Next Adhesive Endodontics: A Single-Step Obturation and Post Technique

Over the past half-century, patients have been educated to retain their teeth whenever possible. Unfortunately, in some situations dental decay, whether initial or secondary to existing restorations, has introduced bacteria into the dental pulp chamber. Many years ago, these infected teeth were condemned to extraction. The science and art of dentistry has developed endodontic treatment for these infected teeth so they can be retained. The infected pulp canal is cleansed and filled with synthetic replacement materials, allowing the tissues around the remaining tooth structure to heal and function normally for many years. Once the pulpal infection has been eliminated, it is possible to develop a post and core assembly that will retain an overlying crown or bridge that restores the damaged tooth to its original function, shape, and appearance.

A number of materials can be used in the filling of the pulp canal and in the building of the post assembly. They include an obturator, a sealer, a post and core, and the materials that are used at the interfaces of these dissimilar substances. The obturator is typically a hard or plastic material that attempts to fill the pulp canal without voids, and whose function it is to drive the sealer into the lateral canals of the root. The purpose of the endodontic sealer is to fill in the gaps that occur between the solid core of the obturating material and the canal walls. Ideally, the post and core will reinforce the remaining radicular tooth structure and provide an anchor for the coronal restoration. If all of these components are adherent in nature, the interface (or cementation) materials can be chosen from among the dental resins.

In traditional endodontic therapy, the fitting of a gutta-percha obturator into the pulp canal is a mechanical process that pushes the sealant into the lateral canals. The most common methods for sealing these canals involve a fluid sealer and gutta-percha that is condensed by lateral and/or vertical condensation, with or without heat. This procedure is associated with a number of technique sensitivities:

1. the viscosity and flow of the sealer
2. the adhesion of the sealer to the tooth, obturator, and post
3. the possibility that the post preparation may cause a perforation
4. the inconvenience of separate appointments for obturation and post fabrication

Scientific Background

In the early 1990s, Torabinejad demonstrated that bacterial penetration...
occurred along the whole root canal when gutta percha was used alone as an obturation material. This indicates that it is essential for the endodontic sealer to function effectively in the elimination of postendodontic bacterial infiltration. Wennberg and Ostravik\textsuperscript{2} studied the adhesion of 8 endodontic sealers, showing that a bonded sealer is more effective than traditional materials. Tagger and colleagues\textsuperscript{3} postulated that adhesion of the root canal filling to the dentinal walls was advantageous for 2 reasons:

1. In a static situation, the adhesive sealer eliminates any space that may allow the percolation of fluids between the filling material and the dentinal wall.

2. In a dynamic situation, the adhesive sealer is needed to resist dislodgement of the filling material during subsequent manipulation.

Thus, research leads to the conclusion that gutta-percha, or any other root canal filling material, must be supported by an effective, preferably adhesive, endodontic sealer.

**Clinical Technique**

Armamentarium of the Next\textsuperscript{®} adhesive endodontic technique (Figure 1) includes a hybrid solid core made of a glass fiber for the coronal pulp canal to anchor the adhesive coronal restoration (and possibly to strengthen the remaining root structure) and a thermoplastic synthetic polymer to hermetically seal the apical and middle segments of the canal. In addition, a methacrylate resin-based sealer with a bioactive glass filler and a bonding solution to enhance sealer adhesion to root dentin are included.

The technique is described in the following section and in visual approximation on a sectioned tooth. In real-life situations, the clinical technique follows tooth contour and endodontic preparation more closely.

The preparation of the tooth (Figure 2) for a root canal procedure develops a .04 taper shape using rotary nickel titanium files (Figure 3).

1. Irrigation protocol for root canal disinfection is mandatory (Figure 3). The last irrigant to be used in the canal should be EDTA to neutralize the effects of the disinfectants.

2. The post is selected and tried-in (Figure 3). The fit is confirmed radiographically.

3. The canal is dried with paper points and/or air (Figure 4).

4. The bonding agent is applied (Figure 4). Excess bonding solution in the canal is removed with paper points (Figure 4). The root dentin should remain wet with adhesive.
5. Premixed sealer is spun into the root canal with a Lentullo (or a paper point) (Figure 5).
6. The Next Core is seated into the canal with light pressure (Figure 5). (The practitioner may choose to confirm the accuracy of placement radiographically.)
7. If the clinical and/or radiographic position is satisfactory, light-curing is applied to seal the coronal orifice and allow the dual-cure process to set the remaining resin components (Figure 5).
8. The dual-cured core buildup material is backfilled around the obturator (Figure 6) that protrudes from the coronal part of the canal, then shaped to the desired core form and light-cured.
9. The length and shape of the core are modified as necessary with a diamond or carbide bur, and the tooth is now ready for the crown fabrication procedure. Coronal and apical close-ups (Figure 6) demonstrate the efficacy of the technique.

Conclusion

The Next technique of adhesively obturating with the post attached to the apical filling material dramatically reduces chair time. Adhesive endodontics offers the benefits of adhesive sealing, which completely and permanently eliminates apical leakage in endodontically treated teeth. Bonding the restorative complex to the remaining dentin provides “dynamic stabilization” that virtually eliminates the possibility of physical dislodging. The continuity of the post with the root canal obturator and the sealer, all adhered to the dentin, creates a highly resistant monobloc that tends to redistribute occlusal stresses over a greater surface area. Post placement at the time of obturation also minimizes risks such as perforation, obturation dislodgement, and inadvertent root fracture.

Disclosure

Dr. Steier has no personal or financial interest in any dental product company. Dr. Freedman offers consulting services to many companies, including Heraeus Kulzer, Inc.

References