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Research Article

FIBER REINFORCED COMPOSITE RESIN FIXED PARTIAL DENTURE: A MINIMALLY INVASIVE TREATMENT OPTION FOR REPLACING MISSING ANTERIORS

Jyotsna Sethumadhavan., Prachi Gholap., Maya Dalaya., Swapnali Mhatre., Uttam Shetty and Reema Srichand

Department of Prosthodontics, Bharati Vidyapeeth Dental College & Hospital, Navi Mumbai

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ABSTRACT

The loss of anterior teeth is often a serious esthetic concern. Apart from esthetics, function of the oropharyngeal region effect quality of life regardless of personal factors such as age, gender and level of education. It is commonly observed that esthetic detoriation due to tooth defect are frequently seen due to deep decay, trauma, periodontal disease, root resorption and failed endodontic treatments. Extraction of these teeth causes esthetic, phonetic and functional difficulties, pathological migration in the teeth and psychological problems in patients. Among the various treatment opportunities available, fiber-reinforced composite resin fixed partial denture offers a conservative alternative for improved esthetics. This Case report describes the case which was restored by a minimally invasive technique, with fibre-reinforced fixed partial denture for esthetics, functional and timely manner.

INTRODUCTION

Anterior tooth loss can be treated with various modes of treatment cited in the literature. Osseo integrated implants, Fixed partial Dentures, Removable partial dentures, Resin Bonded Bridges and Fiber reinforced fixed partial denture are the ways for treatment for replacement of missing anterior tooth. Resin bonded prosthesis is a fixed partial denture which is cemented to the tooth structures, primarily enamel, etched to provide micro-mechanical retention for the resin luting agent (Rochette or Maryland Bridge). The disadvantages can result in the bonding and esthetic problems of metal frameworks.

Fiber-reinforced composite resin (FRC) prostheses offer the advantages of good esthetics, minimal invasive treatment, and an ability to bond to the abutment teeth, thereby compensating for less-than-optimal abutment tooth retention and resistance form1. Another advantage of fiber reinforced adhesive bridges over metal-reinforced adhesive bridges is that the rigidity of the fiber infrastructure is less than the metal infrastructure and less stress is generated at the interfaces due to the low modulus of elasticity. FRPBs can be made intra- or extraorally,2 and several authors have described direct technique for their fabrication. Also, a technique incorporating the manufacture of plaster models for planning restorations indirectly has been published.3 Other authors have described various materials for the pontic area (tooth, ceramic, or denture teeth stock) and for the adjacent teeth (ceramics, resin, or metal).4 This case report explains the case of indirectly planned fiber reinforced fixed partial denture for missing anterior tooth.

CASE REPORT

A 16years old female presented with missing tooth 21 and was concerned regarding esthetics and function. On clinical examination, tooth no. 11 had incisal fracture which was restored before commencing the treatment. After all the treatment options were explained to the patient, the fiber reinforced fixed partial denture was determined as the appropriate minimal conservative choice at the moment as osseointegrated implants can still be considered later.

Preoperative Frontal View

Corresponding author:* **Jyotsna Sethumadhavan
Department of Prosthodontics, Bharati Vidyapeeth Dental College & Hospital, Navi Mumbai

Right Lateral preoperative View

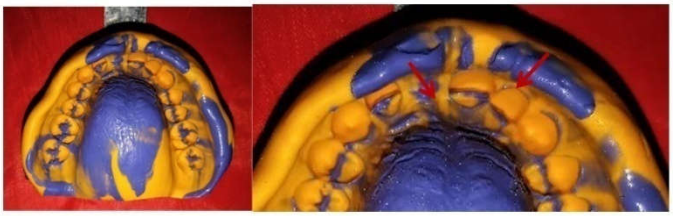
Left Lateral preoperative View

Alginate (Tropicalgin, Zhermack) impressions were made of maxillary and mandibular arches and diagnostic models were poured of dental stone (Type III- Kalstone, Kalabhai). The Diagnostic models were mounted on the articulator and assessed. The wax up was performed on the diagnostic models and patient's consent be taken before initializing the treatment. The tooth preparation was planned according to the width of the fiber reinforced strip. The proposed conservative tooth preparation was marked initially with the indelible pencil. Approximate width of preparation was around 2 mm and was extended across the complete mesiodistal length of the tooth. Minimal tooth preparations were performed on tooth number 11 and 22 which acts as a retainer along with composite resin for the pontic.

