

# 21st Century Solutions to Endodontic Problems

The accessory post technique for conservative and effective treatment

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**F**iber-reinforced composite posts have been available in the United States for nearly 20 years and used successfully in Europe for 25 years. RTD Dental ([www.rtdental.com](http://www.rtdental.com)) invented, patented, and commercialized these posts, which have performed well in clinical trials.<sup>1-5</sup>

Fiber posts have good esthetics, are non-corrodible and biocompatible, and are reversible with UniCore® Post and Drill System (Ultradent, [www.ultradent.com](http://www.ultradent.com)). Mechanically, they exhibit an elastic modulus similar to that of dentin, which helps prevent root fractures in vivo and in vitro.<sup>5</sup>

Dentists have many brand, style, and size choices; the largest is about 2.2 mm. All these options are round, whereas most root canals are elliptical. According to Rosenstiel and colleagues, “[Circular] post systems are only effective in the [most apical] portion of the post space, because the majority of prepared post spaces demonstrate considerable flare in the occlusal half. Similarly, when the root canal is elliptical, a parallel-sided post will not be effective unless the canal is considerably enlarged.”<sup>6</sup>

If that tooth fails after being restored, the clinician can face an over-flared, over-prepared space, especially after a cast post failure. Even the best tapered or double-tapered fiber posts are not a perfect fit in such cases.

or “shears,” under pressure, perfect for a well-fitting inlay, crown, or endodontic post.

Simple friction also contributes. It is less than ideal when the thickness exceeds 100 microns. A small, round post placed in a wide, flared, or oval space creates inadequate surface contact primarily in the emerging coronal half. Another important attribute of these materials is thixotropicity, or the ability of these materials to “stack” or resist slumping.

Then there’s C-factor, a calculated relationship between polymerization shrinkage of a resin and the number of surfaces with which the mass is bonding. A high C-factor leads to higher potential for leakage; C-factor is especially high when restoring an endodontically treated tooth, with or without a post.

## Adhesion and Bonding Considerations

One familiar with the principles of bonding to tooth structure understands the importance of surface energy and surface tension, as well as uniform, consistent, and intimate contact. Resin cements, glass ionomers, resin-modified glass ionomers, and all other cements have a consistency/viscosity that flows well,

## A Modern Solution

Boksman and colleagues<sup>7</sup> described several “21st century” solutions to these dilemmas. If the coronal opening is less than 25% larger than the largest prefabricated post in your kit, and the largest does not require additional dentin removal apically, cement alone should be sufficient. If the space is 25% to 50% larger, a



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FIG. 1



FIG. 2

(1.) The patient presented with a failed metal post but with adequate remaining structure to save this tooth. (2.) Oval-shaped canal, larger than the post.



FIG. 3



FIG. 4



FIG. 5



FIG. 6



FIG. 7

(3.) After the “master” post was trial fitted to confirm apical fit, the Fibercone Accessory Posts were trial fitted. (4.) Prelude® Link provides the environment for “no light” auto-curing down the canal, with very high bond values to canal dentin using this technique. (5.) Unicore post is inserted, followed immediately by Fibercones and more core composite. (6.) Trimmed and provisionalized core. (7.) Postoperative radiograph revealing internal adaptation not possible with a lone prefabricated fiber post and good visibility.

good technique involves taking an impression of the lubricated canal by using the post and either a light-cured or dual-cured core material to register the internal shape of the canal. This is very similar to the technique for creating a pattern for casting with DuraLay (Reliance Dental Mfg. Co., [www.reliancedental.net](http://www.reliancedental.net)). This is then cemented as an indirect procedure. If the internal areas to be restored are more than 50% bigger than the biggest post, the accessory post technique may be the most viable treatment.<sup>8</sup> This includes placing a “master” fiber post, surrounded by one or more accessory posts (ie, specialty posts, much smaller than standard, and generally less expensive than “full-sized” posts of similar quality).

The accessory post technique offers many benefits compared with single fiber or cast posts, including:

- better adaptation for greater bond strength.<sup>8,9</sup>
- higher flexural strength.<sup>10-13</sup>
- improved cyclic fatigue resistance.<sup>14</sup>
- improved stress distribution, resulting in

better failure mode (non-catastrophic).<sup>15-18</sup>

- one-appointment treatment that satisfies all necessary criteria<sup>19</sup> without laboratory fees.

### Case Presentation

A patient presented with a failed metal post but exhibited adequate remaining structure to save the tooth, despite corrosion damage and darkening (Figure 1).

After the corroded post was removed, an oval-shaped canal larger than the post was discovered (Figure 2). For this reason, the accessory post technique was chosen for treatment.

When the post space was prepared apically with the Unicore Post and Drill System, debris was removed and the space was cleaned. The “master” post (UniCore® #2, Ultradent) was trial fitted to confirm apical fit, and then the Fibercone® Accessory Posts (RTD Dental) were trial fitted (Figure 3). Prelude® Primer (Danville Materials, <http://danvillematerials.com>) was scrubbed into the canal walls and the coronal structure, followed by air thinning

and paper point insertion to prevent pooling. Prelude® Adhesive (Danville Materials) was scrubbed in the canal and coronal aspects and air thinned, and a paper point was inserted.

Prelude® Link (Danville Materials) was painted onto the canal and coronal surfaces. This product provides the environment for “no light” auto-curing down the canal, with very high bond values to canal dentin using this technique.<sup>20</sup> Next, RockCore® (Danville Materials) cement/core composite was injected (Figure 4). Prelude Link allowed peroxide from the RockCore to activate the amine in the Prelude Adhesive, creating an auto-cure effect. A UniCore post was inserted, followed immediately by Fibercones and more core composite (Figure 5). A 3-minute delay before light curing allowed the peroxide to auto-cure before introducing light down the post. The core was trimmed and provisionalized (Figure 6).

The postoperative radiograph (Figure 7) reveals internal adaptation not possible with a lone prefabricated fiber post and good visibility.

## Conclusion

Fiber-reinforced composite posts have proven to be a reliable option for endodontic treatment. Because canal shape is rarely perfectly round and canal sizes vary, clinicians can rely upon specialized materials and techniques to ensure clinical success, depending on the requirements and needs of the case. When the internal areas to be restored exceed the largest available post by more than 50%, as in this case, the accessory post technique described here provides a strong, well-adapted, long-lasting result.

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