CASE REPORT

Intraradicular Rehabilitation- A Case Report

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ABSTRACT

Aim: To discuss the rehabilitation of a fractured anterior tooth using flowable composite resin, resin cement and Glass fibre post.

Summary: A structurally weakened fractured anterior tooth after undergoing endodontic treatment, was managed through conservative approach by reinforcement with flowable liner and glassfibre post for the intraradicular rehabilitation of the tooth. The glassfibre post along with flowable liner offers a simplified treatment modality to reinforce the dentinal structures that support the post-and-core, and to enhance resistance to functional fracture.

Keywords: Flowable composite, Glass fiber post, Resin cement

INTRODUCTION

Trauma to dentition is most common in the age group of 9-10 years.[1] During this period, the roots are still in the process of maturing hence there is less intraradicular dentinal thickness and the tooth and root are more prone to fracture. Etiology varies considerably ranging from mild blow, fall, automobile accident, or accident during sports. The most common fracture site for immature teeth is along the cemento-enamel junction.[2] Restoration of such teeth to re-establish a radiant and confident smile is a challenging task for the clinician especially for a tooth with minimal coronal tooth structure and a wide root canal.[2]

The primary objective of post endodontic rehabilitation by post and core is to replace the missing coronal tooth structure sufficiently to provide the required retention and resistance for the final restoration. It should also be esthetically compatible, cost effective and minimize chair side time. The presence of a metal post can cause shadowing of the soft tissues adjacent to the root surface, which will adversely affect the esthetic results required for bonded resin and ceramic restorations in the anterior region.

In the last several years there have been significant advances in the development of bondable, fiber-reinforced, esthetic posts to reinforce endodontically treated teeth.[3] In clinical situations, where the post does not allow light transmission, the resin can be polymerised within the intraradicular space to a maximum depth of 2-3 mm, due to the limited effect of trans-illumination within the composite resin. However, introduction of commercially available light transmitting posts allow light polymerization by transillumination, that effectively polymerises the composite along the entire length of the radicular preparation.[4] Glass fiber post has modulus of elasticity and biomechanical behaviour which is nearly identical to that of dentin.[5]

The objective of this case report is to describe a step by step approach of rehabilitating a fractured anterior tooth using flowable composite resin, resin cement and glass fibre post.

CASE REPORT

A 18 year old girl reported to the Department of Conservative Dentistry and Endodontics, Saraswati Dental College and Hospital Lucknow with the complaint of an unaesthetic smile due to discoloured and fractured upper front tooth. She gave a history of trauma on her front tooth 2 years back. On clinical examination there was Ellis class III fracture on maxillary right central incisor (11). The tooth tested negative on vitality testing. On radiographic examination, the maxillary right central incisor had fracture involving the pulp. Thorough medical history was taken and nothing abnormal was detected. Written consent was obtained from the patient.

Root canal treatment in the tooth 11 was started. Local anaesthetic agent was administered and the tooth was isolated with rubber dam. Access opening was done and pulp extirpated. The canal was irrigated with 2.5% of sodium hypochlorite and saline. Obturation was done by lateral condensation method.

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As more than half of crown structure was destroyed it was decided to restore the tooth by post and core. Regarding the restoration of the tooth since the remaining dentinal thickness was very less, it was decided that the root canal would require intra radicular rehabilitation (Fig. 1). Luminex aesthetic post system (Dentatus, USA) was selected since the involved tooth was a central incisor, gutta percha from the canal was removed carefully using peeso reamer, without disturbing the apical third of the root canal. A radiograph was taken to ensure the adequacy of the canal preparation, and a matching diameter light transmitting plastic post of size # 2 was selected. The canal was irrigated and flushed of all debris created during the canal preparation. At this point the root canal was ready for the bonding procedure. The adhesive was applied and agitated for 20 seconds to the entire length of the root canal surface and the coronal tooth structure using the thin Endo Brush microapplicator (Fig. 2).

A gentle air stream was blown over the tooth for 5 seconds to thin the adhesive and evaporate organic solvent from the adhesive. Flowable composite resin (Dentsply X-Flow) was placed into the canal. The plastic light transmitting post was centered, and the resin was cured for 40 sec (Fig. 3). The post was taken out (Fig. 4). An identical diameter glass fibre post was first coated with a silane coupling agent (Monobond- S, Ivoclar Vivadent). The post was then cemented into the canal with dual cure resin cement (RelyX™ U100 Self-Adhesive Universal Resin Cement) which was cured for another 40 sec (Fig. 5). Core build up was done using hybrid composite resin (Tetric Ceram Ivoclar Vivadent) in an incremental pattern, and this was light-cured for 20 sec, for every increment (Fig. 6).

