



MANAGEMENT AND AESTHETIC REHABILITATION OF FRACTURED MAXILLARY INCISORS WITH FIBER-REINFORCED COMPOSITE POST AND FIXED PROSTHESIS

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ABSTRACT

Traumatic incidents are more common in young patients and generally involve the maxillary anterior teeth. Coronal fracture of such teeth involving the pulp may need conventional endodontic treatment and aesthetic reconstruction. If the remaining coronal tooth structure is less, it may often need post & core as post endodontic restorations. Fiber reinforced composite (FRC) post may be a valid option for such cases because of its esthetic, bonding property and modulus of elasticity closed to root dentin. The present case report is about the management and aesthetic rehabilitation of fractured maxillary central incisors with fiber-reinforced composite post followed by fixed prosthesis.

INTRODUCTION

Traumatic dental injuries occur more commonly in young patients and may range from enamel fracture to avulsions of tooth depending on severity [1]. In permanent dentition, maxillary incisor region is most commonly affected and often result in crown fractures [2,3]. Sometimes, remaining carious portion and large, fragile restorations could result in to coronal fractures in case of teeth which are endodontically treated [4].

Post and core technique is often recommended for endodontically treated anterior teeth who have less coronal tooth structure [5]. Also, the patient having fractured anterior teeth and lost tooth structure due to trauma may need immediate functional and esthetic treatment [6]. Considering the aesthetic cause, the clinicians generally choose the option of composite resin material as core material [5,7]. Among the various post systems available, the fiber reinforced composite (FRC) posts as post-endodontic restorations, have modulus of elasticity close to the dentin and they provide better resistance to tooth fractures than metallic posts [8].

The present case report is about management and aesthetic rehabilitation of fractured maxillary central incisors with fiber-reinforced composite post followed by fixed prosthesis.

Case Report

A 20 year old, male patient reported to the Department of Conservative Dentistry and Endodontics, Dr. R. Ahmed Dental College & Hospital, Kolkata with a chief complaint of fractured upper front teeth. Patient's medical history was non-contributory. His dental history revealed that a recent trauma caused fractures of his right and left maxillary central incisors. There was no associated sign & symptoms. On clinical examination, both maxillary central incisors i.e. 11 & 21 presented with Ellis class #3 fracture and they had lost more than half of its coronal tooth structure. (Fig. 1 – Pre-operative Intra oral photograph) Clinically, there was absence of mobility. But at the same time, diastemas were detected among the maxillary anteriors due to congenital absence of maxillary



lateral incisors. Radiographically, the teeth did not show any sign of periradicular changes or root fracture.

Treatment options were provided to the patients including cast metal post, fiber post & core and extraction followed by fixed prosthesis. Patient showed his interest towards preservation of fractured teeth and opted for fiber post & core restoration.

Hence, the final treatment plan consisted of single visit root canal treatment of 11 & 21, post endodontic restorations with FRC post & core followed by fixed prosthesis of 11 & 21 and reshaping of maxillary canines as lateral incisors. The whole procedures were explained to patient before treatment initiation.

Treatment Procedures:

Initially, local anesthesia (infiltration only) was administered (lignocaine 2% with 1:80,000 epinephrine) related to 11 & 21. The single visit root canal treatment (RCT) of 11 & 22 was done with manual ProTaper file system (Dentsply). After access opening from palatal side (removing all the pulpal content) and working length determination (Fig. 2 – Working length determination), the tooth was biomechanically prepared up to #F5 ProTaper file. The irrigation was done with 2.5% NaOCl and 17% EDTA alternatively during the complete procedure. The canal was dried with paper points and was obturated properly with gutta percha (G.P.) using lateral condensation technique after AH Plus resin sealer (Dentsply) application followed by closed dressing.

At the next visit, G.P. removal and post-space preparation was done with peeso reamer (up to #4) leaving the 5mm of G.P. at apical end of root canal. The fiber reinforced composite post of desired size (1.3 mm) was tried in the canal and adjusted to the desired length. The bonding agent was applied over the fiber post and light cured. (Fig. 3 – Light curing of post after bonding agent application).

