An Esthetic Alternative for Endodontically Treated Teeth

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The gaining popularity of all-ceramic systems has prompted clinicians to reconsider materials that are used as foundations for endodontically treated teeth, especially in the anterior region. With conventional metal-ceramic restorations, the use of a metallic post with an opacious build-up material was often undetected because of the masking of the metal. Today's highly translucent ceramic materials require the use of an esthetic foundation that will not only complement the ceramic's esthetics, but will also function well under occlusal loads. This awareness has led clinicians to incorporate a genre of low elastic modulus, high-strength fiber posts, originally developed in France, for such high-visibility clinical cases.

AESTHETI-PLUS™ fiber posts from Bisco use high-quality quartz fibers (62% fiber by volume), pre-tensed in an epoxy matrix, to achieve excellent mechanical properties (Figure 1). According to the manufacturer, these include a tensile strength (approximately 2,200 MPa) that is superior to metallic posts of the same diameter, and a Young's Modulus of Elasticity equal to that of human dentin (approximately 18 GPa). The low modulus allows the post to dissipate and absorb stress, rather than transfer it to the tooth, as with many high modulus metallic and zirconium oxide posts (Figure 2).

AESTHETI-PLUS™ POST is a direct descendant of the C-POST™, the original patented carbon fiber post that was introduced to the US market by Bisco in 1995. Both versions were included in a multicenter clinical trial involving eight universities in four countries (Table 1). In this retrospective study of 3,477 cases, no root fractures were reported 3 to 7 years after placement.[1]

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Clinical Application

This 45-year-old patient presented with an extensive composite restoration and decay on tooth No. 8. The patient's chief complaint was the diastema between teeth Nos. 8 and 9, as well as the overall shape and length of the central incisors (Figure 3). A treatment plan was chosen that included a full crown on tooth No. 8 and a porcelain veneer on tooth No. 9. After root canal therapy on tooth No. 8, post space was created by removing gutta percha with a heated plugger. The smallest (1.4 mm) of the three AESTHETI-PLUS™ POST sizes was indicated. The AESTHETI-PLUS™ POST features a two-

Table 1—Occurrance of Root Fracture in Multicenter Clinical Trial

University	# of Cases	Root Fractures	Post Fractures
Paris VII	404	0	0
Nice	137	0	1
Toulouse	150	0	0
Montreal	320	0	0
Modena	470	0	0
Siena	1,314	0	0
Padua	450	0	0
Karolinska	236	0	0
Total	**3,477**	**0**	**1**

Figure 1—AESTHETI-PLUS™ fiber posts use high-quality quartz fibers to achieve excellent mechanical properties.

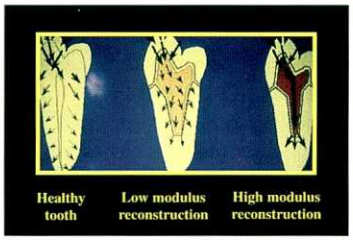

Figure 2—A low modulus allows the post to dissipate and absorb stress, rather than transfer it to the tooth.

Figure 3—The patient's preoperative condition; note the diastema between teeth Nos. 8 and 9, as well as the overall shape and length of the central incisors.

Figure 4—The AESTHETI-PLUS™ POST features a two-stage taper design with "shoulder stops."

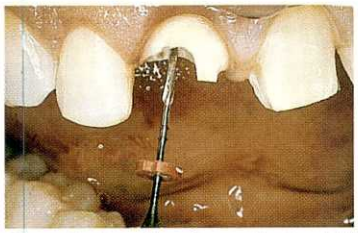

Figure 5—An end-cutting preshaping drill (with one stripe) is used to establish the desired post length.

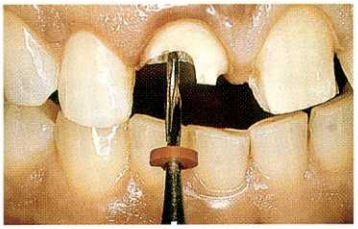

Figure 6—The side-cutting finishing drill (with two stripes) follows, to customize the space for the post width.

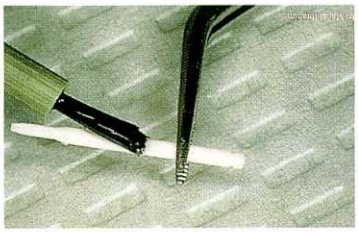

Figure 7—Adhesive (in two coats) was applied to the decontaminated post.

Figure 8—The adhesive was then light-cured for 10 seconds.

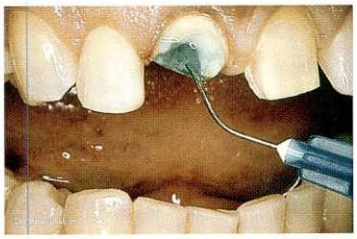

Figure 9—The canal space was etched for 15 seconds, rinsed well with water, and dried with a paper point and air.

