

Fibre- Reinforced Composite Bridges: A Long-Term Space Maintainer and Interim Treatment Option in Young Growing Children: A Novel Approach in Management of Two Siblings with Identical Phenotypic Hypodontia Expression

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ABSTRACT

Background: The permanent anterior teeth in growing children help in aesthetics, function, speech and social well-being. Early loss of these teeth not only affects the appearance of the child but also affects psychologically and thereby their quality of life (QoL). A variety of treatment modalities can be used for replacement of lost permanent anterior teeth ranging from Implants to Maryland bridges. But owing to growth changes in children, these methods pose with number of limitations. A good alternative to conventional treatment protocols is Fibre Reinforced Composite(FRC) Bridges until the growth of child is completed. It is found to provide a metal free, clinically aesthetic and an interim treatment option. This case report presents a case of two siblings with congenitally missing permanent mandibular central incisors and their management by FRC bridge for replacement of missing anterior teeth.

Keywords: Fibre Reinforced Composite(FRC) Bridges, Hypodontia, Pontic, Interlig, Quality of Life(QoL).

INTRODUCTION

The replacement of congenitally or traumatically missing permanent anterior teeth is always a challenge to the clinician. This is true especially in case of growing children and adolescents. A number of treatment options are available for the replacement of congenitally or traumatically missing permanent anterior teeth like removable partial dentures, porcelain fused metal(PFM) bridge, resin bonded fixed partial denture (Maryland bridge) and dental implants (immediate or delayed). But, the above-mentioned treatment options come with own set of drawbacks and disadvantages which make them unsuitable to be used in growing children.¹ A good alternative to conventional treatment options is Fibre-reinforced

composite(FRC) bridges. These are resin based materials and contain fibres to improve the mechanical properties. It was introduced by Smith in 1960 wherein glass fibres were reinforced. Different fibre types have been added to composite to improve the properties like glass fibers, carbon fibers, kelvar fibers, vectran and polyethylene fiber. In dentistry, the polyethylene fibres have been used clinically for various dental procedures like splints, endodontic post and core, repair of denture, composite repairs, fixed partial dentures with a natural or artificial tooth pontic etc.^{2,3} This article describes a clinical case of two siblings with congenitally missing permanent mandibular central incisors in which FRC resin bridge utilizing an artificial tooth pontic was delivered. It acted as a

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long-term space maintainer in addition to an interim treatment option until a fixed prosthesis can be given at end of growth.



Fig 1a: Intraoral examination of elder sibling showed presence of edentulous space in relation to mandibular anterior teeth.



Fig 1b: Intraoral examination of younger sibling presented with retained right primary mandibular central incisor which showed attrition and was mobile.

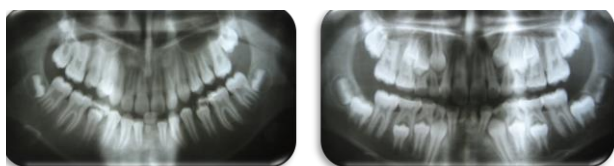


Fig 2a and 2b: An orthopantomogram showing congenital absence of both permanent mandibular central incisors in both the children.



Fig 3: Acrylic tooth (Labial and proximal surface) and groove lingually.

CASE REPORT

Two girl siblings aged 13 years and 15 years reported to our institution with a chief complaint of unaesthetic appearance and discomfort during function, associated with mandibular anterior teeth. Intraoral examination of elder sibling showed presence of edentulous space



Fig 4: Groove created on lingual surface of abutment teeth.



Fig 5: Acid etching with 37% Phosphoric Acid.



Fig 6: Acrylic tooth bonded along with fibre splint.

in relation to mandibular anterior teeth (**Figure 1 A**). The younger sibling presented with retained right primary mandibular central incisor which showed attrition and was mobile (**Figure 1 B**). There was no previous history of trauma or any developmental defects. An orthopantomogram



Fig 7a: Post-operative images of the Older sibling.



Fig 7b: Post-operative images of the younger sibling.

revealed congenital absence of both permanent mandibular central incisors in both the children (**Figure 2A and 2B**). Both the siblings were affected with phenotypic expression of hypodontia identically and concordance genetically.

