



Endodontic Treatment of Complex Curved Root Canal System

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Abstract

Extensive knowledge of root canal anatomy is a prerequisite tool for the success of root canal therapy. It is mandatory for clinician to have a complete knowledge of the morphology of tooth related to its shape, form and structure before initiating treatment. This case report presents an appropriate treatment planning with selection of proper instruments and instrumentation techniques. Adhering to basic principles and being aware of the latest technologies of the root canal therapy helps in managing these root canal complexities and ensures a successful result.

Keywords: Curvature; Premolar; Pre-curve files; Glide path

Introduction

Success of endodontic therapy depends on the all over cleaning and shaping of the root canal systems. Proper assessment of root canal curvature is an essential key procedure for chemo-mechanical preparation. The desired knowledge in root canal curvature radius permits for selecting an appropriate NiTi rotary files and further exact planning of root canal instrumentation. While performing biomechanical preparations, procedural errors like ledge formation, blockages, perforations and apical transportations are mishaps that have been observed to occur mainly while preparing curved canals. Many authors reported that instrumentation while preparing curved canals might result in formation of the ledges, blockage of the apical third, loss of working length,

apical transformation and perforations. Authors suggest that precurving files or using flexible Ni-Ti files reduces procedural errors [1].

Some authors reported that Schneider's technique emphasized canal curvature in coronal region, whereas long axis technique which is described by Hankins et al. considered the apical curvature and did not evaluate overall root curvature [2,3]. Sonntag D, et al., suggested that a preoperative radiograph taken in 20 degree mesial or distal projection helps in detecting the morphology and anatomy of the root canal system [4]. Deciding the canal curvature will allow for the maintenance of the continuous tapered shapes and preclude structural

damage of the endodontic instruments. M Segal, et al., reported that the root curvatures determined by measuring canal access angle which was introduced by Gunday et al. was the most effective and appropriate among the all other methods used [5,6]. Many authors have suggested several methods to determine root canal curvature [7]. According to Schneider, pioneering work on canal angulations was executed and named according to the degree of curvature as: straight 5 degrees, moderate 10 to 20 degrees and severe as 25 to 70 degrees [8].

Case Report

A 37-year old male patient came to the department of conservative dentistry and endodontics, Maitri dental college and research centre with chief complaint of pain in upper right back region of jaw since 6 days. The pain was aggravated on taking hot and cold food and on mastication. Clinical examination revealed proximal carious lesion on premolar. Medical history was non contributory. Radiographic examination revealed deep carious lesion involving pulp with periapical radiolucency with upper right second premolar. Local anesthesia administered and isolation was done using rubber dam, access cavity was prepared precurving the file, using smaller number, intermediate and flexible files to follow the canal curvature. The canal was located and explored with a size 10 K-type file (Dentsply Maillefer, Ballaigues, Switzerland), and passively advanced into the canals. The root canal length was recorded, and the working length was confirmed using RVG and apex locator (J MORTITA ROOT ZX II). The mechanical glide path was made using Glyde (Dentsply Maillefer, Ballaigues, Switzerland) as a lubricating agent, with NiTi rotary instruments neoendo flex glide path files. The system consists of three instruments with 13.02%, 16.02%, and 19.02% of what? helical angles or taper finishing or?. Instrument with 13.02% ...angle was used immediately after a size #10 hands K-file (Dentsply Maillefer, Ballaigues, Switzerland) which was used to prepare the root canal to full WL, and then followed by instruments with 16.02% and 19.02% ...angle. An endodontic engine (X-Smart; Dentsply Maillefer, Ballaigues, Switzerland) at 200 rpm and 51.5 N/cm torque, was used with all glide path files. Continuous irrigation was performed with a 30-G needle syringe with 5 ml of 5% NaOCl after each instrument. Further biomechanical preparation was completed using endo edge files (Johnson City, Tennessee, USA), at first 17.04%, followed by 20.04% and finally 25.04%. Final rinse with 17% EDTA was done. Canal was coated with AH Plus sealer and followed by cold lateral condensation technique (Figures 1-3).



Figure 1: Preoperative IOPA of 15.



Figure 2: Working length was determined using NO. 15 K file.



Figure 3: Obturation done with 15.

Discussion

Keeping the original shape of the canal and avoiding canal aberrations like ledge formation and zip configuration is a

big challenge, particularly while preparing severely curved root canals. Traditionally manual K-files were used for preflaring of the canals but handpreflaring with K-files produced a more straightening of the coronal and apical curves, with a significant modification of the original canal anatomy. After the invention of Nickel Titanium glide path files, the Nickel-titanium instruments claimed to shape root canals more efficaciously than stainless steel instruments because they have 2–3 times greater flexibility [9]. Rotary glide path preparation enables better initial removal of pulp tissue and debris from the canal, allowing the clinician to sustain the working length and patency of root canals. This allows for copious flow of irrigation solutions to the apical root canal. Other advantages of using NiTi rotary instruments include less hand fatigue for the technician as well as less chair time for the patient. Different glide path instrument have been introduced for the preflaring of the curved root canal so as to maintain the canal anatomy as well as to decrease the rotary instrument separation [10]. Different rotary glide path instruments available are: G-file system, Hyflex Glide path file, NiTi Scout Race, Path file, Proglider, Race ISO 10, Xplorer files, Flex Glide files. All of these instruments are made of different NiTi alloys and have different geometries including cross-section, taper, and pitch [11]. Due to variation in their physical dimension and properties, glide path prepared with these instruments is not exactly similar.

Preparing a Glide Path as first step of the Root canal treatment, an access cavity should be prepared that will ensure straight-line access into all the root canals. Removal of any coronal interference and eliminating any obstruction or accentuated curvatures in the coronal third of the root canal, negotiating the root canal up to working and establish patency with a pre-curved stainless steel K-File (size 06, 08 or 10). Preparing an initial glide path with the K-files by using a “watch-wind” or “in-and-out movements” by manual technique. Not to proceed with the rotary glide path instrument before an initial glide path has been established up to a size 10 K-file. To confirm this, a size 10 K-File must be inserted till working length, withdrawn 1.5 mm by hand from the root canal and pushed back to working length without any difficulty. Thereafter rotary Glide path instrument can be used. Intermittent irrigation after each instrument is recommended to remove flush debris from the root canal. In canals that demonstrate accentuated curves in the apical third of the root canal repeated recapitulation with the size 10 K-File by hand to confirm complete patency of the root canal, further proceeded with the next file similarly. At the completion of the glide path the canal should be slightly big or at least the size of the first rotary file to be used for preparing the root canal.

According to literature, present occurrence of canal modifications and aberrations seems to be significantly reduced when previous glide path is performed [5]. However, some other studies reported that using glide path had no impact on the occurrence of apical transportation or the incidence of canal aberrations [3]. In a study by Burklein, et al., the authors showed that glide path preparation exerted no significant effect on the shaping ability of the different instruments used and on the incidence of canal aberrations, but less tapered instruments caused less canal transportation than systems including more tapered instrument [12].

Conclusion

Knowledge of root canal anatomy, instrumentation techniques and root canal filling is essential for successful endodontic treatment.

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