# Short Communication

# **Prospective Clinical Trial of Polyethylene Fiber Ribbon–Reinforced, Resin Composite Post-Core Buildup Restorations**

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The aim of this prospective clinical trial was to determine the outcome of polyethylene fiber ribbon–reinforced, resin composite post-and-core restorations used as endodontic buildups to support all-ceramic crowns. A total of 42 teeth (31 anterior, 11 posterior) with a mean follow-up time of 35.85 months (range, 10 to 73 months) were treated with 3-mm-wide polyethylene fiber ribbon–reinforced resin composite as post-and-core material. The posts and cores were assessed by clinical and radiographic examination. During the evaluation period, only 1 dentin-cement failure was observed as a post dislodgement after 11 months of clinical service. Performance of polyethylene fiber ribbon post and resin composite core foundation restorations provided clinically satisfactory support for all-ceramic crowns. *Int J Prosthodont 2007;20:55–56.* 

The biomechanical properties of fiber-reinforced resin composite posts have been reported to be similar to those of dentin.<sup>1-3</sup> The use of polyethylene fiber ribbon-reinforced resin composite as post material in restoring extensively damaged teeth is new. There have been no reports of clinical performance related to the use of polyethylene fiber ribbon-reinforced resin composite as a post-and-core material. The purpose of this prospective clinical trial was to follow the clinical and radiographic performance of polyethylene fiber ribbon-reinforced resin composite post-and-core restorations used to support all-ceramic crowns.

# **Materials and Methods**

A total of 28 patients (15 men and 12 women, mean age 34.53 years) were treated during a 6-year period. A total of 42 teeth (31 anterior, 11 posterior) with a mean follow-up time of 35.85 months (range, 10 to 73 months) were treated with 3-mm-wide polyethylene fiber ribbon (Connect Reinforcement Ribbon, Kerr Corp), Variolink resin cement (Ivoclar Vivadent), and resin composite

(Tetric Ceram, Ivoclar Vivadent) as post-and-core material. Empress II (Ivoclar Vivadent) full crowns were used as fixed restorations. Teeth with bad root fractures, deep periodontal pockets, periapical lesions, doubtful or extensive caries, tooth fractures under the margins of the free gingiva, or failed endodontic therapy were excluded from the prospective clinical trial, whereas teeth with successful endodontic therapy or tooth fractures over the margins of the free gingiva were included. All of the polyethylene fiber ribbonreinforced resin composite post-and-core restorations were fabricated by a single clinician.

Sound tooth structure (at least 2 mm above the gingiva) was preserved while the root canal filling was removed to the apical third with Gates-Glidden drills and washed with 5% sodium hypochlorite. After the canal was dried with paper points, 37% phosphoric acid was used to etch the root canal wall and remaining tooth surface for 15 seconds and washed thoroughly for 30 seconds. Resin cement was used for luting the polyethylene fiber ribbon. Syntac Primer, Syntac Adhesive, and Heliobond (lvoclar Vivadent) were applied to the dentin separately, in accordance with the manufacturer's directions. A piece of fiber ribbon, 5 to 6 mm longer than the prepared root canal length, was cut off and embedded in mixed resin cement. The root canal was filled with resin cement. The polyethylene fiber ribbon was folded to create 2 stems in the root canal and carefully placed into the canal by means of titanium nitride-coated instruments. A loop-form ribbon was left 2 to 3 mm above the occlusal surface of the root. The combined fiber ribbon and luting resin were light

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| Arch     | Central incisors | Lateral incisors | Canines | Premolars | Total |
|----------|------------------|------------------|---------|-----------|-------|
| Maxilla  | 9                | 19               | 3       | 9         | 40    |
| Mandible | 0                | 0                | 0       | 2         | 2     |

#### Table 2 Time of Posts in Service

| Time in service* (mo) | No. of restorations | No. of failures |  |
|-----------------------|---------------------|-----------------|--|
| 10–14                 | 4                   | 1 <sup>†</sup>  |  |
| 15–19                 | 2                   | 0               |  |
| 20-25                 | 7                   | 0               |  |
| 26-31                 | 7                   | 0               |  |
| 32-37                 | 5                   | 0               |  |
| 38-43                 | 7                   | 0               |  |
| 44-49                 | 0                   | 0               |  |
| 50-55                 | 4                   | 0               |  |
| 56-61                 | 0                   | 0               |  |
| 62-67                 | 0                   | 0               |  |
| 68-73                 | 6                   | 0               |  |
| Total                 | 42                  | 1               |  |

\*Mean follow-up time was 35.85 months.

<sup>†</sup>One patient experienced dentin-cement failure as a result of debonding of the post after 11 months in service.

cured for 40 seconds (Optilux, Demetron). The exposed ribbon loop was then filled and covered with resin composite incrementally to fabricate the core and light cured for 40 seconds on all surfaces.

The core preparation was completed with a circumferential deep chamfer finish line. Medium and coarse diamond burs (Accurata, G+K Mahnhardt Dental) were used for tooth preparations. The width of the shoulder was kept to 1 to 1.2 mm. Cervical margins were placed 0.5 mm subgingivally to increase the length of preparations as well as improve the esthetics of the definitive restorations. Sharp edges or irregularities were corrected to minimize stress concentration. Completearch impressions were made with a silicon impression material (Speedex, Coltene), and provisional crowns (Dentalon Plus, Heraeus Kulzer) were fabricated chairside. Empress II all-ceramic crowns (Ivoclar Vivadent) were fabricated and cemented with resin cement. The occlusion was controlled to prevent premature contacts.

The rate of success was assessed by clinical and radiographic examinations after 3 months, 6 months, and 1 year and annually thereafter. At each recall appointment, radiographs were obtained of the restored teeth with the standardized long-cone technique. Comparisons were made with radiographs obtained immediately after treatment. The outcome was considered successful if the post and core was in situ. No statistical tests were used to evaluate this clinical study, since only 1 failure (a post dislodgement) was observed.



Fig 1 Restoration that debonded after 11 months in service.

## **Results**

The distribution of the types of teeth treated is shown in Table 1. The duration of service of the polyethylene fiber ribbon-reinforced resin composite post-and-core restorations varied from 10 to 73 months (Table 2). During the follow-up period, only 1 dentin-cement failure was observed as a post dislodgement after 11 months of clinical use (Fig 1). No caries and no pathologic changes were seen in the other treated teeth.

## Conclusion

Post-and-core restorations made of polyethylene fiber ribbon-reinforced resin composite followed over a period of up to 6 years, with an average follow-up period of 35.85 months, exhibited a highly successful rate of useful service. The translucent quality of the fiber ribbon and resin composite enabled full porcelain crowns to be fabricated without compromising esthetics.

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56

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