A thorough oral prophylaxis was performed following which alginate impressions of both the arches was recorded. The casts were poured in dental stone. The shade selection was done under natural light for selection of an acrylic tooth (Premadent, New Delhi, India) and a groove was made lingually (**Figure 3**). Commercially available fiber splint (Interlig, Angelus, Brazil) was used in this study. The fiber length was kept just short of the distoproximal surface of the abutment teeth.

The abutment teeth were prepared by making a groove in the lingual middle third with a round bur (BR 40, Mani, Japan) (**Figure 4**). The teeth were then etched with 37% phosphoric acid (Scotchbond TM, 3M, ESPE, USA) for 15 seconds, rinsed with water and air dried (**Figure 5**). After application of bonding agent (Prime and Bond NT, Dentsply, USA) and curing with LED curing unit (Apoza, Taiwan), flowable composite (Charisma, Kulzer) was applied on the lingual enamel surfaces of the abutment teeth. The fiber splint was then adapted to the middle third of the lingual surfaces of the abutment teeth and cured. The facial surface of the fiber splint that would be contacting the acrylic pontic was also restored with composite resin and cured. The pontic was then positioned on the

polyethylene fiber in proper alignment and photopolymerized for 40 seconds (**Figure 6**). The palatal aspect of the fiber in contact with pontic was also restored by the restorative composite resin. The final finishing and polishing was done after checking the occlusion. The post-operative images of both the siblings are as shown. (**Figure 7A and 7B respectively**)

DISCUSSION

Early loss of anterior permanent teeth will have a negative impact on psychological aspect of child development which affects the aesthetics, speech, and socialization of young growing child. Replacement of a congenitally or traumatically missing permanent anterior tooth can be done by different treatment modalities like conventional porcelain fused metal (PFM) bridge or a resin bonded fixed partial denture (Maryland bridge) or Implants. But, factors like tooth reduction and compromised aesthetics due to gingival contour modifications affects the conventional PFM bridges. However, Maryland bridges are found to be less invasive but lack of longevity and questionable bonding of metal to tooth owes to nonesthetic appearance of the metal framework which necessitates more tooth reduction or preparation of grooves etc.⁴

The next treatment option that can be considered would be Implants either immediate or delayed. But these are not indicated before the end of growth period till the age of 18. Also, high cost will add up to its limitation. Hence other economical treatment options need to be explored for replacement of missing anterior teeth. Other treatment options like removable partial dentures may be recommended in young children but it requires patient cooperation and are more prone to fracture and breakage.⁴ Due to above mentioned reasons Fibre Reinforced Composite (FRC) Bridges are found to be the best alternative to conventional metal bridges⁵ which can be made either by direct or indirect methods using acrylic tooth or an avulsed tooth^{6,7} or by direct build up composite resin tooth.^{8,9}

Fixed FRC represents a suitable interim treatment option until growth is completed. It provides many advantages like chairside ease of fabrication, bondability, reparability, and relative

longevity.⁴ A mean survival rate of 3 and 4.5 years was reported by studies done by Unlu,¹⁰ Freilich¹¹ respectively. This procedure can be considered as minimally invasive procedure as it can be done with little or no tooth reduction. The non-invasiveness of this treatment makes it superior to all other options.¹² It can be repaired, modified, or removed easily thereby not causing any iatrogenicity.¹³

However, the most common failure is exposure of the fiber ends resulting in debonding from the tooth. Also, difficulty in maintaining oral hygiene and ability to withstand heavy masticatory forces remains questionable. Hence, further studies are needed to demonstrate the success of FRC bridges.

CONCLUSION

This case report describes the clinical procedure using conservative, aesthetic, and cost effective FRC fixed partial fibre splint with a pontic for missing permanent anterior teeth. It was found to be more comforting than a removable appliance. It offers a metal free and clinically acceptable option for missing permanent anterior teeth replacement.

Clinical Significance

1. The FRC Bridges serve to be the minimally invasive procedure which can be done chairside by direct or indirect fabrication.
2. It may be considered as a permanent treatment or long lasting provisional treatment if implant may be used at the end of growth period.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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