

## 3M<sup>SM</sup> Health Care Academy

# Use of a simplified workflow for a post-and-core restoration.

by Dr. Carlos Eduardo Sabrosa

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The restoration of damaged endodontically treated teeth with materials that have physical and mechanical properties similar to those of dentin has become a major objective of dentistry. The use of materials that can bond to both dentin and core material can improve distribution of forces along the roots, contributing to the reinforcement of the tooth. In addition, there has been an increased demand from patients and clinicians for aesthetic treatments. Consequently, the use of metal-free crowns, as well as aesthetic post and core materials has increased significantly.

The prefabricated glass fiber posts are now being widely used and are proving to be very successful options. Their properties are similar to those of dentin; they are aesthetic, more practical, less expensive, and less invasive than metal posts and core systems. (S. Langdon)

When the French dentist Pierre Fauchard recommended the use of pivots to restore pulpless teeth with artificial crowns in the early 18th century, aesthetic, minimally invasive endodontic treatment approaches were still a long way away. Over the years, post and core concepts changed from one-piece post retained crowns (Richmond crowns), to metal cast post and cores and finally to prefabricated posts. Materials evolved as well: initially, metal or wood were used, while with increasing aesthetic demands, ceramic and fiber-reinforced composite posts were developed.



Figure 1: The new 3M<sup>SM</sup> RelyX<sup>SM</sup> Fiber Post 3D available in four different sizes and with additional coronal macro retentions.

Today, glass fiber posts are becoming the standard of care for different reasons: preventing a shadow effect, they allow for more aesthetic restorations than metal posts. In addition, root fractures caused by materials with a high modulus of elasticity (like metal and ceramics) are avoided.

The glass fiber reinforced composite material has a low, dentine-like e-modulus that provides for a uniform stress distribution and minimises root fracturing. Furthermore, fiber posts are used more frequently due to simplified protocols. Recently, 3M Oral Care launched a new fiber post with improved design (Fig. 1) along with a complete procedure solution that leads to reliable results in just a few steps. The recommended approach is described by means of the following patient case.

## Case example

The upper right second premolar of a 56 year-old patient needed endodontic retreatment (Fig. 2). The remnants of the old root canal filling were removed and the canals were cleaned, filled with gutta-percha and closed with temporary cement (Fig. 3).

Figure 4 shows the control radiograph. Since there was insufficient residual tooth structure to ensure stability of the coronal restoration, we decided to use the new 3M™ RelyX™ Fiber Post 3D.

## Preparation of the root canal

During the follow-up visit, the temporary cement was removed just as the filling in the buccal canal (Fig. 5a).

For root canal preparation, four different burs are available that match the sizes of the fiber posts. Thus, not only the drilling depth, but also the diameter of the post and the corresponding drill had to be determined.

This task was accomplished by using the control radiograph and examining the clinical situation. Then, the root canal was prepared and shaped with the disinfected drills used one after the other with increasing diameters up to the assessed size 3 – the first one that removed a small amount of tooth structure (Figs. 5b and 5c).

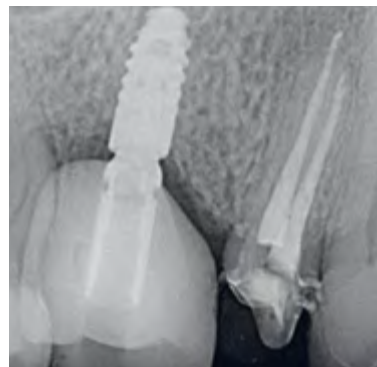
In this way, a tight fit of the post and a small cement gap were ensured. Only 7 mm of gutta-percha were removed from the palatal canal.



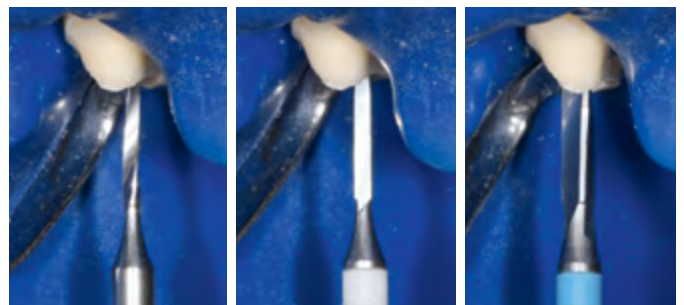
**Figure 2:** Initial situation with the premolar to be endodontically re-treated. The adjacent molar has been replaced by an implant with a 3M™ Lava™ Zirconia custom abutment.



