Esthetic Rehabilitation of Severely Decayed Primary Incisors Using Glass Fiber Reinforced Composite: A Case Report

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ABSTRACT

Restoration of primary maxillary incisors severely damaged by caries or trauma is a clinical challenge in pediatric dental clinics. Early childhood caries is observed in approximately half the child population. In the past, the only treatment option would have been to extract the affected teeth and replace them with prosthetic substitutes. With the introduction of new adhesive systems and restorative materials, alternative approaches in treating these teeth have been proposed. The purpose of this paper was to describe the rehabilitation of primary anterior teeth in a 5-year-old patient using glass fiber reinforced composite resin as an intracanal post. (**J Dent Child 2012;79:22-5**)

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The restoration of primary incisors that are severely broken down by dental caries is often a difficult procedure that presents a special challenge to pediatric dentists. Caries and trauma are the main reasons for the restoration of anterior teeth in young children.[1] The premature loss of primary anterior teeth has many implications, including: neuromuscular imbalance with decreased masticatory efficacy; speech disturbances, such as interfering with the pronunciation of tongue-tip consonants (ie, "t," "d," "s," "sh," and "ch") and labial sounds (ie, "f" and "v"); development of abnormal tongue habits; and potentially, subsequent malocclusion. The child may also suffer from psychological problems if esthetics are compromised.[2] The parents are also affected. Guilt feelings may develop in the concerned parent, or a feeling of helplessness may prevail.[3]

In the past, the most expedient treatment was to extract the involved teeth. This treatment was justified on the basis that permanent teeth would eventually replace extracted teeth. Now, however, dentists recognize the importance of preserving the integrity of the primary dentition until the appropriate exfoliation time.[3] Also, more parents are demanding the esthetic restoration of teeth and are not satisfied with extraction.[4]

An acceptable restoration for maxillary anterior incisors should have matching material color, durability, adhesive cementation that is biocompatible with pulp, an ability to be easily and rapidly placed, and only one treatment visit required.[5]

A problem with anterior primary incisor teeth that are grossly decayed is the lack of coronal structure to support and provide adhesion for a composite resin. In such cases, the use of an intracanal post in endodontically treated teeth improves the retention for a longer-lasting restoration.[6] A variety of materials can be used for this purpose, such as resin composite, metal, biologic and prefabricated posts, orthodontic wire posts, and, recently, omega-shaped stainless steel wire posts.[7] The final coronal restoration can be done with the help of strip crowns over these posts.[8]

Dental manufacturers have developed fiberglass posts, which have several clinical indications such as periodontal splints, fixed orthodontic retainers, space maintainers, fixed bridges, and intracanal posts.[9]

The purpose of this case report was to describe the rehabilitation of carious primary maxillary incisors using glass fiber reinforced composite resin (**GFRCR**) as an intracanal post.

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CASE REPORT

A 5-year, 4-month-old male child presented with the chief complaint of decayed primary maxillary anterior teeth. The patient's medical history was noncontributory. Clinical and radiographic evaluations were performed and a treatment plan was established. On examination, a complete primary dentition was present, but the maxillary incisors, molars, and mandibular molars were severely affected by caries. All maxillary incisors were pulpally involved and required endodontic treatment (Figure 1).

The child's parents were informed about the treatment plan using a GFRCR post. Initially, endodontic treatment of the maxillary incisors was accomplished (Figure 2). The patient was scheduled for his final coronal restoration after 1 week. The patient was asymptomatic on the second visit. During the second visit, 4 mm of filling material was removed from the root canal for the post placement. A 1-mm-thick layer of glass ionomer cement was condensed over the remaining zinc oxide eugenol filling to prevent interference in the polymerization of the composite resin restoration (Figures 3-4).

The adjacent teeth and the incisors' remaining tooth structure were dried and isolated with cotton rolls. The root canal walls were conditioned with 37% phosphoric acid for 15 seconds, rinsed, and dried. The Single Bond Adhesive Dental System (3M ESPE, St. Paul, Minn) was applied and cured. The GFRCR (everStick, Stick Tech Ltd., Turku, Finland) post was placed to a distance of 3 mm into the canal, and the length was adjusted such that it extended 2 mm outside the canal (Figures 3 and 5). The posts of corresponding sizes were then inserted into the canal to the desired length, after which the composite resin was condensed around it and both were cured together as a single unit for 40 seconds. The resin (Z100-3M, Pedo Shade, 3M ESPE) was then built up in increments from the base of the canals, with the fiberglass posts inserted into the material. Each successive layer of resin was condensed around the post and polymerized for 40 seconds. The crown was built up freehand in the same manner and was finally finished with carbide finishing burs and composite polishing discs (Figure 6). A postoperative radiograph was taken immediately afterward (Figure 7). The patient was recalled at 1, 6, and 12 months to evaluate the retention and marginal adaptation of the intracanal-retained coronal restoration (Figure 8).

Figure 1. Intraoral photograph demonstrating preoperative status of anterior teeth.

Figure 2. Immediate postendodontic radiograph.