Proposed rough tooth marking indicating the area of minimal tooth preparation

Tooth preparation on tooth 11 and 22

A final impression was made after the tooth preparation was done with additional silicone putty and light body (Elite HD+, Zhermack) with single step putty wash impression technique. The master cast was poured in Gypsum Product Type V Die stone (Kalrock, Kalabhai).



Final Impression of the Tooth Preparationin Addition Silicone (Arrows showing the replication of tooth preparation)

A composite template of pontic and retainer wings was fabricated with the indirect technique using macrofilled composite (3M, ESPE) The composite was smoothened and polished using polishing kit (Super Snap mini Kit, Shofu) – Burs and Disks. Poly ethylene fiber sheet (Hi-Bond) used in the procedure is cut according to the required dimensions of the planned prosthesis.

Composite teeth fabricated on the master cast

Poly ethylene fibersheet

Composite tooth fabricated on the master cast is tried intraorally and examined for any discrepancies and the poly ethylene fiber dimensions are verified.

Composite tooth fabricated was tried intraorally

A slot was prepared on the composite tooth corresponding to the prepared tooth

Poly ethylene fiber (Labial and Palatal view)

Teeth were isolated with cotton rolls and dried throughly. Following to it, etchant (Discover, 37% Phosphoric acid) was applied on the prepared surfaces and washed off in 20 seconds and air dried. Bonding agent was applied and light cured for 20 seconds. Flowable composite (Ivoclar Vivadent) was applied on the tooth surfaces and poly ethylene fiber was placed and the fabricated composite tooth was positioned accordingly and light-cured. The packable composite was placed over the remaining slot of the prosthesis and prepared tooth surface, light-cured and polished. Any high points were checked and corrected with the help of articulating paper 40 microns (MDM Corp.).The final prosthes is was smoothened and examined.

Application of etchant followed by bonding agent

Flowable Composite applied

Poly ethylene fibre placed

Packable Composite was placed across the slot and prepared tooth surfaces

Final prothesis- palatal view

Final prothesis –Frontal view

Final prothesis – Lateral views

DISCUSSION

Several procedures have been indicated to replace anterior missing teeth. Implant supported and implant-retained restorations are well indicated; however, issues of time and budget can be obstacles for the patient. Fast, successful, and reliable techniques using adhesive procedures have been applied during the last 3 decades.[5]When these treatment options are evaluated, the dentist must consider many factors, including the protection of natural teeth, minimal preparation, esthetics and cost.The survival rate was 95 percent for prostheses made with a high-volume substructure excluding the parafunctional cases.[13]

Composite resins that are reinforced with polyethylene fibers can result in materials with enhanced mechanical properties,[11,12] i.e. stiffiness, strength, toughness and less fatigue.[13] Fibers produce a load-enhancing effect on the composite materials by acting as the stress-bearing component and by crack-stopping or crack-defecting mechanisms.

Advantages of this design include bondability, chairside ease of fabrication and repairability.[6] It is both economical and less time consuming as the fabrication can be performed in a single appointment. The design is noninvasive and reversible so other conventional treatment options always remain open. The clinical disadvantages include loss of surface shining on the particulate veneering composite; fracture or chipping of the particulate composite veneer and debonding of the retainer, questionable under heavy masticatory load and difficulty in maintaining of oral hygiene. Veneering composite chipping can be avoided by using thicker layer (1-2 mm) of composite resin on the surface of FRC framework.[6]

CONCLUSION

Recent years have seen many innovations and improvisation in cosmetic and metal free restorations. This is mainly in desire from the patients for enhanced esthetic restorations. Fiber enhancement positively enhances the mechanical properties of the prosthesis extensively. Fiber reinforced fixed partial dentures require a high level of skill in the composite buildup and knowledge of the esthetic aspects of teeth. Indirect technique of fiber reinforced fixed partial denture provides a long lasting solution for missing anterior teeth.

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