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The Continuous Wave of Condensation Obturation Technique

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THE PREDECESSORS

During the 1980's, the Vertical Condensation Technique⁴ (Fig. 25.1) was significantly improved through the introduction of two electronic devices: the Touch-and-Heat electric heat carrier by Analytic Technology and the Obtura gutta-percha gun by Obtura Corp. These devices helped to make 3D warm gutta-percha obturation more accessible to clinicians at all skill and experience levels.



Fig. 25.1. Mandibular molar with severe multi-planar curvatures in the mesial canals as well as an abrupt apical curvature in the distal canal. When this case was done in 1979 there was only one technique that could have successfully shaped these root canals without ledging, ripping, or transportation—the Serial Step-Back Schilder Technique.

The Touch N' Heat Electric Heat Carrier

Introduced in 1981 by Johan Masreillez of Analytic Technology, the Touch'n Heat electric heat carrier was faster, better, and safer than flame-heated heat carriers. While flame-heated heat carriers required five to 10 seconds to be adequately heated in a Bunsen bur-

ner flame, the Touch N' Heat required one-half second to reach full temperature. More importantly, while a flame-heated carrier cools every second after its removal from the flame, the electric heat carrier could generate heat for an indefinite period of time, giving the doctor more control over the procedure. In addition to speed and control, the Touch'n Heat provided greatly enhanced safety and consistency of result to warm gutta percha obturation.

Dentists could then be passed a cold electric heat carrier, touch its button while taking the instrument into a root canal, and have full heat at the tip of the heat carrier before it touched the apical mass of gutta-percha. Other safety features included the elimination of an open flame in the operatory and the fact that, four seconds after releasing the switch, the heat carrier was safe to touch with gloved fingers.

For the first time, dentists had complete control of the duration of heat applied, allowing more adequate thermo-softening of gutta-percha, less likelihood of pulling the cone out of the canal attached to the heat carrier, and far less chance of burning the doctor, assistant or patient. Rather than being an incremental improvement over flame-heated heat carriers, the electric heat carrier was an evolutionary step forward in the heating and compaction of gutta-percha into root canal systems.

The Obtura II Gutta-Percha Gun

The introduction by Unitek, in 1982, of the Obtura warm gutta-percha gun (now manufactured and sold by The Obtura Corporation) simplified the most difficult aspect of Schilder's Vertical Condensation Technique, the back-fill. With two or three "squirts" of warm gutta-percha from an Obtura Gun and vertical condensation of each aliquot, the backfill took less

than a minute per canal with remarkably infrequent voids. With this new technology, a technique that previously took 45 minutes to an hour could be accomplished more effectively in 15 to 30 minutes; the same time required to do a thorough job of lateral condensation.

The One-Shot Birth of the Continuous Wave of Condensation Technique

Developed in 1987, the Continuous Wave of Condensation Obturation Technique was born out of my desire to simplify warm gutta-percha downpacking. After using the a Touch'n Heat electric heat carrier for two years, I enlisted Johan Masreillez of Analytic Technology (now owned by SybronEndo) to prototype electric heat pluggers which had the same taper as the non-standardized gutta-percha cones I was using at the time. My hope was that we could make a series of variably-tapered electric heat pluggers that could replace three to five vertical condensation pluggers and a heat carrier with a single instrument.

Johan sent the first .08-tapered prototype to me a month later. I prefit the electric heat plugger to its binding point in the canal, adjusted a stop I had placed on it to the reference point, put it into my Touch'n Heat handpiece, pushed the plugger against the cemented master cone, and hit the button. The plugger immediately moved into the canal and within two seconds I let off the switch, gliding to a halt just short of the binding point. I fired a one-second burst of heat to separate the plugger from the apical mass of condensed gutta-percha and pulled the plugger out.

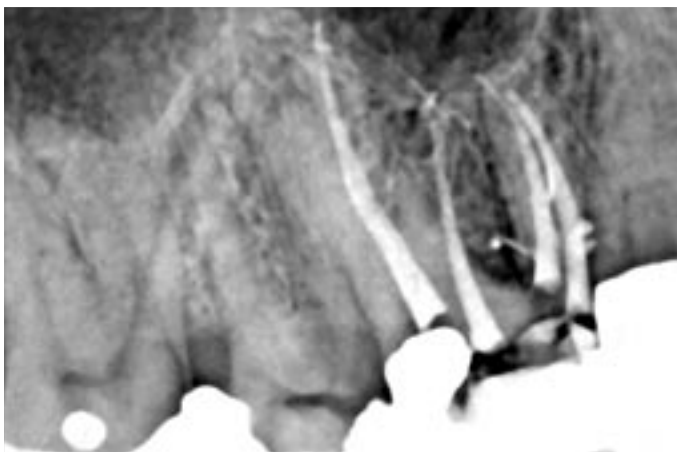


Fig. 25.2. Maxillary molar with a significant lateral canal filled off the MB2 canal. This was the first case filled with an electric heat plugger and the Continuous Wave of Condensation obturation technique.

The first-time result was ideal apically and a large lateral canal was filled as well (Fig. 25.2). Initially, I was suspicious—I had a hard time believing that a two-second downpack could ever fill anatomic complexities as well as the Vertical Condensation Technique (with its 5-7 hydraulic waves moving sealer and warm gutta-percha through a root canal system over a time frame of 2-3 minutes). I finally understood how well it worked after I saw slow-motion video footage, shot through a microscope, of a Continuous Wave Electric Heat Plugger moving through gutta-percha and sealer in a plastic block.

The Conceptual Basis for the Continuous Wave of Condensation Technique

What I saw was the streaming effect that develops between the electric heat plugger and the canal wall as the plugger penetrates the canal, simultaneously warming and displacing gutta-percha along its length. The plasticized gutta-percha is primarily moved in lateral and coronal directions during its displacement as the electric heat plugger drives through the center of the gutta-percha mass in the canal. That is why it is considered to be a *Centered Condensation* obturation technique, as are the carrier-based obturation methods that use Thermafil and GT Obturators. Surprisingly, the sealer acts as a lubricant, helping the softened gutta-percha slip through the canal space.

This technique is called the *Continuous Wave Technique* because it allows a single tapered electric heat plugger to capture a wave of condensation at the orifice of a canal and ride it, without release, to the apical extent of downpacking in a single, continuous movement. This is in contrast to heating and packing the gutta-percha through three, four or five interrupted waves of condensation in the Vertical Condensation Technique. Because these tapered pluggers move through a viscosity-controlled material into a similarly-tapered canal form, the velocity of the thermo-softened gutta-percha and sealer moving into the root canal system actually accelerates as the downpack progresses (Figs. 25.3 A, B).

Interrupted waves of condensation build a pressure wave that is lost each time the gutta-percha cools, starting and stopping its movement into canal irregularities. Techniques using multiple waves of condensation may provide only a single chance at filling a cervically-positioned lateral canal since it is limited to deforming the gutta-percha 4 mm's apical to the plug-