

# Accurate information

**John Rhodes** reviews his use of a new electronic apex locator.

Estimating the length of the root canal and consequently the point at which preparation, disinfection and obturation should end is a vital part of endodontic treatment. The aim is to estimate the position of the apical constriction; a point at the terminus of primary canals that normally varies between 0.5 and 2mm from the radiographic apex.

Electronic apex locators (EALs) were first introduced to endodontics in 1942 but these devices, which worked on a basic resistance measurement, were not reliable and so historically diagnostic working length radiographs were used to estimate the length of the root canal.

Quality guidelines from the ESE state that: "electronic devices measure the length of the root canal accurately in most cases, but working length should normally be confirmed radiographically."

Here-in lies a problem; the root canal rarely terminates at the radiographic apex so working to this point will inevitably result in cases being prepared and filled long. Dummer et al (1984) described the morphological variations of apical constriction, many of which cannot be determined radiographically.

There have been exponential advances in semiconductor electronics since the first units and modern apex locators use complex algorithms to analyse combinations of impedance, capacitance and resistance over



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multiple frequencies giving the operator a reliable and accurate indication of the likely position of the apex.

A study by Brunton et al (2002) showed that EALs could be used to reduce the radiation exposure time to the patients by requiring fewer radiographs during endodontic treatment.

A fifth generation apex locator has been introduced by Dentsply called the Propex Pixi. Using a Pixi the clinician rapidly gleanes all the information they require in order to hit the 'zero reading'. This equates to the apical constriction, the end point of preparation and obturation and therefore the working length; the manufacturer recommends working 0.5mm short of the zero reading. A pre-operative radiograph (which is essential) combined with knowledge of dental anatomy gives an early indication of the likely root lengths.

The file clip and lip hook make the circuit between the patient and the file, and on entering the apical third of the canal the first blue bar lights up indicating that you are in the root canal. There is a simultaneous 'double

beep' audio signal with volume control. With a gentle clockwise winding motion the file advances and subsequent bars light up (with an intermittent beep) until a steady zero reading is illuminated by a thicker yellow bar indicating that the file tip is resting at the constriction. At this point the sound becomes solid and continuous. Going beyond this point results in a warning notice 'beyond apex' and a rapid intermittent signal to alert the operator.

The unit appears to work well with fluid in the canal but the pulp floor should be dry to prevent short-circuiting. The Pixi, as with other apex locators, will alert the operator to perforations, horizontal root fractures and large lateral canals.

In clinical use I found the Propex Pixi behaved impeccably and no different to two top-end apex locators that I normally use - early published research seems to confirm this. Although pitched at the general practice market I would be quite happy to use the Propex Pixi routinely in specialist practice.

References available on request.