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Fibre reinforced composite bridge for missing maxillary central incisor-A Case Report

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ABSTRACT

Resin bonded FRCs FPD has many advantages over the conventional treatment options in young and adolscents. Fiber-reinforced composites (FRC) are resinbased materials containing glass fiber impregnated with light cured composite resin.The applications of these materials include replacement of missing teeth ,splinting of traumatized teeth ,reinforcement of large restorations.the following case report describes the restoration of missing anterior teeth using fibre reinforced composite (FRC).

Keywords: Fibre reinforced composites, Resin bonded, FPD

INTRODUCTION

Loss of anterior teeth is a common form of injury, particularly in children and adolescents. The increased patient demand for tissue maintenance and esthetic, as well as the desire to reduce treatment costs, causes clinician to seek materials and techniques that enable minimally invasive and chairside (direct) fabrication on teeth replacement with fixed partial dentures (FPDs) [1, 2].

Therefore, multidisciplinary approach with cooperation of children's dentist, orthodontist, prosthodontist and oral surgeon is of great importance in order to preserve the space and supporting tissues until definitive therapy. Treatment with restorations of high aesthetic value is mainly limited by unfinished growth and development in children and adolscents.

The introduction of fiber reinforced composite (FRC) has offered the dental profession the possibility of fabricating resin-bonded, esthetically pleasant ,metal-free , tooth coloured restorations for single and multiple teeth in both anterior and posterior tooth replacement.The commonly accepted concept to fabricate FRC FPDs consists of using continuous unidirectional glass fibers in dimethacrylate resin matrix as substructure of the FPD. [3-6]

The treatment option in such cases would be removable partial denture until the eruption of permananet teeth is completed,alveolar bone development,final formation of pulp chamber for definitive restoration.However the inability and lack of mainatinace for the removable partial denture by child and its wear and plaque accumulation are the greatest limitation of this treatment.Fixed partial dentures (FPD) in these cases should also be postponed until the complete establishment of marginal gingival stability ,also the rigid fixation between the abutment teeth can interefere with bone growth.

Maryland bridges can be used as a replacement of missing teeth, but they are criticized for the lack of aesthetics caused by the presence of metal base and weak bonding between metal extensions and enamel

[7,8,9]. Dental implants option was also not recommended, until the end of the growth period; due to ankylotic implant-bone bond that does not allow their growth together with facial bones presenting danger of their apical dislocation [10,11]. Adhesive bridges can be an economical and simple solution that gives good aesthetic results in a single visit in order to preserve space for future definitive treatment.

This clinical report describes the technique to fabricate the single unit prosthesis with the help of FRC (fibre reinforced composite) material.

CASE REPORT-

A 15 year-old male patient reported to the Department of Prosthodontics ,crown and bridge, with a chief complaint of missing right maxillary central incisor (Fig.1) .The reason for loss of tooth was because of accidental injuruy . On clinical examination, the patient revealed a straight profile, with an apparently symmetrical facial form. The patient presented a Class I molar relation bilaterally with adequate overjet and overbite.

After clinical examination and analysis of panoramic x-ray, impressions were taken for the study models. The mounted models on an articulator showed sufficient interocclusal space between the upper and lower anterior teeth to create fiber-reinforced adhesive bridge without the need for preparation of abutment teeth.

The missing teeth was arranged on cast with proper contour around missing tooth gingival region.Then teeth was removed from cast and putty index was made for same tooth to make the duplicate composite pontic of same size ,shape, colour and contour.(Fig.-2)

In a single visit, the FRC adhesive bridge was made using a interlig (Angelus,Brazil) and a set of Ivoclar Vivadent (Lichtenstein) composite materials, with the aim of temporary restoration for missing teeth. Interlig (Angelus,Brazil) is a braided glass fiber impregnated with light cured composite resin.

