

CLINICAL AID

Electric Pulp Tester and Apex Locator Barrier Technique

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Use of the electric pulp tester and the apex locator during assessments of pulp vitality and root length determination involves bacterial cross-contamination of the metal surfaces of the probe tip and lip clip inserts which contact the oral hard and soft tissues. Reuse of these endodontic aids necessitates the sterilization or disinfection of the metal insert or the acquisition of extra attachments.

A barrier technique that protects the electric pulp tester probe tip and the apex locator lip clip from bacterial contamination and employs the principle of electric conductive bridging is presented.

The electric pulp tester (EPT) and the apex locator are electronic dental devices used in providing valuable information about pulp vitality and the location of the apical constriction of the root canal. Their diagnostic value is based on the neurological response of the dental pulp and on the difference in electric resistance between the oral mucous membrane and the periodontium (1).

The use of rubber gloves and other barrier techniques by the dentist to avoid field contamination have become a standard of providing patient care (2). However, their use with the EPT not only results in the blockage of electric current to the tooth but also contamination of the probe tip and/or probe handle. Completion of the current of the EPT while the operator is wearing rubber gloves is possible either by the patient's finger contact on the probe handle (3, 4) or with the use of a lip clip from the patient's lip to the probe handle. The lip clip is supplied by the manufacturers of some of the newer model EPTs.

Butel and Difiore (5) described a technique that allows the use of gloves with the EPT and contact by the patient to the probe handle via a custom made "patient-held contact device." The entire probe handle, including the attachment of the patient-held contact device on the probe handle, is protected with a disposable plastic wrap. The sterilized probe tip is inserted into the wrapped handle. This reduces or eliminates cross-contamination of the probe handle during its use. The

contaminated probe tip requires autoclaving or disinfection before reuse. In a busy practice, a sterile technique during use of the EPT or the apex locator may require the purchase of multiple probe tips and lip clips.

EPT reliability has recently been demonstrated from "metal to metal" electrical bridging of dental instruments between the tooth surface and the EPT probe tip (6). The status of pulp vitality may be established by the contact of any conductive metal instrument from the EPT to the tooth. Using this principle, a barrier technique is described which permits the use of the EPT and the apex locator while preventing cross-contamination of the probe tip of the EPT and the lip clip of the apex locator.

MATERIALS AND METHODS

Preparation of the EPT (Vitality Scanner; Analytic Technology, Redmond, WA) requires cutting a small stabilization groove about 1-mm deep with a #2 round bur at an acute angle along the proximal surface of the probe tip (Fig. 1).

A protective current conductive sleeve (CS) that fits over the tip of the EPT is made by sectioning a new saliva ejector with wire cutters. Initially, the plastic at both ends of the ejector are removed. The plastic portion of the middle section is cut into segments and distributed evenly over the entire length of the wire. Each segment is separated with the wire cutters leaving about 2 to 4 mm of wire at both ends of the CS.

The CS is then inserted over the probe tip of the EPT so that the wire on one end of the CS fits into the stabilization groove of the probe tip and the wire on the other end makes contact with the tooth surface (Fig. 2). The EPT used with this barrier technique functions by the application of a small amount of conductive medium (tooth paste) to the tip of the CS. After isolating and drying the teeth in question, the patient's finger makes contact with the end of the probe handle. The probe handle is held by the gloved hand of the operator (Fig. 3). The patient is instructed to remove his or her finger on initial sensation of electric stimulation or heat.

The barrier device used on the apex locator (Foramatron Parkell, Farmingdale, NY) is also fabricated from a saliva ejector. The plastic on both ends of the saliva ejector is

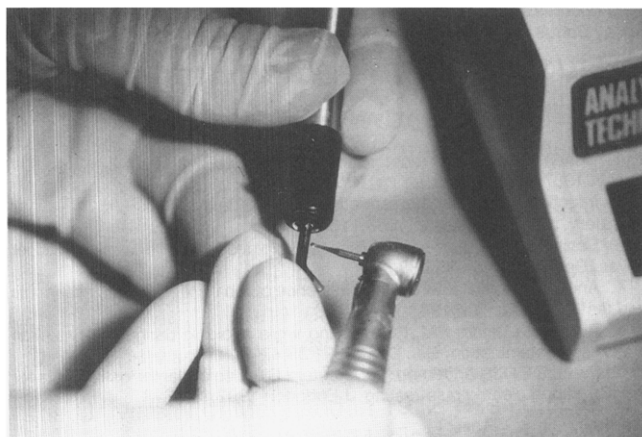


FIG 1. With a #2 round bur, a small groove is made inside the proximal angle of the probe tip.

