Perspectives in practice...

Assessing pulp vitality. **DR MICHAEL SULTAN,** clinical director of EndoCare, thinks it's time for improvement...

GIVEN the amazing technological advances in dentistry, particularly during the last 20 years or so, it is hard to believe that pulp tests have changed very little in the last Century and a half.

It is fundamentally important to know the status of pulp for both diagnosis and planning restorative treatment. We have traditionally used either EPT (electrical pulp tester) or thermal testing, and, in some cases, a test cavity.

However, by using these systems, we are measuring nerve function instead of blood flow, which would be far more useful in assessing pulp vitality. Both EPT and thermal tests work by stimulating sensory nerve fibres in the pulp and dentin, but can provide both false negatives and false positives.

The nerve fibres are predominantly the faster, myelinated A fibres (beta and delta), which innervate the dentin; and the slower, unmyelinated C fibres innervate the body of pulp. Consequently, these fibres respond very differently to stimuli and pain. C fibres are activated by intense heat or cold, and a dull burning pain may radiate to the jaw and face, while A fibres respond to dentinal probing and drilling, and tend towards acute sharp pain.

In effect, pulp testing measures the function of the fluid in the teeth conducting electrical pulse; hence the shorter the distance between the pulp and the electrode, the lower the resistance and the faster the reaction. However, other factors need to be considered, such as the thickness of enamel and dentin, and the number of fibres underlying the pulp.

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Hot and cold testing

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Thermal testing using heat is more difficult and potentially damaging to teeth, but I find hot water, in a syringe, against an isolated tooth, effective, although, it must be bathed for 10 seconds to build up pain.

The history of EPTs

EPTs have been in use since 1867 when electrical currents were used to assess which teeth were vital or non-vital.

Now, many have a numerical scale (e.g 0-80) with lower numbers indicating reaction, and higher up the scale indicating no response, and therefore non-vital.

However, there is no histological correlation between these figures and the state of the pulp in inflammation. My view is that the clinician should, to some extent, trust instinct, and if a result seems odd or unusual, then that tooth should be viewed with caution.

The history of EPTs is littered with false readings – there are case studies of metallic restorations and ortho bands conducting to an adjacent tooth. So, wherever possible, it is advisable to use a conducting medium and individually isolate the teeth.

Problems with pulp testing

The underlying problem with both EPTs and thermal testing is that they are subjective and highly dependent on patient reaction and operator interpretation. And, of course, the response is neural not vascular. So, for instance, traumatised teeth will invariably give false readings because the nerve supply has been disrupted even though the blood flow is still adequate. Similarly, accurate pulp testing in children is notoriously difficult because of anxiety levels and immature teeth, so I would recommend thermal rather than EPT.

It is extraordinary, given the importance of assessing pulp vitality, that we are so limited in what is available.

Laser dopplers, which direct a beam onto red blood cells, are used to gauge blood flow in medicine for skin grafts and reattachment procedures. They have proved their usefulness as a research tool in anaesthesia studies, and in the treatment of traumatised anterior teeth. But, they are slow and cumbersome and, at £5,000 a machine, way beyond the reach of most dental practices.

The importance of accuracy

It is impossible to underestimate the importance of accurate vitality testing.

For example, in both diagnostic and restorative treatment, we need to know the vitality of teeth, pre-crowns or pre-veneers, because while damaged or traumatised anterior teeth may be non-vital, but not infected, crown preparation procedures will open up tubules, allowing bacterial leakage and cause pain in what were previously symptom-free teeth.

How many times have we had a complaint that the tooth didn't hurt before the crown had been placed?

Post-veneer treatment, multiple teeth with cold and pulp testing can be very painful with all teeth very jumpy. The clinician has to decide whether the problem is transient or irreversibly acute. This can be a subjective decision.

So, the challenge is to develop a pulp vitality testing system that is non-invasive, reliable and affordable. I for one will be first in the queue when that comes on the market! ■