CLINICAL ARTICLE

The standardized-taper root canal preparation – Part 5. GT file technique in Small Root canals

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Abstract

Buchanan LS. The standardized-taper root canal preparation – Part 5. GT file technique in Small Root canals. *International Endodontic Journal*, **34**, 244–249, 2001.

Aim To describe the shaping of Small Root canals with GT files.

Summary Small Roots are lower incisors, two and three canal bicuspids, buccal roots of upper molars, and mesial roots of lower molars. The Shaping Objective instrument for such cases is usually a 0.08 or 0.06 taper GT file. After proper access, pulp tissue should be removed to prevent its compaction and canal blockage. Orifice shaping and smoothing is then achieved with a 35-0.12 accessory GT File, running at full slow-speed r.p.m. (5–20K).

Crown-down preparation commences with the 0.10 GT file, followed by the 0.08 and 0.06 tapers as needed. Occasionally, a 20-0.04 Profile is required to reach length. Files are rotated at 300 r.p.m. with steady, light pressure, and withdrawn frequently for cleaning and inspection. Once one of these files has cut to length, the canal terminus is enlarged to Shaping Objective. If difficulty is encountered, be willing to accept a 0.06 instead of the original 0.08 taper Shaping Objective. If the terminal diameter is 0.2 mm you will have plenty of apical resistance form in a tortuous canal with the 0.06 taper preparation. It is definitely better to end up with a smaller shape than originally planned, than to experience the heartache of separation.

Key learning points

- Small Root canals should be prepared to a Shaping Objective 0.08 or 0.06 taper.
- Pulp tissue should be removed before preparation to prevent compaction and blockage.
- Preparation follows in a crown-down sequence, and may occasionally require the use of small Profiles.
- Final apical shaping is easily achieved when root length is reached.

Keywords: GT files, small roots, root canal preparation.

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Introduction

Whilst putting my seven-year-old son Chase to bed one night, he informed me that there were four different parts of his brain. He explained that there was one part for thinking, one part for moving his muscles when he was thinking (like running or jumping), and one part for moving his muscles when he was not thinking (like when his heart pumped or he was breathing). He then said that the last part was the 'bad-idea' side of his brain.

Intrigued, I asked him for an example of what the bad-idea side of his brain did. He said that part of his brain was where he frequently got the idea to hit his nine-year-old sister, Kelleyanne, when he walked by her. He said if his Mum or I were there, he was then in big trouble with us, and if we were not there, he actually had more trouble to deal with from his sister.

I am often reminded of this description when teaching dentists to use handpiece-driven, rotary GT files. I tell my students that if they can engage the first three parts of their brain and eschew the last, learning and successfully using this new shaping system of instruments is extremely simple. In this fifth part of my GT technique series, I will describe strategies for shaping small root canals; canals that most require leaving the 'bad-idea' part of your brain at home.

File selection and use

In the second article (Buchanan 2001), I described the concept of selecting a specific GT file as the Shaping Objective for a given root and the root canal within it. Small Roots are lower incisors, two and three canal bicuspids, buccal roots of upper molars, and mesial roots of lower molars. Large Roots are all the others.

Choosing the Shaping Objective file indicates the maximum taper to which the preparation will be enlarged, or in other words, which GT file will be cut to the terminus of the canal. A Small Root canal typically requires a 20-0.06 or a 20-0.08 GT file as the final Shaping Objective instrument. The 20-0.06 GT file is for curved and/or thin Small Root cases, although the 20-0.08 GT file is the most common Small Root shaping objective choice.

The typical armamentarium of GT files for most Small Root cases is the three-file standard set of GT instruments and a 35-0.12 GT accessory file from the 0.12 accessory set. On occasion, when shaping canals with severe apical curvatures or tiny apical diameters, a 20-0.04 Profile will be used as well. Whilst this is a larger instrument set than when GT files are used in Large Root canals (often requiring only a single file for full shape), it is still a smaller set than any other rotary file system used in the same canal forms.

Before any rotary shaping can be done, the pulp tissue in the primary canal must be removed. Otherwise, crown-down shaping will only drive this highly collagenous tissue into the apical constricture and block the canal terminus. The most predictable method of pulp extirpation in Small Root canals is to simply negotiate an #08, a 10, and a 15 K-file to length in the canal (Fig. 1); always in the presence of a lubricant, such as Glyde (Dentsply). If the #15 still has a 'rubber-band' feel in the canal, a small broach can be used to snag the last pulp remnants.

This preshaping preparation is finished by flaring and smoothing the canal orifice with a 35-0.12 accessory GT file, running at full slow-speed r.p.m. (5–20K). Pushing this file into each line-angle quickly eliminates the common discontinuity between the access line-angles and the canal orifices (Fig. 2), easing the introduction of rotary files into canal orifices during shaping procedures and dramatically reducing the chances of buckling a gutta percha cone later in the case. This short subroutine will save you time throughout the rest of the case, so do not shortcut it.