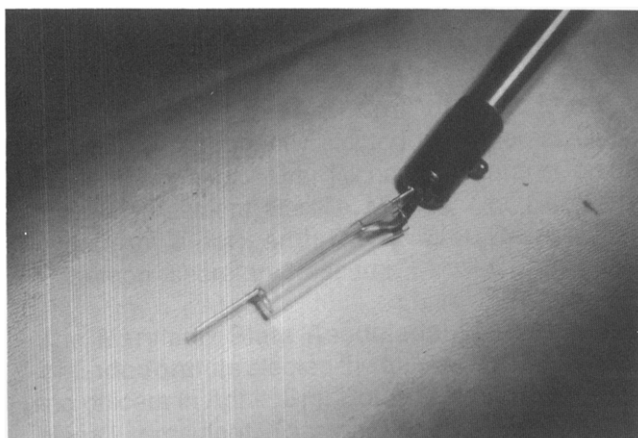


FIG 2. A CS is shown inserted over the probe tip with the proximal wire firmly placed into the prepared groove and the distal wire tip available for electric pulp testing.

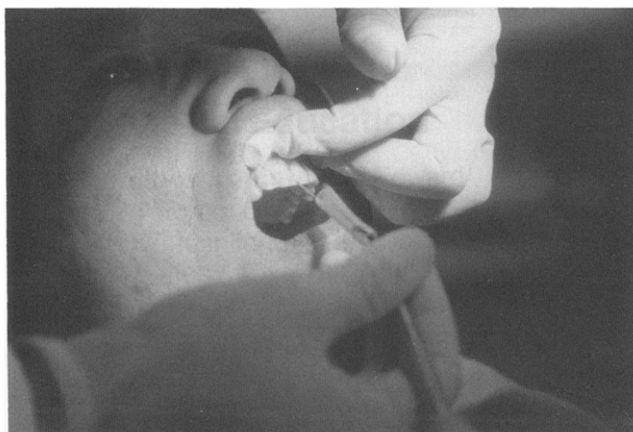


FIG 3. The CS applied to the probe tip is shown as used during electric pulp testing.

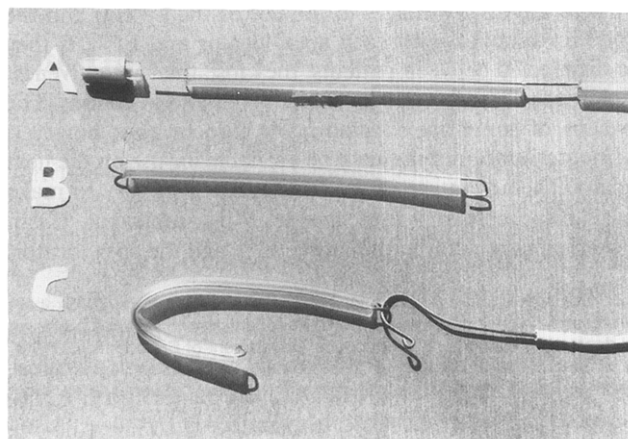


FIG 4. A, A saliva ejector is shown with both ends of the plastic removed and about 10 mm of wire exposed. B, Both wire tips are bent toward the plastic, with one end tucked into the lumen and the other resembling a hook. C, The PLC is shaped so that the smooth end will contact oral mucosa and the other end will lay outside the cheek with the hook away from the face.

removed with wire cutters so that about 10 mm of wire remains exposed at both ends (Fig. 4A). One end of the wire is bent with orthodontic pliers into its own lumen. The other end of the wire is bent in the opposite direction to create a hook outside of the plastic lumen (Fig. 4B). The tip of the plastic lip clip (PLC) shown in Fig. 4C will be placed inside the patient's cheek and make contact with the oral mucosa. The opposite end of the PLC (Fig. 4C) will connect to the lip clip of the apex locator. The apex locator is activated by placing the plastic file clip (PLC) on the file inside the tooth and advancing the file until a reading of 0 appears on the apex locator's digital readout.

DISCUSSION

The physical characteristics of the saliva ejector makes it an ideal dental item for use as a CS or a PLC. It is smooth, flexible, and adaptable to any shape for optimal use in the oral cavity. The metal wire embedded inside the plastic can easily be exposed for use as an electrical conductor. The small diameter of the saliva ejector wire is ideal for vitality testing when there is a minimal area of available tooth structure which is inaccessible to the larger probe tip of the EPT. The plastic sheath around the wire protects the probe tip from oral contamination and prevents accidental contact with the patient's soft tissue. From a single saliva ejector four to eight CSs can be fabricated and used as disposable items.

The use of rubber gloves and the CS aid in preventing cross-contamination of the teeth and the oral mucosa with the probe tip of the EPT but does not eliminate cross-contamination of the probe handle. The handle may be contaminated by the operator when he or she handles the oral mucosa and the probe handle with the same gloved hand. By placing a disposable cover glove over the contaminated gloved hand prior to contact with the probe handle the danger of cross-contamination is eliminated.

There are disadvantages to the use of the lip clip and the probe tip supplied with each apex locator and EPT. If they are disinfected between patients, they lose their retentiveness on the probe wire from repeated removals and insertions. The lip clips of some apex locators are autoclavable; however, during sterilization it may not be available for use on the next patient. The advantage of the PLC is that it is easy to make and is disposable and autoclavable. Most important, it can prevent cross-contamination of the EPT and the apex locator.

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