

Case Report

Decayed Primary Anterior Tooth Restored Postendodontically With Glass Fibre-Reinforced Composite Post and Core: A Case Report

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ABSTRACT

Aesthetic requirement of severely decayed primary anterior teeth in the case of early childhood caries presents a challenge to a pedodontist. This paper presents the clinical sequence of reconstruction of maxillary anterior primary teeth. Endodontic treatment was followed by the placement of a glass fibre-reinforced composite resin post. The crown reconstruction was done with strip crown. Along with ease of application, fiber can be used as an alternative to traditionally used materials in the management of early childhood caries.

Key words- Glass fibre reinforced composite, post, anterior restoration

Introduction

The healthy oral cavity is a main requirement for beautiful looks. Although caries is preventable to a great extent but still it is the most common chronic disease of childhood.¹ Caries in very young children known as early childhood caries may be defined according to the American Academy of Pediatric Dentistry "as the presence of one or more decayed, missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger".² Intraoral examination of the patient exhibits a typical pattern of involvement i.e the maxillary central incisors, lateral incisors, and the maxillary and mandibular 1st primary molars. The maxillary deciduous incisors are the most severely affected teeth with deep carious lesions usually involving the pulp.³ In utmost instances, early childhood caries can even lead to total loss of the crown structure. Until very lately, the only treatment option for early childhood caries used to be extraction of the affected primary anterior teeth.

The early loss of primary anterior teeth may result in reduced masticatory efficiency, loss of vertical dimension, development of parafunctional habits (tongue thrusting) speech problems such as interfering with the pronunciation of tongue-tip consonants (e.g., "t," "d," "s," "sh," and "ch") and labial sounds (e.g., "f" and "v");, esthetic-functional problems that can interfere with the personality and behavioral development of the child.⁴ Aesthetic requirement of severely mutilated primary anterior teeth in the case of early childhood caries presents a challenge to a pedodontist. Among restorative treatment options, prefabricated crown and biological resin composite restoration either by means of direct or indirect technique are mentioned in the literature.

In cases where teeth are severely decayed, endodontic treatment and placement of intracanal posts or retainers becomes mandatory before crown restoration. A post and core is used to sufficiently build up tooth structure for future restoration with a crown when the enough tooth structure is not there to properly retain the crown, due to unavailability of tooth structure due to either decay or fracture.⁵ Posts may be constructed of a variety of materials, including resin composite, metal, and biologic material, prefabricated posts, orthodontic wire posts, and omega-shaped stainless steel wire posts.⁶ In late years, various types of fiber reinforcement have come into use on a large scale as an alternative to prefabricated metal posts in the restoration of endodontically treated teeth.⁷ The advantages of using reinforced fiber to construct an intracanal post includes resin composite crown reinforcement, translucency, and the ease of manipulation.^{7,8} This paper presents a case report of 5-year-old male with severely decayed maxillary anterior tooth that was restored with glass fibre-reinforced composite resin posts (GFRC), i.e. Hi-Rem Posts which are extremely advanced dental reconstruction systems.⁹ The constituent material is a reinforced composite which is made up of high strength "S" type glass fiber with a high elasticity modulus for approximately 60%. The matrix is an epoxy resin with a high conversion degree and a high glass transition temperature (Tg).⁹ Their unique physical characteristic is represented by the balanced elastic modulus (60 GPa), which is low enough to be close to that of the dentin, and high enough to adequately sustain the restoration.⁹ This characteristic ensures that

that when subjected to load, the over fibers fiber post behaves in a very similar way to the dental structure but at the same time, greater elasticity modulus helps in supporting the coronal part of the restoration more effectively, preventing the risk of irreparable failures.⁹

Fiber post has extremely high flexure resistance that is 1650 Mpa. The excellent ratio between resistance and rigidity of the material gives Over Posts excellent resilience characteristics (resistance to impact) whilst at the same time maintaining one of the highest levels of rigidity among glass/resin fiber composites, a great advantage in the capacity to support dental restoration in an adequate way.

Case Report

A 5-year-old male patient reported to the Department of Pedodontics and Preventive Dentistry in Rama Dental College Hospital and Research Centre, with a chief complaint of decayed upper front teeth. Patient's mother gave a history of breast feeding for 1 year after which the child was bottle fed for 3 years. Intraoral examination revealed a complete set of deciduous dentition. It was observed that 61 was affected by dental caries.



PREOP



Intraoral periapical radiographs revealed pulp involvement with 61.

Diet analysis, counseling, and oral prophylaxis were done.

61 was indicated for pulpectomy, followed by glass fibre-reinforced composite resin posts and composite buildups.

The treatment plan was divided into 2 steps for 61.

Step 1. Endodontic phase.

Step 2. Construction of the restoration.

Step 1. Endodontic Phase

Anesthesia was administered for 61. Labial and palatal infiltration was carried out. Gross carious lesions were removed with a no. 330 round carbide steel bur. Unsupported enamel was not removed so as to preserve as possible.

The pulp chamber was opened and working length was determined.

The pulp tissue was extirpated using no. 10–no to 35 K-files. After irrigation with copious amounts of 2.5% NaOCl and normal saline, the root canal was dried using paper points.

A thick mix of ZOE paste was then condensed with conventional method into the canal. The obturated material was allowed to set for 10 minutes.



IOPA Showing Obturation Of 61



After Obturation

Step 2: The Construction Of Restoration.

