*Review Article*

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# The Glidepath: A Pathway to Endodontic Success

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## Abstract

Endodontic success depends primarily on biomechanical preparation. Establishing a Glide path is an important step during cleaning and shaping, which determines and maintains the canal patency till the apex and subsequently aides in achieving a good obturation. It is of prime importance that we slip, slide, and glide through the canal so that the root canal system is three dimensionally patent to facilitate movement of rotary instruments for cleaning and shaping.

The preparation of a glide path not only helps to reduce the risk of instrument separation, but also conveys to the clinician an intimate knowledge of the tortuous anatomy of the canal from the orifice to the terminus. The information gained during glide path preparation enables clinicians to adapt their shaping strategy to the nuances of the anatomy of each individual canal.

While novel mechanical methods of glide path preparation serve to increase the efficiency of this essential prerequisite of canal shaping, the role of hand instruments should not be overlooked. Regarding the kind of files to be employed for glidepath preparation the question should not be "manual versus mechanical" but rather "manual, then mechanical."

The intent of this poster is to look at the various glidepath systems available and assess their design characteristics and shaping ability. Manual Glide systems such as Path File (Dentsply), C pilot files (VDW, Germany), C Plus files (Maillefer/Dentsply) and Pathfinder CS (SybronEndo) along with Rotary Pathfinders ProGlider (Maillefer/Dentsply), OneG (Micro–Mega) and HyFlex EDM Glide path (Coltene) will be discussed.

**Keyword:** Rotary files; Hand files; Calcified canals; Glidepath.

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## INTRODUCTION

The creation of the glide path is a crucial first step stage in root canal instrumentation because it enables all succeeding instruments to travel freely from the coronal orifice of the canal in an unhindered manner to the apical constriction. A prerequisite for the success of canal shaping in endodontic therapy is thought to be proper glidepath control.[1]

The subject of Glidepath has no formal training or

in the endodontic curricula of most dental schools, which is an unfortunate reality. There is also very little literature available regarding this topic even in popular textbooks.

If the glide path is not already existent in the root canal anatomy, it must be prepared or found. Devoid of a patent glidepath, the process of biomechanical preparation deviates from predictability as there is no blueprint for successive shaping instruments to pursue.[2]

No rotary device should be used to clean or shape the root canal system if a hand instrument has not already been utilized there.[3]

## MANUAL GLIDEPATH

The glide path includes four important steps. The first and foremost is locating the canal orifices. To effectively locate the canal orifices, it is mandatory that we know about the normal root canal anatomy and also the possible anatomic variations that are specific to the tooth.[4]

Following the canal to the minor apical diameter is the second step. Numerous techniques, including radiographic techniques, electronic techniques, digital tactile sense, apical periodontal sensitivity, and paper point measurements, can be used to accomplish this.[5]

The reason why the minor apical diameter is so far off is discussed in the third step. The possible causes for this problem are clogged/blocked canals, oversized file or canal calcification.

The fourth step involves the motion with which files are maneuvered into the canal. This involves the following motion, smoothing motion, envelope motion and the balanced force technique.[6]

### *2.1 Stainless Steel K Files*

In order to remove constrictive dentine in small canals, West advises oscillating the file back and forth in 30° to 60° increments to resemble a "watch winding" motion. The file should not be driven apically through any impediments.[7]

Schilder advised using pre-curving of files in curved canals. By moving the file just shy of the point of maximum resistance, this method enables the "watch winding" motion to make room for larger curved files to follow. The file is then turned in a clockwise direction as it is being removed from the canal.[8]

## ROTARY GLIDEPATH

A more recent development in glidepath enlargement is the advent of rotary glidepath systems. Heat treated NiTi files of increased taper have significantly improved the patency of the root canal system making it larger and more accommodating of larger shaping files. Secondly, the use of rotary handpieces to operate these files significantly reduces the hand fatigue of the operator.

### *3.1. PathFiles (Dentsply Sirona)*

A three file rotational NiTi device designed specifically for glide path enlargement was launched by Dentsply Sirona in 2009. Each file has a square cross section and a 2% taper. According to the manufacturer, these characteristics guarantee flexibility, boost cutting efficiency, and increase cyclic fatigue resistance. Each file's non-cutting tip lessens the possibility of ledge formation.

Path File no. 1 (purple) ISO 13 tip size

Path File no. 2 (white) ISO 16 tip size

Path File no. 3 (yellow) has an ISO 19 tip size

According to Berutti *et al*, compared to manual glide path enlargement carried out using stainless steel K-Files, PathFiles preserve the original canal anatomy with less alteration of canal curvature and fewer canal aberrations.[9] In order to fully prepare the glide routes in curved root canals, Pasqualini *et al.* employed stainless steel K-Files and Path Files to prepare the glide paths to full working length. CMCT investigations were carried out and the studyconcluded that PathFiles have a higher root canal centering ability, cause fewer modifications of the canal curvature and fewer canal aberrations and, therefore, maintain the original canal shape considerably better than do stainless steel K-Files.[10]

### *3.2. RaCe ISO 10 (FKG Dentaire)*

A three file system with a constant apical diameter of 0.1 mm , and tapers of 2% (yellow ring), 4% (red ring), and 6% (blue ring). These files have been flagged for abrupt coronal curvatures and obliterated canals.[11]

### *3.3. ScoutRaCe (FKG Dentaire)*

ScoutRaCe (FKG Dentaire) (Fig. 5) is a two file system with each file exhibiting a 2% taper, a triangular cross section, alternating cutting edges and a non-cutting tip. They are available in ISO tip

size 10 (purple), 15 (white) and 20 (yellow) and are used in sequence following initial canal exploration with a size 06 or 08 K-File to working length.[12]

### *3.4. G-Files (Micro-Mega, Besançon, France)*

Two file glidepath system with ISO tip sizes #12 (red) and #17 (white) with 3% taper. The tips are non-cutting with a varying cross sectional design which is claimed to reduce torsion.