Figure 1 15 K-file negotiated to length in the canal, always in the presence of a lubricant.

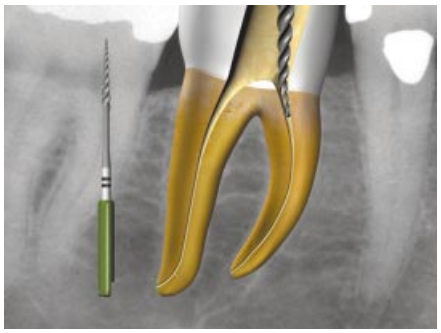

Figure 2 The 35-0.12 GT File (at 5–20K r.p.m.) smoothing the access-to-orifice transition.

Figure 3 The 0.10 GT file (at 300 r.p.m.) cuts up the root canal and stalls out.

Figure 4 The 0.08 GT file cuts further.

Figure 5 The 0.06 GT file nears the terminus.

Figure 6 The 20-0.04 Profile cuts to length.

Crown-down carving

The crown-down carving is begun, in the presence of NaOCl, with the 20-0.10 GT file running at a constant 300 r.p.m. (Fig. 3). Using a light touch, the 20-0.10 is introduced into the canal until dentine is engaged, steady pressure is maintained as the file slowly cuts into the canal, and when it stalls out the file is removed.

Be certain to check the file after removal, to observe the pattern of debris in the file's flute spaces as well as to look for deranged flutes. Files that have packed debris filling

Figure 7 The 20-0.06 GT file cuts to length.

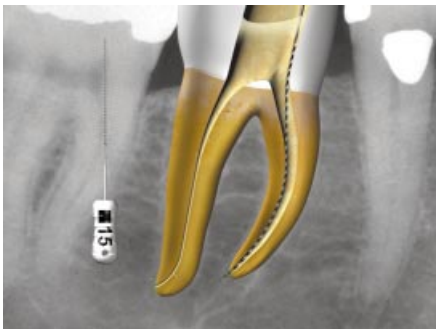

Figure 8 A #15 file goes patent.

Figure 9 A #20 K-file binds at length in the apical gauging procedural finale.

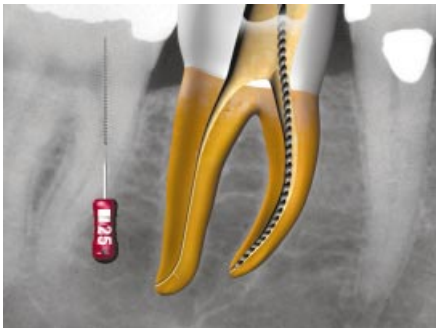

Figure 10 A #25 K-file binds short of the #20.

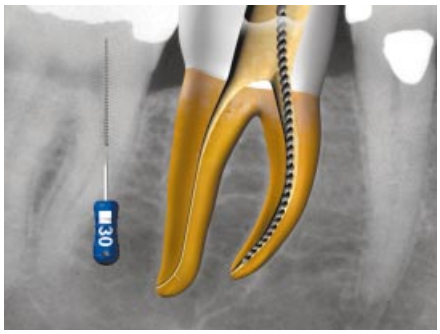

Figure 11 The #30 K-file binds short of the #25, confirming apical continuity of taper.

the flute spaces may cut deeper after cleaning, as the debris physically holds the flute edges away from the canal walls.

The location of the debris along the file's length also indicates where the file was engaging dentine and cutting. Usually the 20-0.10 GT file cuts first in its middle section, with the packed debris extending then to the shank-end flutes as the file is cut deeper into the canal. Obviously, any file with deranged flutes is immediately discarded. If a file stalls out and is not packed with debris, it is usually too large or stiff to fit further into the canal. It is time to drop down in taper size, to the 20-0.08 GT.

The 20-0.08 GT file (at 300 r.p.m.) is used the same way, cleaned, and used until it stalls out without showing packed debris upon removal (Fig. 4). If the Shaping Objective

for the canal being prepared is a 20-0.08 GT file and it resists cutting further, do not push on it! The safest strategy in this situation is to continue the crown-down shaping with smaller GT files.

The 20-0.06 GT file is used in the same manner as the 0.08 and 0.10 GT files were, but with a more careful touch (Fig. 5). This is for two reasons. First, it is a more fragile file than the 0.08 and 0.10 files. Secondly, it is traversing more canal curvature than the larger GT files, because root canals tend to be more curved in their apical halves.

If the 20-0.06 GT file resists cutting to length, a 20-0.04 Profile is brought to bear with the same light touch (Fig. 6). This is usually unnecessary, unless the canal has severe curvature or is of small apical diameter, but when the 0.04 is required, it usually gets to length the first time it is used. If even the 0.04 taper rotary file resists placement to the terminus, be especially careful.

