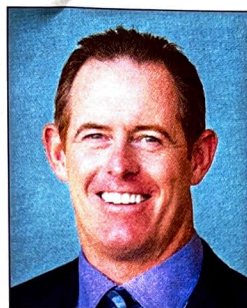


# The Ultimate Root Canal Playbook: Part 1

I was a general dentist for 5 years. I know your root canal pain. I know that your endodontic education was limited, yet you are expected to be proficient at root canal treatment. I understand how difficult it is to perform root canals under poor conditions with limited materials, undertrained assistants, and minimal time. I also know that as a general dentist, I was terrible at performing root canal treatment and that I got sick and tired of feeling insecure and endodontically inadequate.

Root canal treatment is a 4-quarter game—not a game of inches, but a game of millimeters. For every game, it helps to have a playbook, a playbook you can follow and consistently win with. In the proceeding pages, I will lay out the abbreviated RCT playbook and discuss how I incorporate it in my practice to achieve effective, efficient, and excellent endodontics.



Reid Pullen, DDS

## THE ULTIMATE RCT PLAYBOOK

I follow the same root canal playbook for each and every case, whether simple or difficult, and 15,000 cases later, I can attest to the fact that it works. First, you must perform all of the “outside-the-tooth work” flawlessly, and then you can get “inside the tooth” and get to work following the RCT playbook.

### OUTSIDE-THE-TOOTH WORK

#### Pregame

**Diagnosis:** One of the goals of the limited oral examination is to try to duplicate the patient’s chief complaint. Develop an accurate pulpal and periradicular diagnosis prior to any endodontic treatment.

**Case Selection:** Treat simple to medium-difficult cases only. Refer out the difficult cases.

#### First Quarter of the Root Canal Game

**Anesthetic:** Make sure that the patient is fully anesthetized prior to starting endodontic treatment. In our office we like the phrase, “More numb is better than less numb.”

**Rubber Dam:** Isolate the tooth with a rubber dam. Increase your efficiency and success by always placing a rubber dam.

### INSIDE-THE-TOOTH WORK

#### Second Quarter of the Root Canal Game

**Access:** Find those canals! If we can’t locate all the canals, then we are in trouble early in the root canal game. A tip is to locate

one canal and use that as your pulpal floor road map. One canal will lead you to the promised land of the other canals.

**Coronal Negotiation:** Provide a coronal glide path for the orifice opener.

Take the #10 C 21-mm file, dip the tip into RC prep, and place it into the tiny dot of the canal orifice (Figure 1). Gently push/pull 5 to 10 times about 10 to 15 mm down the canal. Make sure the #10 C 21-mm file is free and loose in the coronal portion of the canal. In a sense, this is a coronal glide path.

**Coronal Flare:** Don’t work through dots, and when you open the top, it’s easier to get to the bottom.<sup>1,2</sup>

Place the orifice shaper (ProTaper Gold SX [Dentsply Sirona Endodontics]) (Figure 2) in the canal, and start coronally shaping at 300 rpm. Easy does it: The cutting technique should be slow and smooth. Allow the orifice shaper to run down the canal—the approximate length that the #10 C file extended to. Brush to the outer wall 4 to 5 times.

**Bleach Piranhas:** Sodium hypochlorite dissolves vital and necrotic pulp tissue, kills microbes, and provides lubrication for the shaping files.<sup>3</sup>

Use a 27- or 30-gauge side-vented needle (ProRinse), and irrigate the debris out of the coronal part of the canal. Always use a side-vented needle with an end cap, make sure it is loose in the canal, and gently and slowly irrigate the canal with 6% bleach.

**Middle Negotiation/Middle Flare:** This opens up the middle portion of the canal and, in my opinion, makes it much easier to negotiate to patency.

Place a #10 C 21-mm file back into the canal, and see how far it extends down the canal without resistance—usually approximately 18 to 20 mm. I now use a ProTaper Gold Shaper 1 (S1) (Dentsply Sirona Endodontics) (Figure 3) at 300 rpm to gently shape the middle part of the canal. Allow the S1 to drop in the canal, and perform 4 to 5 engagement/disengagements. Remember, you are a gifted artist. You paint beautiful canvases and create works of art. You are not a construction worker hammering nails. So be gentle and paint with the S1 the way Picasso would.

The shaping technique that I use for any shaping file is to allow the file to engage the canal wall, then let it cut the dentin approximately 3 mm apically, and then disengage and back out approximately 3 mm. Re-engage the canal wall and shape a little

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deeper, but before the file encounters too much torque, disengage from the canal wall and back out approximately 3 mm. Repeat this process for 4 to 5 engagement/disengagements, and then pull out of the canal. Always shape with bleach in the canals. After each pass of shaping, irrigate with bleach and remove all of the accumulated debris.

