

CLINICAL AID

A New Mineral Trioxide Aggregate Root-End Filling Technique

Edward S. Lee, DDS

Carrier and syringe-type devices are currently used to deliver mineral trioxide aggregate as a root-end filling material. In certain surgical situations these devices may be too difficult to use because of the location of the surgical site and the small size of the root-end preparation. This paper describes a new technique to overcome these difficulties by the formation and delivery of mineral trioxide aggregate pellets.

The purpose of a root-end filling is to establish an apical seal of the resected root. Some desirable characteristics of a root-end filling material include the following: biocompatible with the periradicular tissues, nonresorbable, impervious to dissolution or breakdown by the tissue fluids, and capable of being adapted as closely as possible to the dentinal walls of the root-end preparation (1). The more commonly used root-end filling materials are amalgam, IRM (L. D. Caulk Co., Milford, DE), Super-EBA (Harry J. Bosworth Co., Skokie, IL), composite resins, and mineral trioxide aggregate (MTA) (2–7).

In vitro and in vivo experiments studying the sealing ability and biocompatibility of MTA have shown favorable results. The sealing ability of MTA has been shown in dye and bacterial leakage studies to be superior to that of amalgam, Super-EBA, and IRM (8–10). MTA has also shown favorable tissue reactions in dogs and monkeys (11–13). MTA is FDA approved for use as a root-end filling in humans and is currently being marketed as ProRoot MTA Dental Cement (Dentsply Tulsa Dental, Tulsa, OK).

Delivery of MTA has focused mainly on carrier and syringable-type devices, such as the Retro Amalgam Carrier (Moyco Union Broach, York, PA), the Messing Root Canal Gun (R. Chige, Inc., Boca Raton, FL), and the Centrix syringe (Centrix, Inc., Shelton, CT). In certain surgical situations these devices may be difficult to use because of the location of the surgical site and the small size of the root-end preparation.

The following describes a technique used to deliver MTA as a root-end filling material to a difficult surgical site by formation of MTA pellets.

MATERIALS AND METHODS

The mold for the MTA pellet is made by cutting a groove into a 0.5 inch × 0.5 inch × 2 inch plastic block (Tap Plastics, San Rafael, CA) using a #169 fissure bur (Fig. 1). Depending on the desired size of the pellet, the depth of the grooves can vary from one-half to the full circumference of the bur, and the length of the grooves can vary from 2 to 4 mm. Several grooves should be placed, each ~4 to 5 mm apart.

After the root-end is resected and the canal preparation completed using ultrasonic instrumentation, MTA is prepared by mixing three parts powder with one part aqueous solution or by the manufacturer's recommendation (14). After 30 s of mixing the mixture should exhibit a putty-like consistency. The MTA should be immediately placed into the grooves using the cement spatula and the excess material outside the grooves wiped clean with a slightly moistened cotton swab (Fig. 2). The MTA pellet is scooped out of the grooves using a #3 Hollenback instrument (G. Hartzell & Sons, Concord, CA) and delivered to the root-end preparation (Figs. 3 and 4). Pluggers are used to condense the material into place. Depending on the size of the canal and the size of the pellets, it may take from 2 to 5 pellets to fill the preparation.

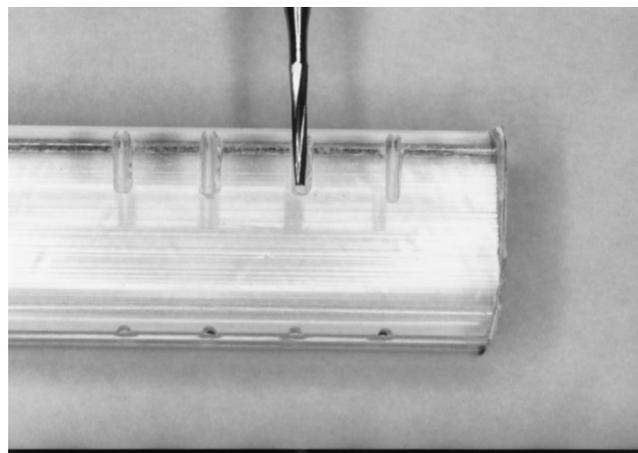


FIG 1. Photograph of the grooves in the plastic block. Each groove is sized to a #169 fissure bur.

