

Fibre Reinforced Fixed Partial Denture for Periodontally Compromised Anterior Teeth

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Abstract

Aim: To describe a protocol to replace few missing anterior teeth with periodontally compromised abutments.

Background: Due to their lower modulus of elasticity, fibre reinforced composites (FRCs) minimize the stress level at the tooth restoration interface and enable an adjustment of the framework's mechanical properties by inserting adequate fibre volumes. Direct and semi-direct fabricated FRC Fixed Dental Prosthesis (FDP) now compete successfully with conventional cast metal resin-bonded FDPs.

Case Description: A Fibre Reinforced Composite(FRC) bridge was given to replace missing 31 and 41. The FRC material was bonded from canine to canine (33-43) to ensure the stability of the periodontally compromised abutment teeth by acting as a splint with minimal intervention.

Conclusion: Fiber-reinforced composite restorations reduce the number of appointments and make single visit dentistry possible especially when the abutments are periodontally compromised and require splinting.

Clinical Significance: This case report demonstrates the benefits of splinting periodontally compromised abutment teeth.

Keywords:

Fiber-reinforced fixed partial denture; GC eversticks c&b material; Chairsides prosthesis; FRC; Periodontal Splints.

Introduction

The development of metal-free restorations and prostheses for the replacement of missing teeth continues to interest both dentists and patients. For the anterior teeth, the use of a resin-bonded fixed

dental prosthesis (FDP) contributes to a conservative and yet successful treatment option when the abutment teeth are periodontally compromised. However, the

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selection of material plays a vital role in the success of the treatment. [1]

During the past decades, cast metal FDPs have been successfully used in clinical dentistry and are found to have a five-year survival rate of 87.70%. In the early 1990s, glass-infiltrated alumina ceramics were introduced and proposed as metal-free alternatives for FDPs in the anterior dentition. The 10- year survival rate was reported to be 73.9% for 2-retainer FDPs and 94.4% for single-retainer FDPs. Constant technical difficulties such as loss of retention or chipping of veneering or framework material are triggered by discrepancies between biomechanical stress in the oral cavity and also their material properties.

Subsequently, a framework material with a reduced modulus of elasticity than that of cast metal alloys or ceramic restorations could be helpful to minimize the chipping or cracking of veneering material from a relatively rigid framework.

Due to their lower modulus of elasticity, fiber-reinforced composites (FRCs) should minimize the stress level at the tooth restoration interface and enable an adjustment of the framework's mechanical properties by inserting adequate fibre volumes. The incorporation of glass fibres into composite resin material was an earlier variation of today's FRC and was considered promising in diverse fields. After 30 years of experience, FRCs have been successfully applied in clinical dentistry. Different research studies have shown that framework style, flexural as well as fatigue properties, and also load-bearing abilities of FRCs have enhanced. Direct and semi-direct fabricated FRC FDPs now compete successfully with

conventional cast metal resin-bonded FDPs. Having shown that the short-term survival and quality outcomes of FRC FDPs are promising, studies should now focus on exploring outcomes after longer follow-up periods. However, midterm and long-term survival data about the clinical outcome and number of patients suitable for such observations are limited. The aging of composite resin and the disintegration of veneering composite and fibre material leading to fatigue fractures might affect long-term survival and occur only after several years of clinical use.[2]

Indications

Indications for selecting a fiber-reinforced polymer prosthesis include the following:

1. The demand for restoration with an excellent look that opposes denture teeth placed on a partial removable oral prosthesis.
2. The requirement to reduce wear of the opposing natural dentition.
3. Using conservative intra-coronal abutment tooth preparation.
4. The possibility of bonding the prosthetic retainer to the abutment teeth.
5. The wish for a metal-free, non-porcelain prosthesis (this is specifically important for individuals with allergic reactions to metal).
6. Rapid chairside replacement of a missing tooth as a transitional fixed prosthesis.

Contraindications:

Contraindications to selecting an FRC fixed prosthesis include the following:

1. Lack of ability to maintain good fluid control (e.g., patients with acute or chronic gingival inflammation or when the gingival margins would be positioned deeply into the sulcus)
2. Long span (i.e., 3 or more pontics for anterior and 2 or more for posterior teeth).
3. Parafunctional habits such as bruxism
4. Individuals with unglazed porcelain/metal partial removable dental prosthesis framework components would certainly oppose the restoration.
5. Patients who abuse alcoholic substances.[1]

Case Report

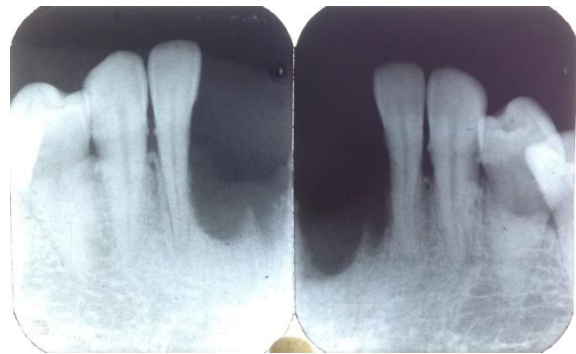
A thirty-five-year-old female patient reported to the general dental practice, with a chief complaint of missing lower anterior teeth for the past 2 weeks. The mandibular central incisors were extracted due to severe mobility as they were periodontally compromised.