Keep in mind, we do not yet have working length but only an estimated working length from preoperative radiographs or CBCT scans. We are only flaring and cutting the middle part (middle flare).

**Negotiation to Patency:** (1) We need to clean and shape the entire canal, not just part of it, and (2) patency allows the electronic apex locator to tell us we are just beyond the apex and helps give an accurate working length.

Select a #10 K 25-mm file, dip the tip into RCPrep, place it into the flared canal, and push down until you feel resistance (Figure 4). Now reciprocate the file through the resistance until you either feel it “pop” through the foramen or you reach your estimated working length. The #10 K file will “pop” right out through the foramen (patency) during a simple root canal treatment like a newborn popping his or her head out of the birth canal. In a medium-difficulty root canal case, the #10 K will stop short of the apex, most likely because there is a slight apical curve. This feels like hitting a brick wall. In this case, take the #10 K file out of the canal and select a



Figure 1. A #10 C “shorty” 21-mm file.

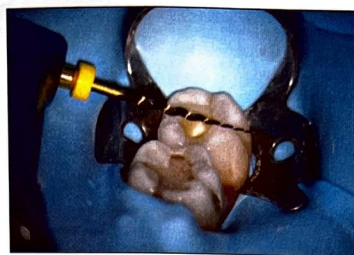


Figure 2. ProTaper Gold SX (Dentsply Sirona Endodontics).



Figure 3. ProTaper Gold Shaper 1 (S1) (Dentsply Sirona Endodontics).

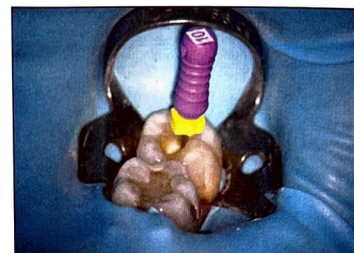


Figure 4. A #10 K 25-mm file.



Figure 5. ProMark Apex Locator (Dentsply Sirona Endodontics).

## ...it helps to have a playbook, a playbook you can follow and consistently win with.

#8 K 25-mm file and place a small 45° bend on the end of the file using your fingernails. Dip the tip into lubricant and place it back into the canal until it hits resistance. Now take the file on a walk around the canal apex, like taking a dog on a walk around a cul-de-sac, until the apical bend of the file finds the direction of the apical curve of the canal. This requires

a delicate touch of gently pulling up on the file approximately 0.5 mm, rotating the file approximately 0.5 mm, and then placing it back down, repeating this over and over (walking the file around the cul-de-sac of the apex) until you finally locate the direction of the apical curve and the file “drops” deeper into the canal.

In some difficult root canal cases,

the #8 K file will also hit the “brick wall” of the apical curve. First, remove the #8 K file; rebend the end at a 45° angle; place it back into the canal until it hits resistance; and then walk the file around the apex, looking for the direction of the apical curve. If it still won't extend down around the curve, then remove the #8 K file and select a #6 K or C 25-mm file, place a small 45° bend on the end, dip the tip into RC prep, and take the file on a walk around the cul-de-sac of the apex. Think “10-8-6, 10-8-6, 10-8-6” in regard to file sizes during the negotiation-to-patency phase.

When you feel the file “drop in”

around the apical curve and extend apically, immediately place the lip clip of an electronic apex locator and connect the file clip to the metal part of the file (this is why I recommend the longer, 25-mm-length hand file for negotiation to patency).

**Accurate Working Length:** This allows you to shape the entire length of the canal. Working length is the key to complete shaping and disinfection of the entire canal.

If you correctly negotiate down the canal to the apex and out through the foramen approximately 0.5 to 1 mm (patency), achieving working length is simple and very accurate. As soon as I feel the file pop out through the foramen, or if I have reached the estimated working length, I attach the file clip to the handle of the file. If you are truly patent, the electronic apex locator (EAL) (ProMark Apex Locator [Dentsply Sirona Endodontics]) (Figure 5) will read “long” (ie, the file is in the periapical tissues). If you are not patent, then it will read “short” of working length.

Once the clip is connected to the handle of the file and the EAL reads “long,” bring the tip of the file back into the canal. If the EAL reads “long” (in the periapical tissues) and then electronically retracts back as you pull the file back into the canal, then it is most likely an accurate reading. In my opinion, the most accurate EAL reading is when I leave the canals wet and the pulp chamber mostly dry. Most of the time, the EAL achieves an accurate reading.<sup>4,5</sup> If I'm having trouble with the reading, it's usually because the pulp chamber is too wet, I am not patent, or the #10 file is too small in a larger canal or foramen and I need to go one size bigger. It is rarely due to poor connection or “old” wires.

