



Endodontic management of curved root canals in molars and premolars - a short case report

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ARTICLE INFO

Article history:

Received: 16 August 2013;

Received in revised form:

29 September 2013;

Accepted: 1 October 2013;

Keywords

Curved Canal,
Crown Down Technique,
EDTA,
Reverse Flaring.

ABSTRACT

Dilaceration can be seen in both the permanent and deciduous dentitions, and is more commonly found in posterior teeth. Periapical radiographs are the most appropriate way to diagnose the presence of root dilacerations. The controlled regularly tapered preparation of the curved canals is the ultimate challenge in endodontics. Careful and meticulous technique will yield a safe and sufficient enlargement of the curved canals. This article gives a two interesting case reports of root dilacerations and its management endodontically by using both hand and rotary instruments.

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Introduction

Complex and unusual root canal morphology is an often occurring phenomenon. The main objective of endodontic treatment is to thoroughly debride, disinfect and shape root canals to accommodate an inert filling material. Therefore it is of utmost importance to identify and measure anatomic variations in root canals so as to select proper technique in achieving best treatment outcome. Preparation of curved canals poses great challenges to even the most experienced clinicians. Improper management of those cases can lead to undesirable outcomes such as ledges, blockages, perforations, apical transportation and instrument separation. Since the advent of new technologies and modern endodontic tools, difficult cases are becoming manageable.¹

Case report 1

A 35 year old female patient reported to dental clinic complaining of pain with upper left back tooth region since one week, pain was dull in onset and radiating in nature to temporal region and aggravated on mastication with no significant medical history. On clinical examination 24 was extensively carious and tender on percussion. The clinical and radiological diagnosis conformed apical periodontitis with dilacerations of roots, requiring endodontic therapy.

Anaesthetising the tooth locally with 2% lidocaine with 1:80,000 epinephrine, a conventional straight line access was prepared. Initial scouting of both root canals were done with K-file No.10. Preflaring was done with Protaper S_x and then coronal preparation was done with Protaper S₁-file in crown-down motion upto the straight portion of the canal. Recapitulation with K-file No.10 was done to check patency and to remove the dentinal debris. Frequent irrigation was done with sodium hypochloride to avoid blockage and to remove necrotic tissue. A working length radiograph was taken at this point with K-file No.10. Sequential filing of the curved canal at apex was done

with K-files No.15, 20, 25 until full working length was achieved. EDTA was also used during root canal preparation that provided the necessary lubricating action.

The apical and middle portions were merged using circumferential filing and final finishing done with Protaper F₁ rotary file. After confirming radiographically Protaper universal size F₁ guttapercha points were placed in both canals (Figure A1), and obturated with lateral compaction technique (Figure A2), post was placed in palatal canal, followed by an amalgam core build up (Figure A3, A4).

Case report 2:

A 22 year female patient reported to dental clinic with lancinating type of pain with lower right back tooth region since 3 days which aggravating on mastication and also showing postural and diurnal variations. Considering the clinical and radiographical findings, the case was diagnosed as apical periodontitis with 46 with distal dilacerations of root, showing teeth as if in walking motion.

Anaesthetising the tooth locally with 2% lidocaine with 1:80,000 epinephrine, a conventional straight line access was prepared. Initial scouting was done with K-file No.8. Preflaring was done with Protaper S_x and coronal preparation was done with Protaper S₁-file in crown down motion upto the straight portion of the canal. Recapitulation done with K-files No.8 and 10. A working length was established by radiograph with K-file 10. This negotiating file reproduced the same curvature as that of the curved root canal. File No.10 was clipped by 1mm and precurved in the same direction and to the same extent as the scouting file resulting in file No.12. Sequential filing of curved canal was done with K-file No.12, 15, 17, 20, 22 & 25 until full working length was achieved. During the whole preparation, root canals were irrigated repeatedly with sodium hypochloride and frequent recapitulation was done using lubricating agent EDTA. The apical and middle portions were merged using

circumferential filing. In this case final finishing was not possible with Protaper F₁-file as curvature of canal was 90°. Reaming action of F₁-file may have caused instrument separation. Canals were flushed with saline and dried with paper points. No.25 0.2 taper GP point was used as master cone. Obturation was done with lateral condensation method. (Figure B1,B2). After the endodontic correction, full ceramic zirconium crown were delivered by prosthodontist for both the cases.

