Esthetic Rehabilitation Using Anterior Fiber-Reinforced Composite Bridge As A Space Maintainer: A Case Report
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ABSTRACT
Premature primary tooth loss may result in deleterious changes in dental arch integrity like space loss, crowding and midline shift, compromising the eruption of succedaneous teeth and altering the development of normal occlusion. The most confident way to cope with these problems is through the use of space maintainers. A variety of therapeutic modalities, from removable partial dentures to conventional fixed space maintainer can be used for the replacement of traumatically missing or carious lost primary anterior teeth. Dentistry has advanced to a point where it is undesirable for children to be partially edentulous or to have unattractive anterior teeth. The introduction of new materials and adhesive systems in dentistry, offers a new reconstructive alternative for severely destroyed or lost primary anterior teeth. The purpose of this article was to present a clinical case of missing primary anterior teeth replacement by means of fiber-reinforced composite bridge.
Key words: Fiber reinforced composite, maxillary incisors, composite pontic, space maintainer
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INTRODUCTION
Maintenance of primary dentition in a healthy condition is important for the well-being of the child as far as proper masticatory, esthetics, phonetics, space maintenance, and prevention of aberrant habits are concerned. The esthetic restoration of severely mutilated anterior primary teeth has been for long a challenge to a pediatric dentist, not only because of the available materials and techniques, but also from the point of view of pediatric
patients, who are usually among the youngest and least manageable group.\textsuperscript{1} Other concerned factors are the small size of teeth, close proximity of pulp to tooth surface, relatively thin enamel and surface area for bonding, and finally cost of treatment.\textsuperscript{2}

Premature loss of primary teeth may harm the normal occlusion development. Drifting of adjacent primary and permanent teeth into the available space created by the premature tooth loss may result in crowding of the dental arches, changes in the arch line, and inadequate space for the eruption of permanent teeth.\textsuperscript{3-5} The use of a space maintainer is one well-known method that can prevent these problems from happening.\textsuperscript{4-6}

For the reconstruction or replacement of primary anterior teeth, it is important to choose a material that is inexpensive, can be placed in one visit, and has the longevity to remain in place until just prior to the eruption of succedaneous teeth without interfering with the normal eruption process. Various esthetic options are available for restoring or replacing the primary incisors and it depends upon the clinician to make the best choice of selection for each individual situation.

Most commonly two different forms of esthetic space maintainers are in use. One designed with an orthodontic wire, bonded with resin to the etched enamel for space control.\textsuperscript{7} Other form by utilizing high technology that allows clinicians to test materials as challenging as space maintainers. This includes the use of Fiber reinforced composite resin (FRCR) that has been developed for various other dental applications.\textsuperscript{8}

This paper describes a case of 3year old child with missing primary anterior tooth missing tooth was replaced by the use of resin bonded esthetic space maintainers.

**CASE REPORT**

A 3 year old apparently healthy male patient reported to the Department of Pedodontics and Preventive Dentistry, Government Dental College, Bangalore, with a chief complain of pain in upper front region since last night. Complete medical and dental history was taken. On intraoral examination a deeply carious 51 and 62 were noted along with missing 61 (Fig 1). Past dental history revealed that 61 was avulsed about 1 month back due to self fall. Radiographic examination revealed pulp involvement in 51 and very deep caries nearly approaching the pulp in 62.

Pulpectomy was planned for pulpally involved 51 followed by restoration of 51 and 62 with composite resin restorations which was followed by replacement of missing 61. So the treatment plan was divided into 2 phases: Phase 1- endodontic
PHASE 1: The Endodontic Phase

Local anaesthesia was administered and rubber dam isolation was carried out for 51. Gross carious lesions were removed with a round diamond bur. Unsupported enamel was not removed so as to preserve as much tooth structure as possible. The pulp chamber was opened & working length determination IOPA was taken with a no. 8 K-file. Pulp tissue was extirpated using barbed broach and canals were prepared with no.15 – no.30 K-files. After irrigation with copious amounts of 2.5% NaOCl & Normal Saline, the root canal was dried using paper points. A thick mix of zinc oxide eugenol paste was then condensed with lentulo-spiral into the canal. For 62 indirect pulp capping was done with calcium hydroxide paste followed by composite restoration.

PHASE TWO: The Construction of Restoration

Patient was recalled 3 days after the endodontic treatment was completed. Space was created by removing approximately 1mm of ZnOE material using a thin straight fissure bur from the access cavity of 51 and 1 mm base of glass ionomer cement was placed to isolate the obturated material. Appropriate strip crown (3M ESPE, MN USA) was then selected & trimmed ( to the cingulum) to create an arched interproximal margin to accommodate the interdental papilla. The shade of natural teeth was recorded using a proper shade guide. The strip crown was then filled with composite resin of same shade & 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 & polishing was done with finishing burs. Occlusal interferences in normal & paranormal mandibular movements were removed (Fig 2).