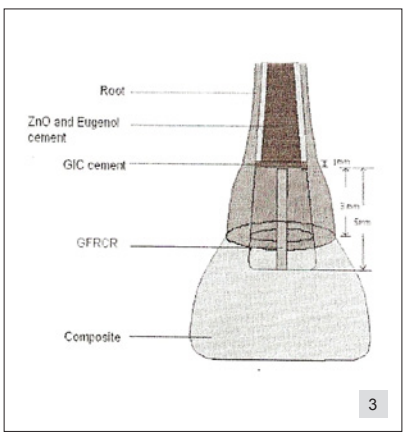

Figure 3. Schematic diagram of glass fiber reinforced composite post in the root canal.

DISCUSSION

The esthetic restoration of severely decayed primary anterior teeth has long been a challenge to the pediatric dentist. This difficulty is not only because of the available materials and techniques, but also because the children who require these restorations are usually among the youngest and least manageable patients. The technological advances in dental materials for use in children that have occurred in the past few decades make constant reevaluation of our treatment philosophies and techniques a necessity.

The use of an intracanal post in endodontically treated teeth improves the retention of a definitive restoration.[10] Post length may not be critical in all cases. In 1990, Judd et al.[11] reported a 100% success rate for composite crowns utilizing short posts for retention. Composite posts have low strength-to-load ratios and are indicated for the reinforcement of enlarged canals, as occur in immature teeth and the primary dentition.[12]

Figure 4. Intraoral photograph demonstrating condensation of glass ionomer cement in the root canal.

Different resin materials and techniques have been used for reinforcing large root canals. A direct composite resin restoration reinforced with mechanically retained orthodontic wire was described by Mortada and King in 2004.[7] This proved to be a simple, quick, and effective technique, which may be performed in one visit and presents good adaptation and high strength. More resistant preformed and cast metal posts have been utilized; however, they are expensive and require an additional laboratory stage.[13] In a previous study on the use of metallic posts in 23 patients, it was reported that the posts improved the durability of the restoration.[14] Metallic posts such as the omega-shaped stainless steel wire, however, require the use of an opaque resin to mask the post, which may in turn affect the restoration's final appearance.[6] The use of metal posts in primary teeth could pose additional problems during the course of natural exfoliation.[1]

A more esthetic option may be the use of biological posts made from extracted primary teeth.[15] The disadvantages of this technique include the need for: a tooth bank; parental and child agreement by the donors and recipients of tooth fragments; and professional expertise to prepare and adapt the natural crowns and intracanal posts.[16] The technique may also not comply with stringent cross-infection control policies in place in the 21st century.

The newly introduced GFRCR posts are esthetic, easy to use, and available in different sizes. This material allows chemical and mechanical adhesion to the restorative materials, resulting in robust restorations with good esthetics.[1] In this study, the posts were introduced inside the canals only in the cervical third because, as described by Rifkin in 1983, a longer length may interfere with the eruption of the underlying permanent tooth during the final stages of resorption of the primary roots.[12] Also, the technique utilizes the coronal portion of the root, which is the strongest part of the root to transmit any functional stresses. If the post is placed deep into the radicular space, root fracture might result.[6]

Sharaf,[8] reporting on a 1-year follow-up period, found that restorations placed on grossly broken down primary incisors using fiberglass posts remained intact. Laboratory studies have also demonstrated that this technique significantly improved the fracture resistance of teeth.[9]

Motisuki et al. reported good retention and esthetics with GFRCR posts over a period of 1 year.[1] Subramanium et al.[6] demonstrated better retention and marginal adaptation of GFRCR posts than omega-shaped stainless steel wire posts.

Using fiberglass posts, the final crown restoration can be performed using a range of materials and techniques, including: a resin-veneered stainless steel crown[5]; natural teeth[15]; a composite resin prefabricated crown[17,18]; a porcelain crown[19]; a metal ceramic crown[20]; celluloid crown forms[4]; and composite resin using both direct and indirect techniques.[21,22]

In this case, the restoration was performed with a direct composite resin technique, as it was easy to perform

Figure 5. Intraoral photograph demonstrating glass fiber reinforced composite post placement.

Figure 6. Intraoral photograph demonstrating immediate postoperative status of anterior teeth.

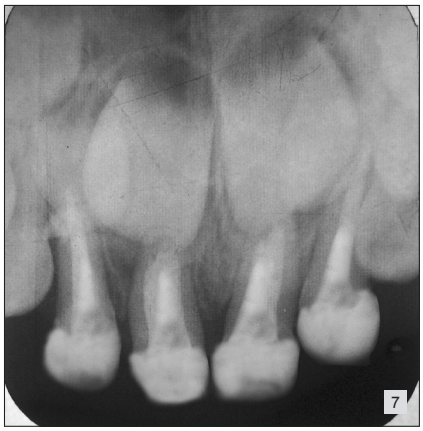

Figure 7. Immediate postoperative radiograph after post placement and crown build-up.

Figure 8. Intraoral photograph demonstrating 1-year follow-up status of anterior teeth.

and could be done in 1 visit. It was technique-sensitive, however, and requires patient cooperation. Additionally, initially rubber dam isolation was tried. However, the patient became frightened by the rubber dam, so a simple procedure of applying cotton rolls was used for isolation. A constant vigilance was kept to avoid any salivary or moisture contamination. Throughout the procedure, proper isolation was maintained.

For rehabilitation of extensively decayed primary incisors, the use of GFRCR posts appears to be a cost-effective alternative option, in view of their ability to reinforce composite resin with adequate translucency, durability, and relative ease of manipulation, improving esthetics, retention, and marginal adaptation.

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