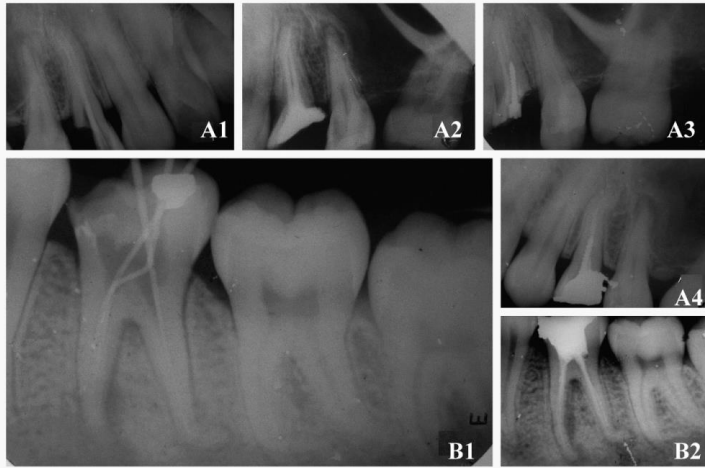


Figure-A1-Master Cone Placed In 24

Figure-A2-Obturation Done In 24

Figure-A3-Post Placement In 24

Figure-A4-Core Build Up In 24

Figure-B1-Master Cone Placed 36

Figure-B2-Obturation Done In 36

Discussion:

One of the greatest challenges in performing root canal therapy is instrumenting curved canals. The frequency of curved canals occurring is about 59% in general all teeth and in double rooted maxillary first premolars buccal canals are curved in about 72.2% of cases whereas in palatal canals it is in about 55.6% of cases.² Common iatrogenic errors encountered in treating curved canals are zip, elbow, transportation of foramen and perforation. To avoid the unwanted procedural errors, it is important to have a good understanding of the root canal anatomy using ideal radiographs. More than one diagnostic radiograph is recommended to have a three dimensional idea of the canal curvature. If the roots are superimposed in 1 view, then they can be assessed using another radiograph which is taken with 10 degree mesial angulation of X-ray cone from the first one.³

The size and shape of the access cavity should be modified based on the degree of curvature of canals to get a straight line access to the canals. Properly prepared access will eliminate frustrations during canal instrumentation.⁴ Canal patency should be obtained with a No.8 or 10 K-file called a scouting file.⁵ which fits quite snugly at the apex and provide gliding path to the NiTi rotary files.⁶ The access cavity should be flared in the coronal third in order to reduce the angle of curvature.³

Pre-enlarging or reverse flaring and crown down preparations should be routinely employed to improve tactile control when directing smaller precurved negotiating files so as to promote removal of dentinal debris thus enhancing cleaning of the canal.^{7,8}

In above cases once coronal preparation was done with Protaper rotary files, K- hand files with 0.02 taper were used to prepare the apical portion of the root canal. The short amplitude filing enlarges the apical portion as well as merges it with the

coronal third of the root canal,³ which you can appreciate in above cases. It is not wise to use rotary file to instrument the canal beyond the curvature which prevent the rotary file from advancing further. In addition such curvature greatly enhances the risk of file separation. For these types of cases, hand instrumentation is a better approach and the apical size of the preparation should be kept small to retain the original shape.¹ As done in our second case.

In the present cases the apical enlargement was limited to size 25 only because any over enlargement could easily result in perforation of these canals.

Advantages of hand files over rotary files⁴

1. They afford more control to the operator.
2. Tactile perception is better.
3. Flutes can be clipped or can be dulled according to the needs of canals, as per narrow canals and curved canals.
4. Files can be precurved.
5. Economical.
6. The hand-held technique is easy to master.⁹

Engine driven systems which have better cleaning efficacy are faster and more aggressive than hand files. But premature use of rotary files and excessive reaming action can lead to instrument separation and canal transportation.¹⁰

Almost all studies have indicated that the curvature of the root canal is the most significant variable affecting the incidence of ledge formation.

Some important points to prevent the above procedural mishaps:

Anticurvature filing decreases the risk of perforation in curved canals in comparison with step back technique.^{11,12} In every technique used, distortion and straightening of curved canals still occur due to stiffness of larger endodontic size files. Thus, extravagant use of smaller number files which are more flexible to engage the curvature and use of intermediate size files are advised. Failure to precurve the instruments and forcing large files into curved canals are perhaps the most common reasons why the ledge occurs. When files have been precurved, the original canal shape is more easily maintained, and a reaming action must not be used.¹³ The use of instruments with noncutting tips and NiTi files has been shown to be very beneficial in maintaining root canal curvatures.¹⁴ Modified tip files maintain the original canal curvature better than unmodified tip files. The concept of use of these files is that the rounded tip does not cut into the wall but will slip alongside.¹⁰

Do not skip the instrument and frequent recapitulation of the canal is always advised. The underlying fact remains that a thorough knowledge of instrumentation is very important when using any canal preparation technique.¹⁵

Conclusion:

Although numerous techniques and modern instruments have been brought forward, curved canal still remains a challenge. The author wishes to emphasize that with the necessary modifications in technique and combination of both rotary and hand instruments in clinical practice and with thorough knowledge about instruments gives an excellent results in curved root canals.

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