Are we deluding ourselves?

Michael Sultan discusses the point of perfection in treating root canals

Over the years dentists have been preparing root canals with the intention of removing infected and inflamed material and ultimately making them easy to seal. The result of all their efforts would reveal itself in a post-treatment X-ray as a pretty, neatly shaped root filling fully sealing the mythical region known as the “apical third”. When we saw those satisfactorily smooth, regular shapes we deluded ourselves into thinking that we had done the perfect job.

However, if we were to clear that tooth, we would uncover an irregularly shaped canal system with an intricate network of interconnections. Years back the only reason the radiographic result looked so wonderful was because the material we used to create these root fillings - the silver point - was so radio-opaque. The reality, as we all know, is that the tool we rely on most - the radiographic film - is a two-dimensional image of a three-dimensional space and is woefully inadequate.

Gutta Percha

And so we moved on to gutta percha; after all, how can a rigid piece of metal possibly seal an irregular canal? However, this material wasn’t rigid and the canal needed to be well prepared so that we could adapt our filling material. Yet again we were under the illusion that we were doing a good job. Yes, our radiographs would reveal impressively filled canals, but what they did not show us was actually how clean the canal was, whether a rubber dam had been used during treatment, whether our irrigant had been saliva (no dam) or the industry-gold standard of bleach.

In the old days clinicians would use stiff, rigid, stainless steel files to try and shape these canals, the results often had little bearing on the canal’s original anatomy but just enlarged in the direction the file wanted to go in. We then moved onto the next instrument that, again, gives us a false sense of security: NiTi. These are actually wonderfully efficient cutting instruments that prepare a canal much faster than was previously possible. In reality, all these instruments do is create pretty shapes that bear no relation to the canal’s natural anatomy. This nicely shaped canal, narrow at the tip and gently flaring out to the orifice, hopefully encompassing the whole canal system somewhere in between, is really being shaped to receive our filling materials.

Basic Flaw

The problem is that the instruments are so conducive to efficiently cutting the canals, but what they did not show us was actually how clean the canal was, whether a rubber dam had been used during treatment, whether our irrigant had been saliva (no dam) or the industry-gold standard of bleach.

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remaining fairly central throughout the procedure. Much of the time the canal walls are not even being touched and, worse still, there is debris being produced which is pushed laterally into the canals’ irregularities. In fact, it doesn’t really matter which NiTi file system we use as they all have this same basic flaw.

To completely remove any debris and bacteria, of course irrigation is vital. However, despite all our best efforts, even when we think we have a technically beautiful root filling coupled with a poor coronal seal will unfortunately fail. This fluid tight root filling will deprive the bacteria of their food supply and cause them to wither and die.

Complex Biofilms
Bacteria do not just float about in the tooth’s canal. They are made of highly complex biofilms that are firmly attached to the walls of the canals and unless we physically remove them, the canals will never be clean. To this end we need to aggressively move the irrigant in and out of the canal walls to remove the bacteria within them.

As an inter-appointment dressing we generally use calcium hydroxide, which is often regarded as the most important dressing we can put in a tooth. It is given an almost mystical status with the ability to cap pulps, cause roots to grow, apexes to close and to kill all bacteria in sight. It may well be highly alkaline (if it hasn’t degraded to calcium carbonate in the jar) and kills bacteria well, but if bacteria are trapped in a muddy pool of debris the calcium hydroxide will be unable to reach it. One of the prime causative agents of endodontic failure is E. faecalis, which is resistant to alkaline solutions anyway. To compound problems further, the purpose of a root canal filling is to entomb any residual bacteria so that they are no longer viable.

For irrigation to work successfully, it has to be activated. It has to be acti-...