

Guest Editorial

ROOT CANAL OBTURATION UPDATE: WHERE DO WE STAND TODAY?

Root canal obturation is an essential stage of endodontic treatment aiming to seal the root canal and prevent future bacterial contamination/recontamination of the canal space. By hindering microleakage between root canal and periapical tissues, this procedure should also deprive any surviving microorganisms and toxic bacterial products from entering periapical tissues.

Numerous materials and techniques have been developed for filling root canals. Studies have shown that none of used obturation techniques was capable of preventing leakage² and on a long-term prognosis all were similar.^{7,14}

There is not actually any evidence-based proof that one method is superior to another, all techniques guarantee very good fillings of the intracanal space, excellent radiographic results and promising clinical responses.

Lateral condensation technique creates a tight apical seal through compression of several gutta-percha cones with spreaders. However, canal curvature and difficult anatomy may prevent achievement of this tight seal. In addition, metal spreaders placed in the canal several times during the filling process for lateral compaction can compromise the required balance between optimal compression of gutta-percha and avoidance of root fracture through application of too much pressure.

But plasticized gutta-percha can easily be moved into canal irregularities, thus replicating the intricacies of the root canal system.⁵ Methods using plasticized gutta-percha include warm vertical condensation (System B[®]/Schilder's technique), coated carrier systems (Thermafil[®]),⁴ injection systems (Obtura II[®]) and thermomechanical compaction.

Both the amount of sealer used to fill the canal and the ratio of sealer to gutta-percha affect the long-term seal of a root filling, because sealers become variably soluble after a certain time, whereas gutta-percha is not subject to such dimensional degradation.¹³ Given the difference in properties of these materials, the preferred filling techniques are those that minimize sealer component and hence the ratio of sealer to gutta-percha.

Unfortunately, the good quality of our obturation is not the only factor influencing apical healing and long-term success of our root canal treatments.

No technique have yet proven entirely efficacious in preventing bacteria penetration in the interface dentine/filling, both with and without a smear layer. A total of 35.1% of correct obturations developed an apical periodontitis (Kirkevang et al 2000), 63.9% of teeth with insufficient coronal restoration failed with time (Ray et al 1995). If periradicular or coronary leakage occur during an apparently correct treatment (Hovland EJ and Dumsha TC 1985), success rate of radicular treatment is then affected (Naidorf 1974, Saunders and Saunders 1994).

Both apical and coronal seal are major keys to long-term success of our root canal treatments.¹²

What about the Future?

The introduction of gutta-percha a century ago changed the concept of endodontic obturation by progressively replacing silver cones and pastes techniques.

Today, most root canal filling methods use different formulations of gutta-percha, cemented into the root canal with a sealer. The gold standard, gutta-percha, continues to be the material of choice, owing to its unique chemical and physical properties. But even when used in various obturation techniques and associated to different types of sealers, gutta-percha is not capable of preventing leakage.

Resilon Research (Wallingford, CT, USA) introduced Resilon obturation points and resin sealer with better adhesive properties. This polymer-based thermoplastic resin material is used with the Epiphany root canal sealant (Pentron Clinical Technologies, Wallingford, CT, USA) or RealSeal (Sybron Endo, Orange, CA, USA), a dual-curable resin material containing dimethacrylates. The new system can be used with lateral, vertical compaction and thermoplasticized carrier-based technique (Real Seal I system). Various advantages of this new obturation system including microbial leakage,^{1,3,10} bond strength,¹¹ sealing ability and fracture resistance have been evaluated. One more advantage of Resilon is a lower thermoplastic temperature minimizing the heat impact on periapical tissues.

Even with many promising qualities, Resilon[®] remains a relatively new material,⁶ and further long term clinical studies are necessary.



But until now, gutta-percha has kept its persistent popularity among endodontists and general practitioners.

Recently, endodontic biological studies are emerging. They proved that stem cells, morphogen and a scaffold of extracellular matrix are the key elements of tissue engineering, a novel approach to restore tooth structure. Stem cells placed through a perforation of apical papilla induced bone apposition similar to intracanal tissues after 10 months.

Those therapies are only applicable until now on immature apices. Others studies on odontoblasts^{8,9} or pulpal revascularization produced promising results for the future of endodontics. Tissue engineering in endodontics is at its first steps but could really surprise us in the future to come....

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