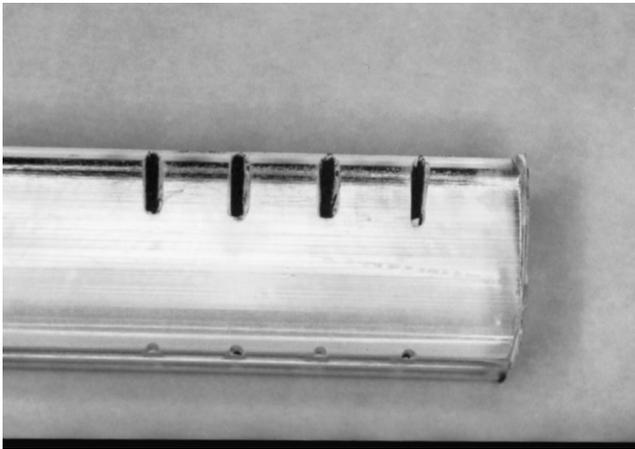


FIG 2. MTA in each of the grooves.

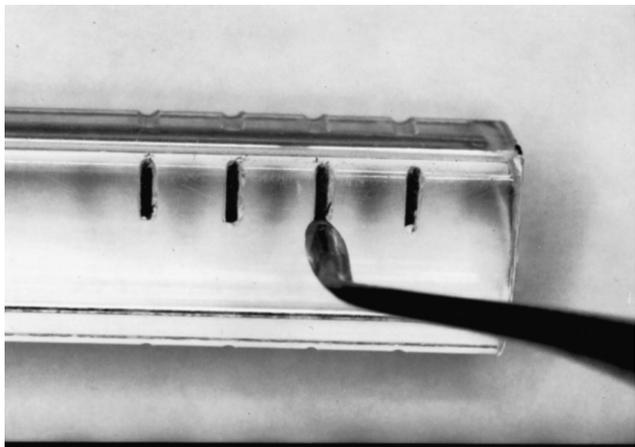


FIG 3. MTA being scooped out of the groove by the #3 Hollenback instrument.

DISCUSSION

Exposure of the periradicular tissues to microorganisms results in the development of a periradicular lesion. The goal of a root-end resection, preparation, and filling is to eliminate exposure of the periradicular tissues to the microorganisms in the root canal space. If the root-end preparation is inadequately prepared and sealed, failure will result.

MTA is a powder that consists of fine hydrophilic particles that set in the presence of moisture. Hydration of the powder results in a colloidal gel with a pH of 12.5 that solidifies to a hard structure. The setting time for the cement is ~4 h (15). Because of the slow setting time, the initial looseness of the MTA after mixing can make the material difficult to manage as a root-end filling material. Carrier-type devices are most often used for delivery of the MTA; but when the access or root-end preparation is small, the carrier-type devices can also be difficult to use. The MTA pellet forming and delivery technique overcome these difficulties.

When using this technique, the MTA pellets should be placed as fast as possible into the root-end preparation because the small pellets will quickly dehydrate. When the MTA mixture is dry, it becomes crumbly and unmanageable. Using several grooves on

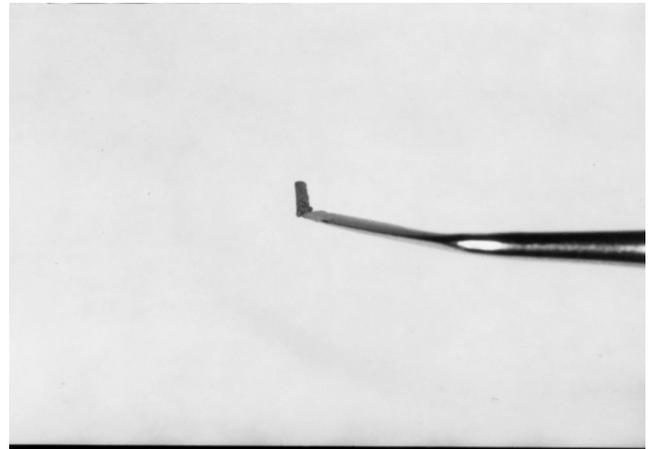


FIG 4. MTA at the tip of the #3 Hollenback instrument.

each of the four surfaces of the plastic block will help with the speed in placement of multiple pellets of MTA. Covering the plastic block with a moistened gauze will also help prevent desiccation of the MTA.

Dr. Lee is currently practicing in San Francisco, CA. Address requests for reprints to Dr. Edward S. Lee, 156 West Portal Avenue, San Francisco, CA 94127.

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