### *3.4. ProGlider (Dentsply Sirona)*

Incorporating M-Wire technology, the ProGlider is a single file glide path system. NiTi is thermomechanically treated to create M-Wire, which is more flexible and resistant to cyclic fatigue. Johnson et al. claimed that M-Wire files are over 400% more resistant to cyclic fatigue than typical NiTi files, lowering the possibility of file fracture.[13]

The file features a square cross section, tapering from 2% to 8% along its length, and has diameters of 0.16mm (D0) and 0.82mm (D16). The file enables a controlled, inward cutting motion, which produces a smoother glide path, according to the manufacturer. The internal walls of the canal are originally surveyed, expanded, and improved using a small size stainless steel K-File. The single ProGlider file increases the working width prior to shaping techniques.

### *3.5 One G (Micro-Mega)*

The One G single file system was introduced in 2015. The producers claim that the three cutting edges and 3% taper on this NiTi rotary glide path file improve the cutting action and provide more room for debris removal. The file contains an ISO size 14 non-cutting tip that lowers the possibility of ledge formation and a variable pitch between the cutting edges that, according to the manufacturer, reduces the screwing effect.[14]

### *3.6 Neoglide (Orikam Healthcare India)*

This single file system has a Rectangular cross-section which gives it an increased core area for better strength. With an inactive #16 tip and variable progressive taper the file prepares the glidepath for the larger shaping files.

### *Reciprocating Glide Path Instruments*

### *4.1 Wave One Gold Glider (Dentsply Sirona)*

Launched in 2015 as the glidepath file for the reciprocating Wave One file system, it has a semi-active tip with a diameter of #15 and variable taper of 2% at D0 and 6% at D16. The post manufacturing thermal process produces a super elastic NiTi file with a gold finish making it more resistant to cyclic fatigue compared with conventional NiTi and M-Wire alloys.[15]

## CONCLUSION

The preparation of a patent glidepath is necessary to allow smooth movement of all larger sized shaping files. This plays an important role in the biomechanical reparation process and determines the success of the root canal therapy. Failure to prepare a patent glidepath can result in ledge formation, instrument separations and short of apex obturation. As the concept of glidepath preparation has gathered focus in literature and clinical practice over the years, a wide array of manual and mechanical glidepath systems are available for the practitioners to deploy in their root canal preparation.

## REFERENCES


1. West J. The Magic of Mastering the Glidepath: What Every Endodontist Should Know. Paper presented at: American Association of Endodontists Annual Session; April 16, 2010; San Diego, CA.
2. West J. Endodontic update 2006. J Esthet Restor Dent. 2006;18:280-300.
3. Bergmans L, Van Cleyenbreugel J, Wevers M, Lambrechts P. Mechanical root canal preparation with NiTi rotary instruments: rationale, performance and safety. Am J Dent 2001 Oct; 14 (5): 324- 333.
4. West, JD. Endodontic predictability "Restore or remove: how do I choose?" In: Cohen M, editor. Interdisciplinary treatment planning: principles, design, implementation. Chicago (IL): Quintesssence Publishing Co; 2008. pp. 123- 164.
5. Spangberg, SF. Instruments, materials and devices. In: Cohen S, Burns RC, editors. Pathways of pulp. 8th ed. St. Louis (MO): Mosby; 2002. pp. 521- 572.
6. Kinsey B, Mounce R. Safe and efficient use of M4 safety handpiece in endodontics. Roots 2008 Jan; 4 (2): 36- 40.
7. West J. The endodontic glidepath: "secret to rotary safety." Dent Today. 2010;29(9):86-3.
8. Schilder H. Cleaning and shaping the root canal. Dent Clin North Am. 1974;18:269-96.
9. Berutti E, Cantatore G, Castellucci A, Chiandussi G, Pera F, Migliaretti G, *et al*. Use of nickel-titanium rotary PathFile to create the glide path: comparison with manual preflaring in simulated root canals. J Endod. 2009 Mar;35(3):408-12.

10. Pasqualini D, Bianchi C, Paolino D, Mancini L, Cemenasco A, Cantatore G, *et al.* Computed micro-tomographic evaluation of glide path with nickel-titanium rotary PathFile in maxillary first molars curved canals. J Endod. 2012;38(3):389-93.
11. Debelian G, Trope M. Scouting the root canal with dedicated NiTi files. Roots. 2012;2:24-7.
12. Cassim I, Van der Vyver P. An in vitro comparison of different techniques for glide path preparation. J Dent Res. 2013;92:183-227.
13. Johnson E, Lloyd A, Kuttler S, Namerow K. Comparison between a novel nickel-titanium alloy and 508 nitinol on the cyclic fatigue life of Profile 25/.04 rotary instruments. J Endod. 2008;34(11):1406-9.
14. Van der Vyver, PJ, Vorster, M, Paleker, F, & de Wet, FA. (2019). Glide path preparation in Endodontics: case report and a literature review of available materials and techniques. South African Dental Journal, 74(3), 129-136.
15. Webber J. Shaping canals with confidence: Wave One GOLD single-file. Roots. 2015;1:34-40.