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REVIEW ARTICLE

Glide Path in Endodontics

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ABSTRACT

Endodontic success depends primarily on good obturation. Obturation is a complex procedure that depends on many important steps. Overlooking any step may lead to failure of the endodontic treatment. Glide path is one of the most important steps during biomechanical preparation, which determines the canal patency until the apex and successful subsequent obturation. This article reviews some of the parameters regarding this very important step.

Keywords: Extrusion of debris, Glide path, Reciprocating handpiece.

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INTRODUCTION

A vital step in the instrumentation process is preparation of the glide path to allow all subsequent instruments to move smoothly from the coronal orifice of the canal in an unimpeded progression to the apical constriction. Glide path management is considered to be the shaping success in endodontic treatment.[1-3]

Hence, it is of prime importance that we slip, slide, and glide through the canal from the orifice to the apical constriction, so that the root canal system is successfully and three-dimensionally cleaned and shaped[2] to a tapering funnel shape to receive the obturating material. This article will guide us through the significance, techniques of preparation, apical extrusion of debris, irrigation, and postoperative pain associated with glide path management.

GLIDE PATH

The endodontic glide path is a smooth radicular tunnel from the canal orifice to the apical constriction. Its minimal size should be a, super loose No. 10 endodontic file. The glide path must be discovered if already present in the root canal anatomy or prepared if it is not present.[3] The glide path can be of various types: Long, narrow, or wide, or they may be straight or curved (Fig. 1).

Fig. 1: Glide paths in different widths, lengths and may be short or long, curved or straight (*West JD. The endodontic Glidepath: "Secret to rotary safety". Dent Today. 2010 Sep;29(9):86,88,90-93*)

SIGNIFICANCE OF GLIDE PATH

A successfully secured glide path means a smooth passage exists that is reproducible by successful larger files.[4] During cleaning and shaping of the root canal system, no rotary instrument should be used where a hand instrument has not been placed before.[5] The other significance is the coronal preflaring, which considerably decreases the separation of instruments.[6] Most of the Ni–Ti rotary instruments that are available in the market have noncutting tips[7] and they are extremely flexible also. These two characteristics of rotary endodontic files though seem advantageous for the cleaning and shaping procedures. Even though they effectively clean and shape, these rotary endodontic files are not really suited for the initial negotiation of the root canal.[8] Therefore, the use of small hand files prior to the use of rotary Ni–Ti instruments will confirm patency as well as maintain sufficient space, thereby, improving the safety of the rotary or reciprocating endodontic files.[1]

The presence of intracanal calcifications or denticles poses severe problems during endodontic therapy, especially, in the aging population.[4,9] These denticles may be present at the coronal, middle, or apical third of the root canals.[10] Instrumentation beyond these calcifications is an ardent task, which can effectively be accomplished with successful glide path management.[4,9] Failure to achieve patency beyond the calcifications leads to ledge formation,[8] which is one of the most important reasons for retreatment.[11] Effective glide path creation maintains the original canal curvature.[12,13] Lack of glide path

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establishment may lead to blockage of canals, transportation, zip formation, and perforation. Last but not the least, without the endodontic glide path, the rationale of endodontics and better quality control of endodontic obturations cannot be achieved.

GLIDEPATH TECHNIQUE

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.[14] The various classifications proposed dictates that the typical root canal system anatomy of a tooth is not specific at all. Hence, with better magnification and illumination, a good knowledge about root canal anatomy and the possible anatomic variations, as well as location of root canal orifices can be determined.

The second step is following the canal to the minor apical diameter. This can be done using various methods, such as radiographic methods, digital–tactile sense, electronic methods, apical periodontal sensitivity, and paper point measurements.[15]

The third step is regarding why the minor apical diameter is a long way off. This may be due to four possible reasons as explained in Figure 2.[16,17]

1. The canal is clogged or blocked due to necrotic and dentinal debris.
2. The angle of incidence and angle of access are not the same.
3. The diameter of the file is wider than the canal.
4. The shaft of the file is too wide for the canal.

The fourth step is the different types of motions employed.

The first type of motion is the following motion. The necrotic debris and the calcifications can be removed by using ultrasonics, high-speed burs, and also Mueller burs. Using an irrigating solution, proper agitation techniques, and a gentle slipping and sliding motion, the radiographic terminus can be reached.

The second type of motion is the smoothing motion. This is employed only when the radiographic terminus is reached. This makes use of short-amplitude vertical strokes of 1 to 2 mm. Initially with the smoothing motion, the files are tight, which later may become loose with effective canal enlargement.