The central incisor was prepared to receive all ceramic crown. Gingival retraction was done using a braided cord (Roeko Retracto, Coltene Whaledent). Definitive impressions of the prepared maxillary anterior teeth were obtained using vinyl

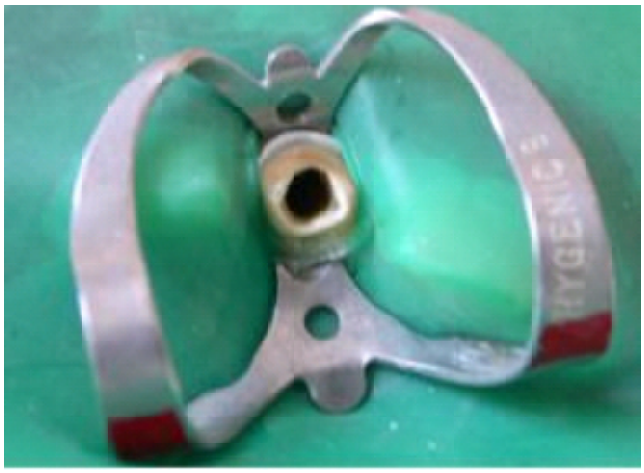

Figure 1: Wide root canal following endodontic treatment.

Figure 3: Insertion and compaction of flowable composite and the light transmitting post.

Figure 2: Application of self etch adhesive.

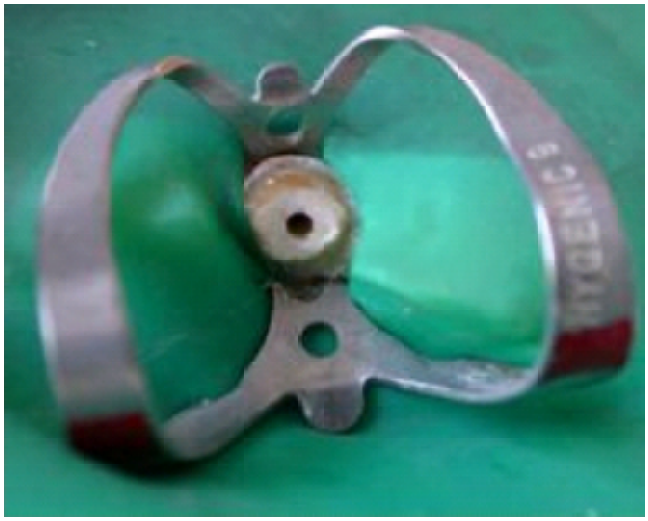

Figure 4: Rehabilitated canal with an ideally sized and spaced post space

Figure 5: Luting of the post using dual cure resin cement

Figure 6: Core build up done

polysiloxane impression material (Aquasil Putty and XLV, Dentsply, USA). Working casts were generated from Type IV die stone (Ultrarock, Kalabhai Dental, India). The final restoration was then cemented using dual cure resin cement (RelyX™ U100 Self-Adhesive Universal Resin Cement*)*.

DISCUSSION

The increasing predictability of endodontic treatment has made these procedures far more popular with both patients and professionals in recent decades. In particular, patient acceptance has increased as the discomfort associated with endodontic procedures has decreased; thus patients are encouraged to treat and maintain their teeth rather than having them extracted. After endodontic treatment is successfully completed, the dentist faces the task of restoring the remaining radicular structure to full form and function. In most cases, the remaining root structure is relatively intact, and the post-endodontic treatment (post-and-core followed by a full crown) is routine. A number of established techniques and materials are available for restoring the endodontically treated tooth. Typically, if the post-and-core is to succeed, the dentinal structure must be sufficiently strong to support the post/core/crown complex.[6]

Endodontically treated teeth can be directly restored with numerous components (gold, stainless steel posts, composite resin or alloy build ups), but the potential for these materials to behave differently than dentin under dynamic load or thermal expansion may affect the resultant modulus of the elasticity, tensile strength and compressive strength of the remaining tooth structure. Hence, this dissimilarity promotes failure.[7]

Lack of dentin support at the coronal end of the root canal also poses a problem to the restorative dentist. To restore the lost dentin, composite resin was used as a lining of the root canal surface to reinforce the weakened canal walls.[8]

The modulus of elasticity of composite resin approaches that of dentin. The replacement and reinforcement of intra-radicular tooth structure with a material that is elastically compatible with dentin is far better than morphologic dowel,[9] which has higher modulus of elasticity and hence higher potential to transfer and concentrate applied stresses to the surrounding compromised root structure. So the canal was rehabilitated using flowable composite.

Fiber-reinforced composite posts are indicated when restoring endodontically treated teeth to provide retention of the core and for root reinforcement.[10-14] Although they do not have the rigidity of a metal post, fiber posts are indicated for cases where a metal post would jeopardize the esthetic result , at-risk patients who have a past history of trauma to the orofacial region and the placement of a metal post would put an endodontically treated tooth at risk of root fracture, teeth with sufficient remaining coronal structure so that a 1.5 mm to 2 mm ferrule can be developed in the crown preparation and teeth that have large root canals where additional intraradicular reinforcement of the canal would be beneficial.

More recent studies have clearly shown that fiber posts bonded with composite resin cores are less likely to cause root fractures than stainless steel posts. This indicates that the bonded post-and-core monobloc contributes to the continuing strength and integrity of the remaining tooth structure.[3]

Intra-radicular rehabilitation, before post cementation or post fabrication increases the chance for clinical success of the tooth.[8] It is important that the remaining dentin structure has sufficient strength to support the post-core-crown complex that will eventually restore the tooth in-form and function.

CONCLUSION

The management of a structurally weakened root through conservative approach by reinforcement with Flowable liner and Glassfibre post can be a simple and efficient procedure for the treatment of immature anterior traumatized teeth with excellent esthetic and functional results. Such teeth restored with this technique best serve the needs of the patients.

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