

Provisional Restoration for Missing Anterior Teeth Using Fiber Reinforced Composite Resin-case reports

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INTRODUCTION

Orofacial trauma is among the most prominent oral health problems among children in developing countries.¹ Facial trauma that results in fractured, displaced, or lost teeth can have significant negative functional, esthetic, and psychological effects on children.² Avulsion injuries accounts 0.5% to 16% of traumatic injuries in the permanent dentition.³

Various therapeutic options such as Implants, Partial removable dentures, conventional porcelain-fused-metal (PFM) bridge or a resin-bonded fixed partial denture (Maryland bridge) can be considered for the replacement of a traumatically missing permanent incisor in young children and adolescents.⁴ But their use is generally not intended before the end of the growth period, invasive treatment in terms of tooth reduction and lack of longevity could limit its use.

Fiber reinforced composite resin technology offers various solutions to many complex problems in restorative dentistry. Two most important mechanical properties for FRC resins are strengths and stiffness. The properties for FRC resins that make them well suited for various chair side application include strength, desirable esthetic characteristics, ease of use, adaptability of various shapes, and potential for direct bonding to tooth structure.

The article presents chairside procedures of two cases in which interim provisional replacement of missing teeth prior to implant replacement was accomplished by fiber reinforced composite resin technology.

Case report 1

A 16-year-old boy referred to the Department of Pedodontics and Preventive Dentistry, Saveetha University, Chennai, with chief complaint of missing tooth in the front region of the upper jaw after falling from a bicycle. The boy's medical history revealed no specific problem.

The intraoral examination revealed 21 was avulsed. Unfortunately the patient could not trace the avulsed tooth. Radiographs were obtained to rule out root fracture in the adjacent teeth and to confirm the findings the diagnosis that was done during the clinical procedure.

After discussing all treatment options with the patient and his parents, the placement of a single implant tooth for the replacement of the missing natural tooth was decided when the boy turned 18. It had been decided to place a fiber-reinforced composite or Maryland-like bridge until the implant treatment.

The required length of ribbon Vectris frame ivoclarvivadent was determined by measuring the space with dental floss on diagnostic cast. Care was taken to keep the wet ribbon from light to

prevent initial polymerization, which would interfere while manipulation of ribbon. The palatal and proximal surfaces of adjacent teeth were acid etched 37% phosphoric acid (stochbond etchant 3M ESPE). Bonding agent (single bond, 3M ESPE) was applied and light polymerized with a halogen light of 500Mw/mm ten seconds.

A thin layer of universal hybrid composite resin (Filtek Z250, 3M ESPE) was placed on the palatal surfaces of adjacent teeth and extended slightly to the proximal surfaces to each tooth adjacent to the edentulous area.

The wetted ribbon was pressed into the composite resin and placed on the palatal surfaces. The ribbon was polymerized for 40 seconds from the lingual and proximal directions and covered by another layer of composite resin.

The composite pontic was built around the composite laminate framework. The final step was adjustment of occlusion and esthetic contouring of provisional restoration. Care was taken to avoid centric and eccentric contacts on the pontic. The splint was finished and polished (sof-lex, 3M ESPE). As the fixed interim restoration was bulky and over contoured, the patient was clearly informed of the importance of oral hygiene by giving more attention

to plaque control and traditional home care procedures using proximal brushes and dental floss. The patient was seen for 1 week, 1 month, 6 month, and 15 month follow up appointments.

A 16-year-old boy referred to the Department of Pedodontics and Preventive Dentistry, Saveetha University, Chennai, with chief complaint of missing tooth in the front region of the upper jaw. The intraoral examination revealed 11 was avulsed in a road traffic accident one month before. The patient convinced for an provisional restoration using fiber reinforced composite. The teeth was prepared as in case 1 and the missing 11 was replaced vectris multipurpose bondable composite and the restoration was finished and polished. The patient was called for follow up appointments at 1 week, and 8 months.