The root canal was then etched with 37% phosphoric acid, rinsed, dried with paper points, and bonding agent (Parabond, Coltene Whaledent) was applied and light cured. (Fig. 4 – Bonding agent application within post space) The post was then luted in the canal using dual cured resin luting cement (Paracore, Coltene Whaledent). For this, the resin cement was first filled within the prepared canal and then applied over the FRC post (Fig. 5 – Dual cure resin application over post). The post was inserted within canal and was moved from inside out 2-3 times for proper flow of resin cement within canal. Then light curing was done for 20 sec through the light transmitting transparent post. The remaining core-build up was done by applying pre-fabricated transparent crown strips of desired size over the central incisors (Fig. 6 - Pre-fabricated transparent crown strips adjusted over teeth) and filling it with the same dual cure resin. The filled transparent crown were then light cured for 40 sec from all the sides. After complete curing, the crown strips were cut with the help of B.P. blade no. 12 and removed from the

site. The finished core build-up of 11 & 22 has been shown in post-endodontic core restoration photograph (Fig. 7 - Post-endodontic core restoration photograph) and the post-operative IOPA radiograph has been shown in Fig. 8 (Post-operative IOPA radiograph). Now, the shade selection for teeth 11 & 21 was done prior to initiation of crown preparations. After teeth preparations for the porcelain fused to metal (PFM) crowns, the impression was made and sent to the lab. Temporary white acrylic crowns were provided to the patient till next visit. At the successive visit, the prepared PFM crowns were luted to their respective teeth using type I luting GIC. (Fuji 1) followed by finishing procedure. Finally, the maxillary canines were reshaped to the anatomy of lateral incisors with help of diamond bur. (Fig. 9 – Final post-operative photograph)

DISCUSSION

Both esthetic and mechanical aspects should be considered while restoring traumatized anterior teeth. Endodontically treated teeth often have less coronal tooth structure remaining and they require a post to retain the core and restoration. It has been found that endodontically treated teeth have more brittle dentin because of water loss and loss of collagen cross linking [9,10]. Also, compared to vital tooth, various factors like decreased structural integrity and impaired neuro sensory feedback mechanism are associated with endodontically treated tooth. [11]

Core fabrication using prefabricated posts and composite resin is a viable technique for endodontically treated teeth [12]. Glass fiber post has modulus of elasticity and biomechanical behavior which is almost similar to that of dentin and generally results less tooth stress and fewer root fractures, unlike metallic posts. Also, aesthetic posts and cores contribute to the optical properties of the overlying restorations when metal-free crowns are used. [13]. FRC post are new to endodontic field and can be used as an alternative to other post systems. The properties of such posts depend on the nature of matrix, fibers, interface strength, and the geometry of reinforcement. [14]

In the present case, at first visit, single visit root canal treatment was performed as the patient was reported as completely asymptomatic with recent history of trauma and the patient was willing to have all aesthetic corrections as early as possible. At next visit, resin-based restorative materials with tooth-colored FRC post was considered for this case in order to reconstruct the lost teeth structures because of several advantages like suitable elastic modulus, esthetics, good bonding between post and cement, lower chair time, and minimal tissue removal.

Also, for core build-up of teeth, the transparent pre-fabricated crown strips of selected size were adjusted over teeth cemented with post, and completely filled with dual cure resin material and light cured. This procedure saved the extra chair time through avoiding unnecessary incremental build-ups, shaping and finishing of using composite core material.



The final fixed prosthesis in form of PFM crowns in relation to 11 & 21 give more strength to the reformed maxillary central incisors and at the same time, they also

closed the diastemas created due to absence of lateral incisors, rehabilitating the aesthetic and functional requirements of the patient.

Figure 1. Pre-operative Intra oral photograph



Figure 2. Working length determination



Figure 3. Light curing of post after bonding agent application

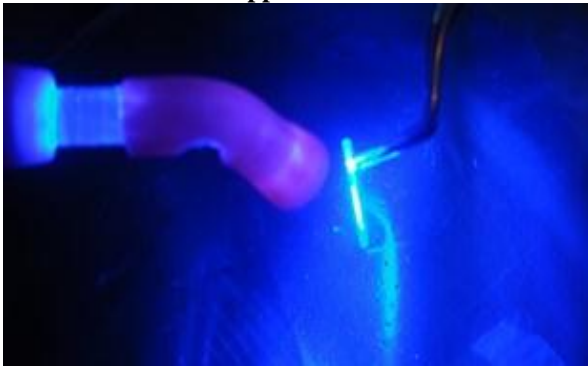


Figure 4. Bonding agent application within post space



Figure 5. Dual cure resin application over post



Figure 6. Pre-fabricated transparent crown strips adjusted over teeth



Figure 7. Post-endodontic core restoration photograph



Figure 8. Post-operative IOPA radiograph



Figure 9. Final post-operative photograph



CONCLUSION

In the present era of restorative and adhesive dentistry, where the regular advancements in the materials are taking place, often the options of cast metal post or extraction are becoming obsolete.

Because of concentration towards aesthetic and natural preservation of tooth structure, all the efforts should be made in direction of immediate rehabilitation of compromised tooth structures using suitable materials and techniques as in the present case.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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