

## Multifunctional Ribbon – A Versatile Tool

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*Pediatric dentists come across a variety of cases in their day to day practice that requires quick intervention in order to enhance or restore children's smile and functions in the oral cavity. Ribbon is one such material, which has occupied an important place in the dentist's repertoire. Ribbon can be used as an alternative to conventional treatment in pediatric dentistry. This case report demonstrates usage of Ribbon as a space maintainer, a fixed partial denture with an acrylic tooth pontic, an endodontic post and a splint material in children. Ribbon combines high-strength fibers with enhanced bondability and patented cross-link lock-stitch leno weave. Ribbon's strength, esthetics, and bondability make it useful for multiple applications in clinical pediatric dentistry.*

**Keywords:** Ribbon, Fixed partial denture, Endodontic post, Trauma splint, Space maintainer.

J Clin Pediatr Dent 36(4): 325–328, 2012

### INTRODUCTION

The use of ribbon has become a day to day practice in clinical pediatric dentistry which has made life easier for the Pediatric dentist at the same time helping him provide faster quality care to the patients.

Ribbon fibers, introduced in 1992, are bondable, reinforced fibers consisting of ultrahigh strength polyethylene fibers. These fibers far exceed the breaking point of fiberglass and are so tough that specially made scissors are required to cut them. Unlike Kevlar, Ribbon's fibers absorb less moisture than the dental resins.<sup>1</sup>

The key to Ribbon's success, (what distinguishes Ribbon from the other fiber reinforcements) is its patented leno weave. Designed with a lock-stitch feature that effectively transfers forces throughout the weave without stress transfer back into the resin, Ribbon's weave also provides excellent manageability characteristics. Having virtually no memory, Ribbon adapts to the contours of the teeth and dental arch. Ribbon is translucent, practically colorless and disappears within the composite or acrylic without show-through. Not only does Ribbon offer excellent esthetics, its translucency also allows the use of light cured composites.

Ribbon's fibers are the standard in biocompatibility. The same material is also used in the construction of artificial hip and knee joints. Unlike fiberglass, if at any time the Ribbon is cut into with a rotary instrument, the resultant particles and exposed fibers will not be a biocompatibility risk to the patient. The unique combination of strength, esthetics and bondability allows Ribbon to be used for many different applications.

Ribbon can be used for stabilizing traumatized teeth, restoring fractured teeth and creating a fixed partial denture and for direct-bonded endodontic post and core, orthodontic fixed lingual retainers and space maintainers.<sup>2-12</sup> Despite this versatility, there are few reports on the use of Ribbon in pediatric dentistry. This case report aims to present four different applications of Ribbon as an alternative procedure in clinical pediatric dentistry.

### Case 1: Endodontic post

A 4-year-old boy was referred to the department of Pedodontics and Preventive Dentistry in Santosh Dental College and Hospitals, Ghaziabad with a complaint of decayed teeth. Intraoral and radiographic examination revealed nursing bottle caries (Figure 1a). Due to extensive

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damage to the tooth structure, decision was made to restore the maxillary incisors using ribbon as an endodontic post. The endodontic procedure was performed. The depth of the post space was created and measured using a periodontal probe. Ribbon measuring twice the depth of the post space and height of the core build-up was measured and cut. The root canal wall was etched for 15s, washed for 30s and then gently air-dried. Excess water was removed from the post space using paper points. The adhesive system (Ed Primer II A&B) was applied using a microbrush in 2 consecutive coats and gently air-dried to evaporate the solvent. The Ribbon was wetted with a flowable composite (3M), was then placed in the post space (Figure 1b) and cured. Finally restorative procedure was completed by building up the crown using (Z 350 filtek supreme) composite resin. (Figure 1c).



**Figure 1a.** Frontal view of case 1 showing early childhood caries in 52,51,61,62



**Figure 1b.** Intraoral view of case 1 after insertion of ribbon in 61,62



**Figure 1c.** Frontal view of case 1 after composite build up

**Case 2: Fixed space maintainer**

A 8-year-old boy was referred to the department with a complaint of premature loss of primary mandibular right first molar (Figure 2a). Following clinical and radiographic examinations, decision was made to create a fixed-space maintainer using Ribbon (3M). The palatal surfaces of the abutment teeth (83,85) were cleaned with a non-fluoridated pumice paste, etched with 37% phosphoric acid, rinsed and dried. Single Bond and a flowable composite resin were applied to the enamel surfaces, the Ribbon was placed. The Ribbon was coated with flowable composite, and cured. The embrasures were shaped to facilitate good oral hygiene, and the composite was polished using sof lex polishing disc (Figure 2b).