Discussion

The loss of anterior permanent teeth requires immediate treatment by the dentist if intra arch changes are to be prevented. Within a few days after the loss of a tooth as a result of trauma or extraction of a severely traumatized tooth, the teeth adjacent to the space will begin to drift and often within a few several millimeters of space will be lost. Rather than allow the extraction area to heal



and regain normal contour, the dentist should take an impression at the time of the initial appointment or within few days. The temporary bridge is constructed and inserted as soon as possible after the loss to prevent the space closure. 5

Implants are the treatment of choice and should be considered when general and local conditions are favorable. Their use is generally not intended before the end of the growth period and around the age of 18. Because of their high cost, poor financial condition could also limit their use. More economically acceptable treatments should, therefore, be investigated for the replacement of a missing tooth, as a main treatment or as a long-term provisional treatment before implant therapy.

Partial removable dentures are often recommended for very young patients when adjacent teeth are not in their final vertical and horizontal positions. These dentures could be modified when necessary by adding or grinding the acrylic resin. They are not comfortable, however, and are

frequently subjected to fracture. When an orthodontic treatment is indicated, an artificial plastic tooth can be attached to a removable or fixed orthodontic appliance to solve the esthetic concern.

The replacement of a missing tooth can also be made via a conventional porcelain-fused-metal (PFM) bridge or a resin-bonded fixed partial denture (Maryland bridge). The former is the most invasive treatment in terms of tooth reduction and could be aesthetically compromised with gingival contour modifications. The latter is less invasive, but the non esthetic aspect of the metal framework, necessity of dental reduction or preparation (grooves, etc.), challenging long-lasting bonding of metal to tooth, and lack of longevity could limit its use.6

The fiber-reinforced composite (FRC) bridges represent an interesting alternative to conventional metal bridges.7 They could be made directly or indirectly using an artificial plastic tooth or the avulsed tooth, 8, 9 or by a direct build up composite resin tooth with 10, 11 or without 12 porcelain veneering.

The use of unreinforced composite resins as the structural material for bridges often results in fracture. Composites are brittle materials and contain bubbles, cracks, and other defects causing or facilitating fissure propagation and fracture.13. It has been demonstrated that the reinforcement of a composite resin by fibers increases the fracture toughness and resistance.14 The combination of





an esthetic, wear-resistant composite resin, and tough fiber material gives a new option for short-span composite bridge fabrication.¹⁵

Fixed FRC bridges represent one of these options, with many advantages including bond ability, reparability, ease of fabrication, and relative longevity. This is considered a noninvasive or minimally invasive procedure with very little or no tooth reduction. Compared to traditional prosthetic

options, a fiber-reinforced composite bridge is generally less costly and labor intensive.

A chair side FRC bridge fabrication could be performed easily, reducing lab fees and time.

Plasma-treated polyethylene fibers reinforce the final structure by being a physical part of the composite. Compared to metal-framed Maryland bridge, an FRC bridge is easier to bond,

more esthetically pleasing with no metal shadow, and does not show through the very translucent dental hard tissues in young permanent teeth.

The use of different dentin and enamel composites to build up the intermediate tooth according to the anatomical layering technique provides a vital final aspect, with natural opalescence, translucency, and opacity. The use of a denture tooth could also be considered instead of direct fabrication of the missing tooth. This method is easier, faster, and, in some cases, more esthetically acceptable than the direct fabrication of a tooth. The shape and the incisal color of denture teeth are, in some cases, however, difficult to match to the adjacent teeth. Moreover, the interface between the restorative composite covering the

beam and artificial tooth could weaken the bridge and lead to fracture in this region.

CONCLUSIONS

FRC bridge fabrication technique presented in this article suggests a new treatment option for the replacement of a missing anterior tooth. This technique restores esthetic and function. It is more comfortable than a removable appliance, nonirritating, and hygienic. Generally, it does not require any tooth reduction and could be repaired, modified, or removed from teeth without any iatrogenic problem.¹⁶ It can be considered a permanent treatment or a long-lasting provisional treatment if implant therapy is used at a later date. In this case, the noninvasive characteristic of this treatment renders it superior to all other options.¹⁷

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