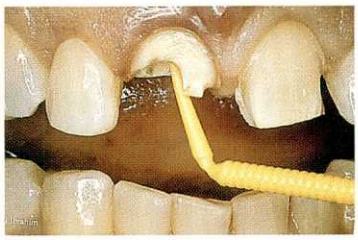

Figure 10—Two coats of ONE-STEP® were placed in the canal and the excess removed with a paper point.

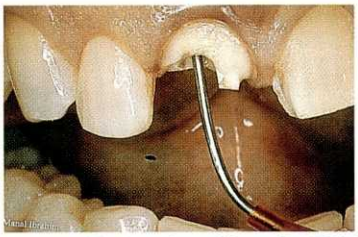

Figure 11—Bisco's self-cured POST CEMENT HI-X™ was used to provide high bond strength and a virtually insoluble seal around the post.

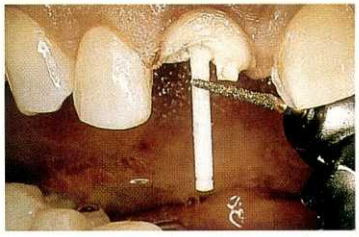

Figure 12—Post length was adjusted using a diamond bur, leaving enough length to support the build-up material.

Figure 13—The core build-up was created using a translucent, light-cured composite with a 5-mm depth-of-cure.

Figure 14—Impressions were made and the restorations were fabricated and cemented.

stage taper design with "shoulder stops" (Figure 4). The tapered shape accommodates the narrowing of the root and canal, and the shoulders provide a positive, tactile stop during try-in and final cementation.

Canal Preparation

Each AESTHETI-PLUS™ size takes two drills, which are color-coded and striped for ease of identification. First, the end-cutting preshaping drill (with one stripe) is used to establish the desired post length (Figure 5). The side-cutting finishing drill (with two stripes) follows, to customize the space for the post width, while leaving a 30-µm circumferential space for the adhesive and cement (Figure 6). The first AESTHETI-PLUS™ post was tried-in to ensure fit and a positive seat. These posts are 19 mm long and can be trimmed to the desired length after try-in or after cementation and build-up.

Bonding Capability

Serrations (retention rings) in endodontic posts represent the weakest areas, and ultimately weaken the overall post strength. To avoid this, the AESTHETI-PLUS™ system achieves high bond (pull-out) strength by way of its microretentive surface—created by machining. In this clinical case, Bisco ONE-STEP® Universal Adhesive (in two coats) was applied to the decontaminated post (Figure 7) and air-dried to evaporate solvent. It was then light-cured for 10 seconds (Figure 8). The canal space was etched for 15 seconds with UNI-ETCH® 32% H_3PO^4, rinsed well with water, and dried with a paper point and air (Figure 9). It is ideal to leave the dentin slightly moist. Two coats of ONE-STEP® were placed in the canal and the excess removed with a paper point (Figure 10). The canal was air-dried to evaporate the solvent, and ONE-STEP® was light-cured for 20 seconds.

Cementation

Bisco's self-cured POST CEMENT HI-X™ was used in this case to provide high bond strength and a virtually insoluble seal around the post (Figure 11). HI-X™ cement also has a high radiographic density, and aids in postoperative diagnoses.

The post was seated with gentle, passive pressure and the cement was allowed to self-cure. Post length was adjusted using a diamond bur, leaving enough length to support the build-up material (Figure 12).

Core Build-Up

The core build-up was created using LIGHT-CORE™, a translucent, light-cured composite with a 5-mm depth-of-cure (Figure 13). The translucency of this material would aid in achieving the desired esthetic result with the ceramic restorations. Impressions were made and the restorations were fabricated (Oral Rehabilitation Institute) and cemented with ILLUSION™ Universal Aesthetic Cementation System (Figure 14). The final restorations addressed the patient's chief concerns while providing long-term esthetics and function.

In the event that reaccess to this canal will be required, the fiber post can be atraumatically removed in minutes using the FIBER POST REMOVAL KIT. The AESTHETI-PLUS™ is also available in International Standards Organization (ISO) sizes of 100, 120, and 140 with a matching drill system. A translucent version of this post is also available in the two-stage shape, the LIGHT-POST™, and in a radiopaque, double-taper design, the D.T. LIGHT POST™.

Conclusion

In summary, the AESTHETI-PLUS™ fiber post system offers a conservative alternative to restoring endodontically treated teeth without compromising esthetics. The high strength coupled with low elastic modulus creates a tremendous confidence level in the longevity and success rate of this foundation.

Reference

1. Tõbjorner A, Karlsson S, Ödman PA: Survival rate and failure characteristics for two post designs. *J Prosthet Dent* 73:439-444, 1995.