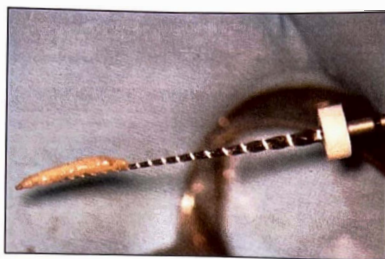
Another way to achieve an accurate working length is to follow the rule “When in doubt, whip it out” (a military rule for saluting). Whip out the x-ray machine, and take a straight and a shift view periapical-working-length radiograph. Once you become confident with EALs, you will *not* need to take working-length films for most of your cases.

**Loose #10 K file:** This ensures that the canal is “open” to working length and helps prevent file separation when cutting an open glide path.





**Figure 6.** WaveOne Gold Glider (Dentsply Sirona Endodontics).



**Figure 7.** ProGlider (Dentsply Sirona Endodontics).

So far, you have located the canals, performed a coronal negotiation approximately 10 to 15 mm down the canal with a #10 C 21-mm file, performed a coronal flare with a ProTaper Gold SX at 300 rpm, scouted the middle area of the canal with a #10 C 21-mm file, performed a middle flare with the ProTaper Gold S1 at 300 rpm, negotiated to patency, and obtained an accurate working length. If the working length is 21 mm, then take a #10 K 25-mm file and perform 25 “smoothies,” or push/

Gold user (my other shaping system), use the WaveOne Gold Glider (Dentsply Sirona Endodontics) and gently advance it to working length. The technique is the same: Gently work the Glider to working length using 4 to 5 engagement/disengagements. It may take 1 to 2 passes to gently work the WaveOne Gold Glider (Figure 6) or S1 to working length. Each pass consists of 4 to 5 gentle engagement/disengagements of slow in-and-out brushes. Brush to the outer wall on the disen-

## Follow the root canal playbook and achieve effective, efficient, and excellent root canal treatment.

pulls, to working length until the #10 file is loose. This creates a mini-glide path and ensures that the canal is “open” and “safe or secure” so that a real open glide path can be cut safely without file separation.

Once access is complete, the coronal negotiation to the loose #10 K file in simple cases only takes a few minutes to achieve. This RCT playbook is very effective and extremely efficient.

**Open Glide Path:** This ensures safe and secure shaping and helps prevent file separation.<sup>6</sup>

If you are using ProTaper Gold as your shaping system, then continue with the ProTaper Gold S1 to length. This will increase the middle canal shape and achieve an open glide path. It is not a dedicated glide path file, but as long as you have a loose #10 file to working length, it will easily slide and glide to the apex and safely cut an open glide path. If you are a WaveOne

gagement. Another great dedicated glide path file is the ProGlider (Figure 7). This file runs at 300 rpm and works with any shaping system. Just make sure that prior to using the ProGlider or the WaveOne Gold Glider that you have a loose #10 K file to working length. Once an open glide path has been created, then you are ready to shape. I will cover shaping and obturation in part 2 of this article.

### CONCLUSION

Follow the root canal playbook and achieve effective, efficient, and excellent root canal treatment. It will take practice, practice, practice, and a few missteps, but keep at it, and you will achieve endodontic success. ♦

### References

1. Stabholz A, Rotstein I, Torabinejad M. Effect of preflaring on tactile detection of the apical constriction. *J Endod.* 1995;21(2):92-4. doi:10.1016/S0099-2399(06)81103-9
2. Leeb J. Canal orifice enlargement as related to biomechanical preparation. *J Endod.*

1983;9(11):463-70. doi:10.1016/S0099-2399(83)80160-5

3. Hasselgren G, Olsson B, Cvek M. Effects of calcium hydroxide and sodium hypochlorite on the dissolution of necrotic porcine muscle tissue. *J Endod.* 1988;14(3):125-7. doi:10.1016/S0099-2399(88)80212-7
4. Shabahang S, Goon WW, Gluskin AH. An in vivo evaluation of Root ZX electronic apex locator. *J Endod.* 1996;22(11):616-8. doi:10.1016/S0099-2399(96)80033-1
5. Pagavino G, Pace R, Baccetti T. A SEM study of in vivo accuracy of the Root ZX electronic apex locator. *J Endod.* 1998;24(6):438-41. doi:10.1016/S0099-2399(98)80029-0
6. Patiño PV, Biedma BM, Liébana CR, et al. The influence of a manual glide path on the separation rate of NiTi rotary instruments. *J Endod.* 2005;31(2):114-6. doi:10.1097/01.don.0000136209.28647.13

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**Disclosure:** Dr. Pullen lectures for Dentsply Sirona.