In this situation, I would first recommend checking to ensure patency (seldom necessary with rotary files), then recapitulate with the 0.06 to length, and the 0.08 file to length if the canal form will allow it (Figs 7 and 8). In the unlikely event that the terminus has not yet been reached, consider putting in a new 0.06 GT file here, before an already tired file is asked to cut through the most challenging canal curvatures in that root. This situation occurs most often in a canal with an apically accelerating curvature or a canal with severe multiplanar curvatures.

Finishing the shape

Once one of these files has cut to length, it is easier to go up in GT taper size, as all of the files in the standard series have the same tip diameter 0.2 mm. In a Small Root canal of greater than usual diameter, the Shaping Objective file may be cut to length the first time it is used. In that case, the only procedural detail remaining is the apical gauging subroutine, to ensure the presence of an apical constricture and that there is continuous shape coronal to the terminus.

In most Small Root canals, it will require continuing the crown-down shaping to the 0.06 or even the 0.04 taper file before enlargement up to the Shaping Objective may be accomplished, whether it is a 0.06 or 0.08 GT file that is appropriate for the final shape in that canal. If difficulty is encountered, be willing to accept a 0.06 instead of the original 0.08 taper Shaping Objective. If the terminal diameter is 0.2 mm, you will have plenty of apical resistance form in a tortuous canal with the 0.06 taper preparation. It is definitely better to end up with a smaller shape than originally planned, than to experience the heartache of separation.

Apical gauging should be done in the presence of 17% aqueous ethylenediamine tetraacetic acid (EDTA), so the smear layer is removed as the final dentine cutting is occurring. Remember, this procedural subroutine is not intended to cut dentine, but only to measure the terminal diameter of the canal and to ensure that there is continuity of shape coronal to that point in the canal. In most small root canals, a #20 K-file will bind at the terminus and every larger K-file (taken straight in and straight out, no rotation) will step back from that point (Figs 9–11).

As mentioned in the last GT article, if the apical diameter is *larger* than 0.2 mm, the easiest resolution is to take the Shaping Objective file an appropriate distance long, dropping the shape deep enough to ensure apical continuity of taper. If you have not yet wrapped your brain around that concept of preparation, consider stepping back with the #25, 30, and 35-0.04 Profiles instead. The compromise here is that there is no longer a predefined taper as shaping outcome.

Figure 12 shows a completed case in a Small Root canal with severe curvature, prepared in the manner described.

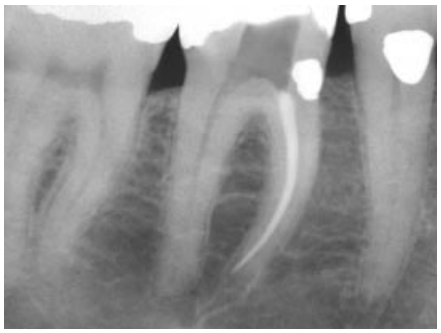

Figure 12 Postoperative result in Small Root canal with severe curvature.

Conclusion

So, to return to Chase's concept of the four parts of your brain, applying it to the rotary GT file technique ('this is your brain on nickel titanium'). The first part of your brain is definitely needed for thinking here. You must understand the concepts of GT file selection and even more important, you must understand how to use rotary files without breakage. This is also one of the good parts of your brain, which will resist the 'bad-idea' part, instituting effective procedural strategies rather than allowing risky clinical behaviour.

You also need the part of your brain that moves your muscles when you are thinking. You need a soft hand on a handpiece-driven file, and you really must develop neuromuscular patterns that will resist impulsive behaviour, like pushing on a file that does not want to cut deeper in the canal. As soon as you can control the 'thinking-muscle' part, the other part of your brain that just thinks will have a chance to suggest safe, effective alternative strategies.

Finally, you can even use the part of your brain that moves your muscles when you are not thinking in this technique. In fact, you can relax all of your 'involuntary' musculature. If you do not have to use the commonly recommended in-and-out 'pecking' method of rotary file use, you can start to gain 'tactile competence' when using these handpiece-driven files. When you understand the critical technique paths in the use of GT files, you can lower your heart and respiration rates as you watch these files literally 'walk' into the canal, creating the same shape every time.

But leave the bad-idea side of your brain at home.

In the sixth and final article of this series, I will turn finally to the abruptly curved canal, and explore what the GT approach has to offer.

Acknowledgement

This article will also appear in *Endodontic Practice* in 2001, and is being reproduced with kind permission from FMC Ltd and Dental Education Laboratories.

Reference

Buchanan LS (2001) The standardized-taper root canal preparation – Part 2. GT file selection and safe handpiece-driven file use. *International Endodontic Journal* 34, 63–71.