The third type of motion is the envelope motion.[18] The smart and subtle envelope motion will wear away the restrictive dentin in an outward stroke. This is very similar to reverse filing.

The fourth type of motion is the balanced force or the Roane technique.[19] This is explained in Figure 3.

In this technique, when the file engages with apical pressure, 1/4 turn should be clockwise followed by, with apical pressure, a 3/4 turn counterclockwise. Progressive instrumentation with larger instruments cuts dentin effectively. Repeat sequence two or three times. Then for the final instance, a 360° turn clockwise (no apical pressure) should be made in order to load onto the file all the dentinal debris collected, and then remove file from canal. When the file is removed from the canal, one can appreciate the presence of dentin on the most apical portion of the file.

When properly used, these robust and efficient glide path techniques and motions can negate all of the risks out of rotary shaping.

GLIDE PATH PREPARATION USING A RECIPROCATING HANDPIECE

The patency of the canal is established using a 10 K file. The tip of the file is precurved and using a watch–wind motion, the working length is reached. The same file is then attached to the M4 reciprocating handpiece. With the handpiece activated, the file is withdrawn 0.5 mm from the canal and moved back to its original length. This process is repeated until a glide path preparation is confirmed. A successful glide path is said to be created when the file can travel 5 mm in the root canal without any obstruction.[18]

GLIDE PATH AND APICAL EXTRUSION OF DEBRIS

From the above discussions, it is very well clear that the creation of glide path enhances the performance of Ni–Ti instruments.[19] Glide path preparation allows the

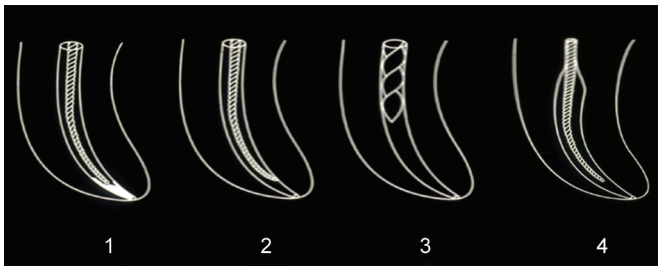

Fig. 2: Four reasons why minor apical diameter is a long way off (*West JD. The endodontic Glidepath: "Secret to rotary safety". Dent Today. 2010 Sep;29(9):86,88,90-93*)

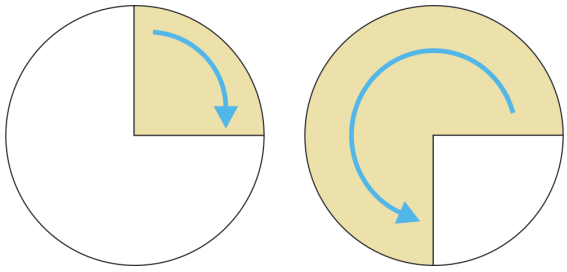

Fig. 3: Technique is explained (*West JD. The endodontic Glidepath: "Secret to rotary safety". Dent Today. 2010 Sep;29(9):86,88, 90-93*)

preservation of a pathway to the entire working length, thus avoiding excessive binding in the canal and, thus, there is less extrusion of debris.[20] Procedural errors during preparation of root canals, such as apical transportation and irregular foramen widening can lead to poor sealing efficiency with a high rate of extrusion of debris and postoperative discomfort.[21] Microhardness values of human dentin may affect extrusion of debris.[22] In teeth with lower hardness, debris may be extruded more readily into the periapical tissues. But, ultimately, the amount of apically extruded debris was decreased when a glide path was created before canal preparation.[23]

POSTOPERATIVE PAIN AFTER MANUAL AND MECHANICAL GLIDE PATH

Pain is a frequent complication associated with endodontic treatment.[24,25] Mechanical, chemical, or microbial injuries to the periradicular tissues are frequent causes of pain complications.[26] Hence, performing a glide path with hand instrumentation may have a significant impact in reducing the postoperative pain.[27]

CONCLUSION

Every tooth that requires endodontic therapy presents its own set of anatomical challenges to effective instrumentation. Grossman states that "a dentist who has not separated an instrument has not done enough root canals."[28] This threat of instrument fracture remains in contemporary endodontics. 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 gleaned during glide path preparation enables clinicians to adapt their shaping strategy to the nuances of the canal 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.

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