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## RESEARCH ARTICLE

### BOND WITH RIBBOND – A CASE REPORT

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#### ABSTRACT

Copious alternates are available nowadays to address the challenge of immediately replacing a missing anterior tooth, these include a removable or fixed, temporary or permanent, acrylic prosthesis, or resin-bonded bridges. Ribbon single-visit bridges provide strength, durability, and immediate convenience. They are cost effective and reliable and are excellent for emergencies like implant temporization, congenitally missing teeth and patients who cannot afford conventional lab fabricated bridgework. In place of the pontic, a natural tooth, denture tooth can be used or composite build-up can be done. Creating an adhesive FRC bridge by using a composite resin pontic is a successful treatment option for the direct aesthetic replacement of missing anterior teeth.

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## INTRODUCTION

The emergence of fiber-reinforced composite as a new material into the realm of metal-free, adhesive esthetic dentistry. First introduced to the market in 1992, Ribbon (Ribbon Inc., Seattle, Wash) is a reinforced ribbon made of ultrahigh molecular weight polyethylene fiber with ultrahigh modulus. It is a spectrum of 215 fibers with a very high molecular weight and these fibers have a very high coefficient of elasticity (117GPa) and resistance to traction (3GPa) as a result of their "closed stitch" configuration and good adaptability.<sup>(1)</sup> Ribbon with impact strength 5 times higher than iron, is treated with cold gas plasma to enhance its adhesion to synthetic restoration materials, including chemically cured or light-cured composite resins. Ribbon assume the colour of the resin to which they are added making it translucent in nature. Ribbon fibers easily absorb water because of the "gas plasma" treatment to which they are exposed thus reducing the fiber superficial tension and ensuring a good chemical bond to composite material.<sup>(2)</sup>

The special fiber network of this material allows efficient transfer of forces. It is virtually pliable and thus, adapts easily to tooth morphology and dental arch contours. Its translucency makes it an esthetic material and it can be cured with light-cured composites. Ribbon fibers can also be cut by using special nippers without fraying or losing their original dimensions. Fibre reinforced conservative bridge with natural tooth pontic is a simple, economical and quick method to improve the esthetics and to fulfil functional and psychological requirements of patients presenting minimal space for replacement of the tooth. This case report demonstrates application of chair side fiber-reinforced ribbon and composites as substitute for conventional fixed partial denture.<sup>(3)</sup>

#### Indications

- Replacement of missing anterior teeth in children and adolescents
- Short span edentulous areas
- Unrestored abutments
- Single posterior tooth replacement
- Significant clinical crown length

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### Contraindications

- Parafunctional habits
- Long edentulous spans
- Restored or damaged abutments
- Compromised enamel
- Significant pontic width discrepancy

### Advantages

- Minimal removal of the tooth structure
- Minimal potential for pulpal trauma
- Anesthesia not usually required
- Supragingival preparation
- Easy impression making
- Interim restoration not usually required
- Reduced chair time
- Reduced patient expense

### Disadvantages

- Reduced restoration longevity
- Enamel modifications are required
- Space corrections are difficult
- Good alignment of the abutment teeth is required<sup>(4)</sup>

**Applications:** Cementing Ribbond Bridges to the Teeth - *Anterior Bridges*. In general, the construction of directly bonded bridges is a variation of the splint construction technique. This procedure is best done indirectly. If the teeth are very mobile, the Ribbond framework should extend over additional abutment teeth for added stabilization.

**Maryland Bridge Framework:** Using A Denture Tooth As The Pontic: Direct Technique Because of the unpredictability of bonding acrylic resin to composite resin, it is not recommend using an acrylic denture tooth as a pontic for anything other than a provisional bridge. Modify the denture tooth on the lingual so that it fits closely over the Ribbond framework. Apply an unfilled bonding adhesive to the groove and cure it. Apply an unfilled bonding adhesive to the groove and cure it. Shape and smooth the composite resin. Light-cure the resin and check occlusion finish and polish.

**Post and Core:** Technique minimizes the chance for root fracture and has the following advantages. Compared to preformed posts, there is no additional tooth removal after endodontic treatment. This maintains the natural strength of the tooth. Eliminates the possibility of root perforation. The Ribbond post and core is passive and highly retentive. Furthermore, because Ribbond's translucent fibers take on the color characteristics of the composite it allows for the natural transmission of light through teeth and crowns. This provides an exceptionally esthetic result.

### Crown Retained Bridges

**Reinforcing an Acrylic Provisional Bridge:** Wet cut pieces of Ribbond with a runny mix of acrylic resin, lay them in the channel and cover with acrylic. If the Ribbond has a tendency to float to the surface, it can be pressed back into the channel with a doughy mix of acrylic. If possible, use multiple layers

of Ribbond with acrylic between each layer. Ribbond does not polish well. Avoid cutting into the Ribbond fibers.

**Reinforce or Repair a Denture:** Place the Ribbond as close to the oral-cavity side as possible, opposite the tissue surface on which the denture is pivoting. The greater the area covered with Ribbond, the stronger the repair will be. Follow the preceding directions for acrylic repairs.<sup>(5)</sup>

### CASE REPORT

A 25 year old female patient reported to the Department of Prosthodontics, Crown & Bridge and Implantology, GDC&RI Bengaluru, with congenitally missing lower central incisors. On clinical examination, the mandibular central incisors #31, #32 was absent. The patient was interested in an esthetic solution to her problem. Various treatment options put forth to the patient were: Removable partial denture or Fixed partial denture or Fibre reinforced composite bridge. Since the patient preferred fixed prosthesis without altering the structures of the adjacent teeth i.e. minimally invasive approach, the patient opted for a fiber reinforced composite bridge.