On the evaluation of the abutment teeth, the lower lateral incisors were of grade 1 mobility and the edentulous ridge was classified as Sibert's class III variety as there were severe ridge and soft tissue defect. (Figures 1 and 2).

Figure 1: Preoperative view.



Figure 2: Radiograph.



A fibre reinforced fixed partial denture was indicated for this patient and GC ever stick C&B FRC material was used(Figure 3).

Figure 3: Armamentarium.



The FRC material was bonded from mandibular canine to canine to ensure better stability and support considering the periodontally compromised mandibular lateral incisors. A mock wax-up was done before the procedure replacing the tooth and soft tissue defects. (Figure 4, 4.1)

Figure 4: Wax-up.



Figure 4.1: Wax-up.



A putty index was made of the individual pontics and the pontic was then fabricated with bulk-fill composite and cured incrementally (Figure 5, 5.1).

Figure 5: Putty index made from wax-up, composite pontic made and cured.



32,33,42,43 were etched and bonded with FRC material along with both the pontics. (Figure 6, 6.1, 7, 7.1).

Figure 6: Etching Done.



Figure 6.1: Bonding Agent Applied.



Figure 7: FRC Crown and Bridge Material.

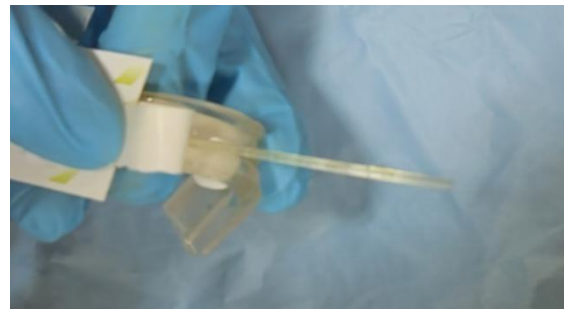


Figure 7.1: FRC Crown and Bridge Material Placed and Cured For 40-60 Seconds.



Occlusion is checked and high points were reduced. Final finishing and polishing were done. (Figure 8, 8.1).

Figure 8 : Final Prosthesis – Occlusal View.



The patient was then called for recalls after 3,6 and 12 months respectively and her teeth were stable and required minor scaling and polishing.

Figure 8.1: Final Prosthesis.



Discussion

Various treatment modalities can be thought about for the esthetic and also functional

replacement of missing anterior teeth because of various reasons in old and young individuals. An implant sustained crown can be taken into consideration as a sensible treatment choice for the replacement of a missing tooth. However, as a basic rule, adequate bone width and height are important factors to consider. Implants are nevertheless contraindicated in female patients listed below 15 years, and male patients listed less than 18 years old throughout the growing phase. Any effort to put an implant at this phase may lead to an immersed dental implant, therefore, affecting the final result.

Conventional FDP is likewise contraindicated owing to huge pulp chambers as well as horns, which might lead to direct pulpal exposure during tooth preparation work. In an adult, the existence of local bony defects, socioeconomic status as well as the hesitation of the individual to experience intrusive implant surgical treatment might prevent making use of an implant

sustained crown to replace the missing tooth. Some individuals reject the option of a conventional fixed partial denture due to the involvement of a minimum of 2 natural teeth to be used as an abutment for the placement of retainers and also consider it as the most invasive therapy option in regards to tooth reduction.

In such patients who have an interest in changing missing tooth with fixed prosthesis apart from the above treatment techniques and also in young patients where the dental implant and also standard FDPs are contraindicated, the resin bonded FDP's or the fiber-reinforced composite material FDP is the most viable treatment options

Composite materials are brittle materials as well as contain gaps, cracks, and also various other issues leading to fissure propagation and finally fracture. It has been shown that the support of a composite resin by fibers boosts fracture toughness and also resistance. Carbon, polyethylene or glass fibers embedded in resin matrix are used for composite resin reinforcement. The primary elements that decide the mechanical properties of the material rely on the type of fibre, design, and also the quality of the matrix coupling.

There are lab studies that show FRC materials have good flexural strength that is comparable or sometimes higher than metal alloys. However, have a low flexure modulus. Scientific usage, as well as research, has revealed that FRC prostheses can be used to adequately restore or can be used to replace teeth with fixed prostheses. The fiber-reinforced FDP is made up of fiber-reinforced composite (FRC) substructure veneered with composite material and acrylic, composite resin, or

(extracted) all-natural tooth pontic. This prosthesis can be taken into consideration as a long-term choice for effective rehabilitation of a missing out on tooth in patients with vital undamaged abutment teeth, short edentulous span (1or 2 missing teeth), and also minimal dynamic occlusal contacts on the abutment teeth. Functional and occlusal loading of the pontic needs to be kept as minimal as possible. The abutment teeth which support the prosthesis should have adequate bone support and also be surrounded by healthy periodontium. If primary abutments are considerably weaker, the second

abutments have to be used to ensure the long-term success of the prosthesis.[3,4,5]

Conclusion

A successful FDP is achieved by studying the patient requirements and supportive structures available to achieve the best possible outcome with the given circumstances. Fiber-reinforced composite restorations are gaining the spotlight with time due to their ease of use and strength. It also reduces the number of appointments and makes single visit dentistry possible.

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