An impression was made with alginate for fiber-reinforced composite bridge formation to replace the missing 61. The impression was poured with dental stone and the casts was made. The teeth to be replaced was made in composite by using same size strip crown as for 51(Fig 3,4)

**Fig1** Pre-operative extra-oral view & intra-oral view
and to obtain good natural esthetics, a composite restorative system containing different enamel and dentin shades was used. A horizontal groove was made in the middle third of the fabricated composite pontic palatally at nearly 2-mm depth using a round diamond bur (No. 8) to accommodate the thickness and width of fiber reinforced composite (INSTA FIBRE SPLINT).

The required length of the fiber was measured using dental floss between the adjacent teeth extending from distal surface of 62 - 51. Palatal surfaces of both the composite pontic and adjacent restored teeth were etched with 37% phosphoric acid for 20 s. The fiber soaked in bonding agent was adapted using a tweezer onto the fabricated crown to ensure that it fits into the groove and light cured. Thereafter, it was coated with flowable resin and light cured from multiple directions for 20 s (Fig 5), which increased the mechanical strength of the space maintainer.

Fiber-adapted crown was then positioned in the edentulous space and adapted to the adjacent teeth. Composite application was initiated starting from the distal aspects of 62 and 51 and cured after etchant and bonding agent application on adjacent restored teeth. This enabled us to stabilize the natural tooth crown and check for its correct position. After confirming the correct position, the remaining fiber was coated with composite and cured. Finally, occlusion was adjusted; finishing and polishing was performed (Fig 6,7). The patient was informed about the importance of good oral hygiene and regular follow up. A 6-month follow up revealed satisfactory esthetic results.

**DISCUSSION**

Early loss of primary anterior teeth following trauma or dental caries might
lead to speech difficulty, lack of confidence, and self-esteem leading to psychological problems in children. Satisfactory restoration of the lost teeth space presents a challenge to the pediatric dentist as there are limited treatment options in children. Clinician may advise various types of space maintainers (removable or fixed appliances), depending upon the child’s stage of dental development, the arch involved and the location of missing primary teeth. Removable space maintainers have certain advantages, such as being easier to clean and can facilitate better maintenance of oral hygiene than fixed space maintainers. Removable space maintainers, however, may be lost, broken, or removed on the whim of the patient, thereby reducing their effectiveness due to lack of use. By contrast, fixed space maintainers reduce the need for patient and parent compliance, require less regular maintenance, cause less damage to oral tissue because they are less bulky, and are easier for the patient to accept and manage.

The replacement of single missing primary anterior teeth could be performed via different therapeutic options. It includes adhesive splinting using a natural tooth pontic, denture tooth, or composite resin tooth pontic embedded in wire, metal mesh, nylon, mesh, and cast metal frameworks. The inherent problems with these techniques have included lack of bonding between composite and metal or nylon, leading to fracture at the composite interface. Furthermore, to extend the durability of the restoration with submerged wires and mesh grids, composite resin had to be thick and bulky to minimize fracture. This thick and over contoured restoration led to an increase in food and plaque retention and difficulties in maintaining periodontal health. Fiber reinforced composite bridge, represent one of the best options, with many advantages including bondability, ease of fabrication, reparability and relative longevity. This technique is
considered as a noninvasive procedure and is easy to perform in pediatric patients. If the tooth or tooth crown is still intact and the patient brings it with them to the dental office, it is easiest to use it as a natural tooth pontic, joining it to the adjacent teeth with an adhesive composite with fiber reinforcement ribbon. Earlier reports support the use of natural teeth as pontics. \(^{20,21}\) But in this case tooth was lost 1 months back. Also use of denture teeth either acrylic or porcelain does not prove effective due to problems of differential wear, unmatched shades, difficulty of contouring and most important unpredictable bonding\(^ {22}\) with composite resin. So in this case report a composite resin tooth pontic was fabricated using the same shade of composite as used to restore 51 and 62. The use of composites to build primary teeth provides a vital final aspect, with natural opalescence, translucency and opacity. This ensured proper esthetics and predictable bondability with adjacent teeth. Insta Fibre Splint was selected in the present case, as it is an ultrahigh molecular weight polyethylene fiber having virtually no memory; hence, it adapts to the contours of the teeth and dental arch. It is practically colorless and disappears within the composite or acrylic without show-through offering excellent esthetics. Key factors that influence the physical properties of fiber reinforced structures are fiber loading within the restoration and efficacy of the bond at the fiber resin interface, fiber orientation and fiber position in the restoration.\(^ {22}\) Earlier evidence suggests the use of FRC as a successful alternative to conventional space maintainers over a short follow-up period.\(^ {10,23}\) Long-term studies are required to evaluate their prolonged use.

**CONCLUSION**

This report describes a simple, rapid and conservative chairside technique for restoring a single anterior tooth using composite resin pontic and fiber reinforced composite. This chair side technique does not require laboratory procedures. Patient gets immediate benefit by repositioning the lost tooth. The FRC space maintainer technique described in this case can satisfactorily restore esthetics and function and hence suggested as an alternative to conventional techniques.

**REFERENCE**