### MATERIALS AND METHODS

In the first appointment, thorough clinical evaluations were made followed with Intraoral Periapical Radiographs (IOPAR) and Orthopantomogram (OPG). Patient was explained about the treatment plan and written consent was taken for the same. Alginate impression was made using Zelgan 2002 (Dentsply) for the missing tooth and poured the cast with Type 3 dental gypsum product (Gem Stone). Acrylic tooth was selected with corresponding shade and shape. (Figure 3) After drying of the cast, the ridge area on the cast was marked. Pontic trial was made and positioned on the cast, and final modified pontic configuration was adjusted by trimming with acrylic burs. Any discrepancies of the gingival surface of the pontic were corrected. Horizontal slot on the lingual surface of the pontic was prepared to determine the length of the Ribbond fiber on the cast. Ribbond fiber was placed over the slot prepared in the pontic and cured with the help of flowable composite. Minimal preparation, similar to a class 3 cavity preparation was done on the abutment teeth (32, 42). Prepared surfaces on the abutment was etched using 37% phosphoric acid for 30 seconds followed by rinsing with water for 20 seconds. After application of bonding agent, Optibond FL (Kerr Corporation) flowable composite was placed on the prepared tooth surfaces and on the fiber extension of the pontic. Pontic was stabilized in place using finger pressure. Fiber extensions of pontic was adjusted into the prepared slots on the abutment teeth and cured. (Figure 6)

The patient was recalled after a week to complete the final finishing and polishing using finishing diamond bur and disc by Shofu Composite Polishing kit. The case was followed up for a period of 3 months and the fiber reinforced composite (FRC) bridge was found to be satisfactory.

### Following instructions were given to the patient:

- Do not bite hard foods or objects by placing it on the replaced front tooth.
- The bridge will aid only in esthetics and phonation.



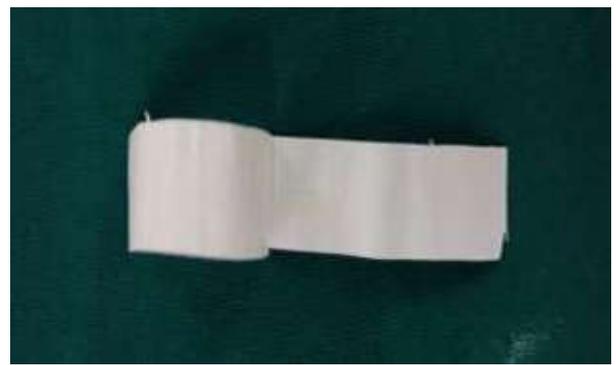
**Fig. 1. Pre-Treatment**



**Fig. 2. Cast**



**Fig. 3. Acrylic Teeth**



**Fig. 4. Ribbon Material**



**Fig. 5. Teeth preparation on lingual surface of abutment**



**Fig. 6. Ribbon Placed on prepared surfaces**



**Fig. 7. Post Treatment**



**Fig. 8. Follow up done after 3 months**

## DISCUSSION

The loss of anterior teeth requires immediate attention for re-establishing esthetics and function. The fabrication of an instantaneous fiber bolstered composite bridge provides a chair aspect single visit price effective and minimally invasive fastened answer to the patient. The FRC material, Ribbond (Ribbond, USA) which was used in this case is an ultra-high molecular weight polyethylene fiber connector. The leno weave design provides superior toughness and effectively distributes the stresses throughout the material it is conjointly reported to own wonderful bonding characteristics to the composite resin. With FRC bridge the abutment teeth requires minimal preparation. The clinical technique described in this case is reversible. In case of failure all other options can still be performed. <sup>(6)</sup> The special fiber network of this material allows efficient transfer of forces. The same ultra-high molecular weight polyethylene fibers (UHMWP) used to make Ribbond is also used for making bulletproof vests. The conventional method of producing fixed partial dentures is by bulk reduction of the teeth to create sufficient space for metal and for porcelain. The procedure is time consuming, exacting, often uncomfortable for the patient and expensive, for some patients, especially the very young and the very old, the experience can be rather exhaustive due to the extensive dental sessions. Thus, a technique which involves very little tooth reduction and obviates the need for local anaesthetics, and which simply allows stick on a false tooth to bridge an edentulous gap, would have many attractions.

The so-called “Maryland Bridge” has undergone many alterations since its introduction in the 1980s, although the basic advantage of conserving tooth structure has remained. Retention will be improved with a lot of recollected framework style the addition of grooves labial wrap and also the conception of most coverage of the enamel. If an implant supported replacement of a single missing incisor is not possible, the Maryland Bridge can still be a restoration of first choice. <sup>(7)</sup> Each and every step requires proper planning and precision including impressions and bonding. The potential advantages of this technique are self-evident. First the procedure will be completed in one appointment and with the exception of the fibre mesh material needs no uncommon materials or hardware. Second, the periodontal apparatus of the abutment teeth is left entirely uninvaded. Third, interdental spaces may be shaped to facilitate access for oral hygiene. Fourth, because this approach is relatively less invasive, it permits the patient to opt for other, more traditional tooth replacement methods in future. Fifth, repairs can be carried out directly, without the need for any complicated techniques or materials.

## Conclusions

In conclusion, the fixed anterior fiber-reinforced composite resin bridge fabrication technique suggests an alternative treatment option for the temporarily replacement of a missing anterior tooth. Using this technique, it is possible to restore esthetics and function. It is more comfortable than a removable appliance, non-irritating, and hygienic. Generally, it does not require any tooth substance loss and can be repaired, modified, or removed from teeth without any iatrogenic damage. Clinical long-time studies have to show whether it can also serve as a permanent restoration.

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