**Figure 3:** Premolar with a new root canal filling and ready to be isolated with a rubber dam.



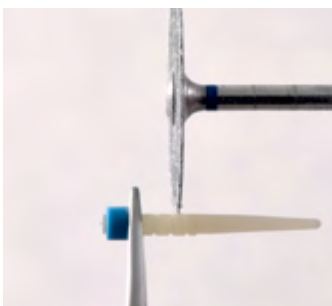
**Figure 4:** Control radiographs taken at the end of the first appointment.



**Figure 5a) 5b) 5c):** Removal of the existing filling with the universal drill (left) and preparation of the root canal beginning with the size-0 drill (middle) and ending with size 3 (right).



**Figure 6:** The fiber post fits the root canal exactly.



**Figure 7:** Shortening of the fiber post to the required length using a diamond disc strong enough to cleanly cut the glass fibers.



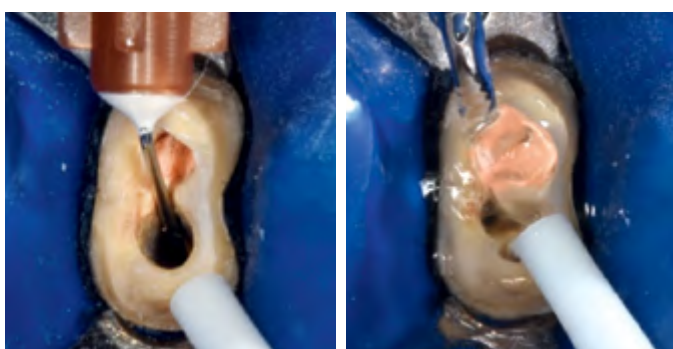
**Figure 9:** Application of the cement directly into the root canal with endo tips available for the automix and Aplicap™ delivery systems.



**Figure 10:** Treatment of the coronal part of the post with adhesive.

Finally, the fiber post was fitted into the prepared canal (Fig. 6), shortened to the required length extraorally using a diamond disc (Fig. 7) and cleaned with alcohol.

Prior to cementation of the post with 3M™ RelyX™ Unicem 2 Self-Adhesive Resin Cement, the root canal was cleaned with a 2.5 percent sodium hypochlorite solution, thoroughly rinsed with water and dried with paper points (Fig. 8).



**Figure 8:** Cleaning of the root canal prior to cement application.

To ensure a void-free procedure, the resin cement was applied directly into the root canal with elongation tips (Fig. 9). The fiber post was inserted and the cement was light cured after removal of the excess material. For the core build-up, the coronal part of the post was treated with 3M™ Scotchbond™ Universal Adhesive in the self-etch mode (Fig. 10).

Immediately after light curing, 3M™ Filtek™ Bulk Fill Posterior Restorative was applied. This filling material supports an efficient procedure since it may be used in layers of up to 5 mm. Proper curing is ensured due to an increased translucency of the composite and reduced shrinkage stress resulting from an innovative matrix system. The build-up material was simply modelled, cured and finally prepared with a ferrule design to receive the final crown restoration (Fig. 11).



**Figure 11:** Composite build up after preparation.



**Figure 12:** Final aesthetic restoration.

Figure 12 shows the final restorations in place.

## Conclusion

With the described procedure, a post-and-core restoration can be completed in just a few steps. The need for conditioning of the root dentine and the post is eliminated, there is no need for etching prior to adhesive application and the core build up is accomplished in 1-to-2 layers of composite.



Due to the use of high-quality materials which are adjusted to another, a high reliability and safety of the procedure is guaranteed.



## Dr Carlos Sabrosa

Dr Carlos Sabrosa is an Associate Professor at the State University of Rio de Janeiro Dental School. He received his DDS in 1992 from the State University of Rio de Janeiro Dental School and the Clinical Advanced Graduate Studies (CAGS) in Prosthodontics from Boston University Goldman School of Dental Medicine in 1996. Dr. Sabrosa also received his MSD and DScD in Prosthodontics/Biomaterials from Boston University Goldman School of Dental Medicine in 1997 and 1999 consecutively. He received the Steven Gordon Research/Clinical Award in 1995 and 1996 and the Tylman Research Grant Award in 1993 from the American College of Prosthodontics. He has a private practice, focused in oral rehabilitation and implantology, in Leblon, Rio de Janeiro, Brazil.

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