The continuous wave obturation technique for enhanced precision

Step 1: Down-pack
Once the cone fit has been accomplished and radiographically confirmed, the Continuous Wave (CW) plugger that matches the gutta-percha cone is fitted in the canal. The tip should be fitted within 5 mm from the canal terminus and never closer than 3 mm. The canal is dried and measured one last time with feather-tipped GT Series X paper points. The cone is trimmed to be .5 mm short, coated with sealer, and cemented in the canal (Fig. 1).

The cone can then be seared at the orifice with the tip of the pre-heated CW plugger at an angle to the cone, and the butt end can then be removed. The larger stainless-steel end of a CW hand plugger is used to compact the softened gutta-percha at the canal orifice (Fig. 2). The cold CW electric heat plugger is pushed against the gutta-percha, then the heated plugger is driven smoothly through the gutta-percha, to within 5 mm of the binding point. This single down-pack stroke should take 1.5 to 5.5 seconds, but never more than 4 seconds for safety. The CW plugger will show its apical movement & stop about 1 mm short of the binding point. At this point, any previously cleaned lateral & accessory canals will be filled. Firm apical pressure should be maintained for a full 5-second sustained push to take up any shrinkage that might occur upon cooling of the apical mass of gutta-percha. The System-B/Elements unit will sound a click signal 5 seconds after the switch is released (Figs. 5 & 4).

Step 2: Separation burst
Still maintaining apical pressure, the button should again be activated for a full 1 second in order to heat the plugger fully (Fig. 5). When the button is released, the clinician should pause for another full second and then slowly withdraw the plugger (Fig. 6).

After removal of the CW plugger, the small, flexible NiTi end of the CW handplugger can be introduced, and with pressure, the clinician should confirm that the apical mass of gutta-percha has not dislodged, and that it has cooled and set. In medium & large canals, the plugger should not be buried in the apical mass of gutta-percha, as it will create a tubular space—the primary cause of backfill voids. The canal is now ready for the backfill by any means preferred. If post space is required, this has been achieved (Fig. 7). The backfill can be accomplished using one of two methods: a syringe-backfill technique, using the extruder function of the System-B/Elements unit or an optional single-cone technique for backfilling medium and large canals.

Step 3a: Syringe-backfill option
The speed of extrusion is set on the control panel of the System-B/Elements unit. After pre-heat is completed (45 sec.), the forward toggle switch on the handpiece is pressed until material extrudes out of the needle tip to prime the needle. The heated needle can then be placed into the canal for 5 seconds, allowing the needle to reheat after being cooled by contact with the den- time. After the 5-second pause, with the needle lightly held in place, one of the handpiece toggle switches (back button for medium speed, forward button for faster speed) should be acti- vated in order to extrude the gutta-percha (Fig. 8).

After the extruded material fills the backfill space above the needle, the back pressure of the extruded gutta-percha will move the needle back out of the canal. At this point, it is important that the clinician resist the temptation to pull the needle out of the canal. The extruded gutta-percha should be allowed to back the needle out. Care should be taken to allow approximately 5 to 10 seconds for the needle to reach the orifice level (Fig. 9). Using the rigid stainless-steel end of the appropriate CW hand plugger, a very firm condensation push should be given to the warm gutta-percha. A void of 4 mm can be eliminated if enough pressure is applied (Figs. 10 & 11).

Step 3b: Single-cone backfill option (ideal for medium and large canals)
While the filler material should be down-packed through the master cone as usual, the 1-second separation burst is not necessary. Instead, the plugger should be allowed to cool in the canal for approximately 10 seconds (two clicks from the unit). The plugger can be removed by rotating it back and forth with apical pressure, and the still-cold plugger can be teased out during rotation. An AutoFit Backfill cone (the same size as the plugger used for the down pack) can be coated with sealer and moved in and out of the empty backfilling space three to four times to ensure that the sealer material coats the backfill space. The area left by the plugger will exactly match the shape of the backfill cone (Fig. 12). The cone can then be seared off at the orifice level with the System-B/Elements unit electric heat plugger (Fig. 15). The rigid stainless-steel end of the hand plugger can then be placed against the gutta-percha and with a firm sustained pressure, the coro- nal mass can be condensed at the orifice level. This technique is also ideal for removing voids created during an extruder backfill. The stop on the CW electric heat plugger should simply be adjusted so that it will reach beyond the existing void. The heated plugger can then be thrust through the void, cooled for 10 seconds, then removed so the backfill can be completed using the steps outlined above (Fig. 14).

The opposing canal was filled with a GT Series X carrier-based obturation technique.