Intraoral periapical radiographs revealed pulp involvement with 61.

The post space was prepared 1 week after the endodontic treatment was completed. The post space was created by removing approximately 4 mm of Zinc oxide eugenol material using a thin straight fissure bur.

All visible ZOE cement on the walls of the post space was removed.

The prepared post space was then cleaned with saline, air dried, and acid etched with 37% phosphoric acid for 15 seconds. This space was rinsed and air dried with oil-free compressed air. A light-cured bonding agent was brushed on the etched surface and uniformly dispersed by a compressed air blast. It was then light cured with for 20 seconds.



Application Of Bonding Agent



Light cured flowable composite resin was inserted into the canal chamber after which the GFRC post was inserted. The fiber post and composite were then cured with together for 60 seconds. The coronal portion of the glass fibre reinforced composite post was splayed to increase the surface area for the retention of the core.



Cured



Curing



Cured

The coronal enamel was then etched for 20 seconds, rinsed with water and air dried followed by application of bonding agent—which was then light cured. The coronal post was then covered with the flowable composite for core build up, followed by light curing it for 60 seconds, and finally teeth were

restored with an appropriate strip crown (3M ESPE, MN USA) was selected & trimmed (to the cingulum) to create an arched interproximal margin to accommodate the interdental papilla. The hybrid composite using strip crown.

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An appropriate strip crown (3M ESPE, MN USA) was selected & trimmed (to the cingulum) to create an arched interproximal margin to accommodate the interdental papilla. The strip crown was then filled with composite resin & placed on the tooth. The composite resin was cured for 60 seconds. The strip crown was then peeled off with a sharp explorer. The final finishing and polishing was done with finishing burs. Occlusal interferences in normal and paranormal mandibular movements were checked.



Selection And Trimming Of Strip Crown



Core Build Up



Post Up



Smiling And Satisfied Patient

Discussion

In early childhood caries there is early carious involvement and severe destruction of maxillary anterior teeth. When coronal tooth structure is severely lost, the posts placed inside the canal after endodontic treatment will give retention and stability to the reconstructed crown as well as withstand the masticatory forces in function.

There are various kinds of root posts used in pediatric dentistry eg: resin composite short post placement, a resin composite post building up directly, stainless steel pre-fabricated posts, alpha or omega shaped orthodontic wires, nickel-chromium cast posts with macroretentive elements, natural teeth from a tooth bank or reinforced fibers.

Although metal posts are indicated for deciduous teeth but because of their color, metal posts are not esthetic, moreover these may cause problems during the course of natural exfoliation.⁵

Composite post do providesatisfactory esthetics but there is risk of loss of retention due to polymerization shrinkage.⁸ The use of omega-shaped stainless orthodontic wire as an intracanal post is also simple however, the wire is not able to adequately adapt to the canal form, because it is not the exact copy of the canal.

The development of the fibre-reinforced composite technology has brought a new material into the sphere of metal-free adhesive esthetic dentistry. Various fibers such as glass fibers, carbon fibers, Kevlar fibers, vectran fibers, and polyethylene fibers have been added to composite materials. Carbon fibers prevent fatigue fracture and provide strength to thecomposite materials, but they have a dark colour, which is undesirable esthetically.^{8,10,11}

Kevlar fibers made of an aromatic polyamide increase the impact strength of composites but areunaesthetic, and, hence, their use is limited.¹²

Vectran fibers are synthetic fibers made of aromatic polyesters. They displaya good resistance to abrasion and impact strength, though they are expensive and not easily wielded.¹⁰ Polyethylene fibers are esthetic but their flexural strength is less as compared to glass fiber-reinforced composite posts. The biological posts use natural extracted teeth that are prepared in a post shape for cementation in the root canal. The natural crowns provide excellent esthetics but it requires establishment of tooth bank and secure methods of sterilization and storage to ensure the safety of teeth.¹¹Glass fiber-reinforced composite resin posts (GFRC) can be used as an alternative to the other post systems.

The properties of fiber- reinforced posts are relying on the nature of the matrix, fibers, interface strength, and geometry of reinforcement. This material possesses an advantage over the older fibers like greater flexural strength, greater ease of handling, can be used in high stress-bearing areas and can be bonded to any type of composites. Scanning Electron Microscopic (SEM) evaluation has shown clearly the formation of a hybrid layer, resin tags, and an adhesive lateral branch. Successful bonding minimizes the wedging effect of the post within the root canal, requires less dentin removal to accommodate a shorter and thinner post, and leads to lower susceptibility to tooth fracture. These posts are placed in cervical one third of the canals, to avoid interference with the process of permanent tooth eruption.¹³

When compared to other fibres, they are almost invisible in resinous matrix so they are the most appropriate and the best esthetic strengtheners of composite materials.¹⁴

Conclusion

Restoration of deciduous teeth after pulpectomy is becoming mandatoryin pediatric dentistry. The treatment described in the case report is simple, effective and presents a promising alternative for rehabilitation of grossly destructed or fractured primary anterior teeth. This technique of glass fibre-reinforced composite resin post and core has shown promising results and has presented the pediatric dentistry with an additional treatment option.

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How to cite this article : Sharma K, Kohli A, Gupta K, Pandey M, Kohli V
Decayed Primary Anterior Tooth Restored Postendodontically With Glass Fibre-Reinforced Composite Post and Core: A Case Report
Rama Univ J Dent. Sci 2017 December;4(4):1-5.