

Endodontic Spotlight

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Introduction

I hope everyone has been enjoying the beautiful weather that we have been having here in the Pacific Northwest. I've definitely been outside quite a bit! The theme for this issue is pulp testing. We start off with an article that looks at the most predictable pulp testing methods. We then have an article that discusses the best technique when using Endo Ice. Finally we have a set of three studies that determine the optimal placement of the EPT probe.

Spotlight on Pulp Testing

Just as the correct diagnosis is important in other aspects of dentistry, it is critical in endodontics as well. Diagnosis in endodontics is made by using a combination of history, clinical examination, radiographs, and perhaps most importantly pulp testing. Commonly used pulp tests include percussion, palpation, mobility, perio probing, cold, hot, and EPT. The first four are used to evaluate the periodontium, whereas the last three help determine the health of the nerve itself. I find that the cold test is the most useful pulp test, as it allows me to determine not only if the nerve is alive (vital versus necrotic), but also the health of the nerve (normal versus reversible pulpitis versus irreversible pulpitis). Using commercially available Endo Ice, it is also very convenient to perform. Endo Ice is 1,1,1,2-tetrafluoroethane (TFE) which is a refrigerant that evaporates immediately causing cooling of the sprayed area (previously it was dichlorodifluoromethane or DDM which served the same purpose but was replaced by TFE due to environmental concerns). While we have many tests, it is always important to remember that these are imperfect diagnostic aids that sometimes give false positive or false negatives, so your professional judgment is required. Sometimes even if a tooth is suspicious but the testing is unclear, we will choose to watch the tooth – we feel it is better to be sure about our diagnosis before committing to the tooth to root canal therapy.

Fuss Z, Trowbridge H, Bender IB, Rickoff B, Sorin S. Assessment of reliability of electrical and thermal pulp testing agents. *J Endod* 1986;12:301-5.

This clinical study evaluated the effectiveness of five different pulp testing methods – electric pulp tester (EPT), CO₂ snow (dry ice), dichlorodifluoromethane (DDM, a refrigerant similar to Endo Ice), ethyl chloride, and ice. The authors tested these techniques on 96 clinically sound healthy premolars in 24 patients, ranging from ages 9 to 34 years old. In addition, they measured the effect of the cold tests at the pulpodentinal border in extracted teeth. They found the EPT, CO₂, and DDM were more dependable than ethyl chloride or ice in producing a response in adults. In children, the EPT was less effective than CO₂ or DDM, but still more reliable than the other two. They also found that in vitro the CO₂ and DDM were more effective than ethyl chloride and ice in lowering the temperature at the pulpodentinal border. *SUMMARY: EPT, CO₂, and DDM (a refrigerant similar to Endo Ice) are the most reliable ways to test adult teeth; children's teeth should be tested with CO₂ or DDM.*

Jones DM. Effect of the type of carrier used on the results of dichlorodifluoromethane application to teeth. J Endod 1999;25:692-4.

This laboratory study evaluated the temperature change in the pulp of an extracted tooth to determine what method was the most effective when using dichlorodifluoromethane (a refrigerant similar to Endo Ice). Four techniques were used – a large (#2) cotton pellet held in cotton pliers, a small (#4) cotton pellet held in cotton pliers, a wooden stick cotton tip applicator, and a cotton roll. Each of these carriers were either sprayed or submerged in the refrigerant and applied to the outside of an extracted mandibular incisor for 10 seconds. A thermocouple placed in the pulp chamber measured the changed in temperature caused by the cold test. They found that using the large (#2) cotton pellet was the most effective method to cool the pulp chamber. Moreover, no significant difference was found when the carrier was sprayed or dipped in the refrigerant. However, although some of the doctors in our practice use the larger #2 cotton pellet, others use the smaller #4 cotton pellet because of concern for false positive tests due to the gingiva. *SUMMARY: A large (#2) cotton pellet held in cotton pliers is the most effective way to perform a cold test using refrigerant spray.*

Bender IB, Landau MA, Fonseca S, Trowbridge HO. The optimum placement-site of the electrode in electric pulp testing of the 12 anterior teeth. J Amer Dent Assoc 1989;118:305-10.

Jacobson JJ. Probe placement during electric pulp-testing procedures. Oral Surg 1984;58:242-7.

Lin J, Chandler N, Purton D, Monteith B. Appropriate electrode placement site for electric pulp testing first molar teeth. J Endod 2007;33:1296-8.

These three studies all looked at where the EPT tip should be placed on the tooth. The authors placed the EPT probe in different regions of the tooth and measured where the lowest response was found clinically (Bender, et al. and Lin, et al.) or in the laboratory (Jacobson). Bender, et al. found in anterior teeth that the incisal edge regions was the best location. Jacobson determined in bicuspid that the occlusal third region was the optimal area. Lin, et al. showed for molars that the MB cusp tip was the best. Although Jacobson also found the middle third was preferred for incisors, I would follow the advice from Bender's study because his was a clinical study whereas Jacobson did his work in a laboratory. Conveniently, these three study show that the EPT probe should be placed on the most easily accessible location of the tooth. *SUMMARY: The EPT probe should be placed on the incisal edge in anterior teeth, the occlusal third in bicuspid, and the MB cusp tip in molars.*

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