The aluminium foil was used to measure required length of the fiber ,measured intraorally between the abutment teeth .(Fig.3).The fibers were the length of interproximal space and a few mm longer on to the palatal surfaces of the abutment teeth. Enamel on palatal and proximal part of abutment teeth was etched with 37% phosphoric acid, rinsed with water, air dried and a thin layer of universal self adhesive bond (Ivoclar Vivadent) was applied (Fig.4). The fibre was sectioned exact to the same length in accordance with the measured aluminium foil introrally.

Flow composite resin (Ivoclar Vivadent, Lichtenstein) was applied on the bonding surfaces prior placing the resin impregnated fibers Interlig (Angelus,Brazil).The flow composite was not light cured before fibers were pressed tightly against the tooth surface . The resin impregnated fibers were light cured.(Fig.5).The purpose of using the flow composite was to seal the space tightly between the FRC and the enamel surface.

Fiber framework was fully covered with a thin layer of flow composite resin, and pontic ,which was made previously of composite material was adjusted by creating a notch in it.Successful chemical bond between fiber framework and composite made pontic was achieved by curing. The final occlusion was carefully adjusted by using the articulating paper (Fig .6).

The occlusion was adjusted carefully to avoid any premature contacts or traumatic occlusal forces to the restored teeth.

DISCUSSION-

The replacement of missing teeth in children and adolscents is quite difficult task, as the options for restorations are limited because of the overall growth factors. The use of FRCs as a direct technique for a bridge construction requires a high level of skill in the composite build-up and current knowledge of the aesthetic aspects of teeth.

On the other hand, even after the completion of development and growth bridges are inferior therapeutic solution, because they reduce healthy tooth substance of the two supporting teeth and there is always danger of exposing the pulp during preparation [12, 9, 13].

Another treatment option can be a Maryland Bridge with a preparation on the palatal surface of abutment teeth for rest placement. However, the biggest disadvantage of these bridges is the necessity for the

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preparation of healthy teeth and inadequate aesthetics of metal base [9].

In case of surface-retained FRC prostheses, the framework can be supported from both ends because of better bonding characteristics and biomechanical flexibility of the FRC framework [3]. The flexibility allows abutment teeth to move without stressing the cement-framework interface in function, and loosening the prostheses. However, in the case of abutments with increased mobility, it is recommended to support the resin-bonded FRC FPD from one end only.

In the cantilever designs, special care has to be taken to ensure adequate design-based rigidity of the FRC framework to resist bending forces by biting function. Adequate rigidity is obtained by increasing the cross-sectional diameter of the connector. Fibers of the framework should cover as large surface as possible on the abutments and, in the anterior area, should be placed close to the incisal edge to eliminate the dislodging forces [14].

Although resin-bonded FRC FPDs are most commonly used in the anterior and premolar regions, rather than molar region, recent laboratory investigations have suggested that optimally designed FRC FPD made on non prepared abutments can provide even higher load-bearing capacity for the FPD than conventional porcelain-fused tometal FPD can provide [15]. Thus, the development of the FRC materials and technologies may allow alternatives also for directly made molar replacements.

Van Heumen et al. showed a survival rate of 64% after 5 years follow-up of 3-unit anterior FRC prostheses made with the materials and techniques used in late 1990s [16]. The recent clinical data, on the semi-IPN resin matrix FRC FPDs made directly in patients mouth, suggest high survival percentages (>96% at five years), which reflects material development and learning of fabricating FRC FPDs [17].

CONCLUSION-

Fibre-reinforced composite bridges can offer an alternative treatment option for patients until the option for definitive treatment.This technique restores the functions as well as speech,and is more comfortable than removable partial denture.It also provide conservative approach as there is no tooth reduction or minimum reduction required and can be repaired, modified or removed from the teeth without any trouble.

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FIGURES-

Fig.1-Pre-operative intraoral examination

Fig.2-Putty index and prepared composite pontic

Fig.3-Aluminium foil measured between abutments

Fig.4-Etching of abutments

Fig.5-FRC placed in place

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Fig.6-Post-operative intraoral view

Fig.7-Pre-operative and post-operative

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