**Case 3: Fixed partial denture with a tooth pontic**

A 5<sup>1/2</sup> year-old boy was referred to the department with the chief complaint of premature loss of upper front tooth (Figure 3a) due to fall. Following clinical and radiographic examinations, the decision was made to create a fixed partial denture reinforced with Ribbon using an acrylic tooth as a pontic (Figure 3b and 3c). Following completion of etching

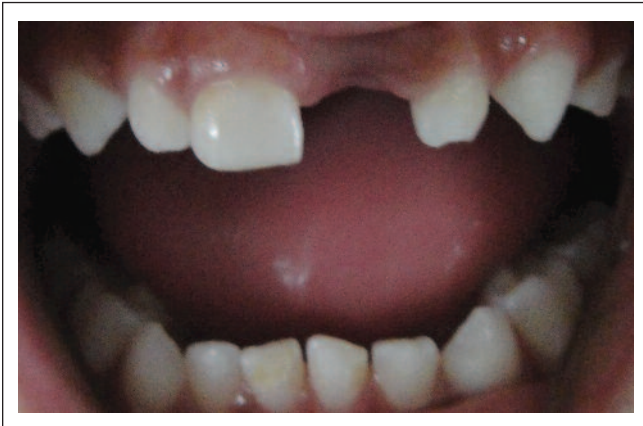


**Figure 2a.** Intraoral view of case 2 showing missing 84



**Figure 2b.** Intraoral view of Ribbon fixed space maintainer

and bonding procedures, a thin layer of flowable composite resin was applied (without curing) to the lingual and proximal surfaces of the abutment teeth, Ribbon was placed on the lingual surface of the teeth. A thin layer of flowable composite was applied to the acrylic tooth pontic, which was placed in the desired position on the Ribbon and light cured. The patient's occlusion was checked for premature contacts, and the resin composite was polished using a polishing disc.



**Figure 3a.** Frontal view of case 3 showing missing 61



**Figure 3b.** Occlusal view of polyethylene fiber-reinforced composite fixed partial denture



**Figure 3c.** Frontal of Polyethylene fiber-reinforced composite fixed partial denture constructed with a acrylic tooth.

#### Case 4: Splint traumatized teeth

A 13-year-old girl was referred to the department of within an hour of traumatic injury resulting from a road accident. Clinical examination revealed subluxation of the permanent left maxillary central and lateral incisors (Figure 4a). With slight finger pressure teeth were relocated (Figure 4b) and splinting was done from canine to canine using a 2-mm-wide strip of Ribbon after the labial surfaces of the teeth were etched, rinsed and dried, and Single Bond applied. To ensure semi-rigidity, the interproximal region was not etched or bonded. After applying a flowable composite to the enamel surfaces, the Ribbon was pressed through the composite against the teeth and cured. The Ribbon was then coated with additional flowable composite and cured (Figure 4c). Two weeks later, the Ribbon splint at the interproximal region was cut with a diamond bur. Then, the splint was removed from the abutment by sliding a scalpel blade between the Ribbon and the tooth on the most distal end. The remaining adhesive was removed with a tungsten carbide bur in a low speed handpiece under cooled water and surfaces were polished with disks.



**Figure 4a.** Frontal view of case 4 showing extrusion of 21, 22



**Figure 4b.** Intraoral view of case 4 after reinsertion of 21, 22



**Figure 4c.** Frontal view of Case 4 after stabilization with a Ribbond-composite splint

## DISCUSSION

Not only do polyethylene fibers improve the impact and flexural strength and the modulus of elasticity of composite materials,<sup>3</sup> they are barely visible within the resin matrix. For these reasons, polyethylene fibers appear to be the most appropriate and esthetic strengtheners of composite materials.<sup>4</sup>

Polyethylene fiber-reinforced composite used as a fixed space maintainer offers many advantages. FRC has an esthetic appearance, is easily manipulated, can be quickly inserted in a single-visit procedure that requires no laboratory services, poses no risk of damage to abutment teeth and is easy to clean.<sup>6,8</sup>

Polyethylene FRC fixed partial dentures (FPDs) could be a functional and esthetic alternative to replace a prematurely lost tooth. It is more comfortable than a removable appliance, nonirritating, and hygienic. It does not require any tooth preparation and can be repaired, modified, or removed from teeth without any iatrogenic problem.<sup>2,4,5,7</sup> It can be considered as a long-lasting provisional treatment if implant therapy is used at a later date. In this case, the noninvasive characteristic of the treatment renders it superior to all other options. For the child patients, this treatment could be considered as an interim treatment that could provide acceptable function and esthetics by replacing missing teeth and tissues until a definitive restoration can be performed. The patient's natural tooth, an acrylic tooth, or composite resin can be used as a pontic.

Due to insufficient tooth structure, an endodontic post and core may be necessary to provide support to the restoration. Various types of FRC posts have recently come into widespread use as an alternative to cast or prefabricated

metal posts in the restoration of endodontically treated teeth.<sup>4,9</sup> In the case reported here, Ribbond was chosen for its esthetic properties and because its application required no additional tooth preparation.

Dental splinting is frequently needed following traumatic injury to stabilize subluxated, luxated, avulsed, or root-fractured teeth.<sup>10</sup> Many different types of splinting techniques have been described in the literature.<sup>11,12</sup> Rib bond can be used in the treatment of multiple displaced teeth.<sup>4</sup> A Ribbond splint is esthetic, thin, smooth and non-irritating to the lip.

The only disadvantage is that this material is expensive.

## CONCLUSION

Ribbond can be used as an alternative to conventional treatment in pediatric dentistry. However, long-term clinical studies are needed to evaluate the effects of prolonged use of Ribbond in pediatric dentistry.

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