient's esthetic and functional requirement.

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