Case Report
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Endodontic Management of Dilacerated Maxillary First Molar with Tactile Controlled Activation Technique – A Case Report

Vijay Yadav[1*], Rega Kumar[2], Ruchika Roongta Nawal[2] and Sangeeta Talwar[2]

[1]Department of Conservative Dentistry and Endodontics, Faculty of Dentistry, Jamia Millia Islamia, New Delhi – 110025, India; dr.vjyadav@gmail.com
[2]Department of Conservative Dentistry and Endodontics, Maulana Azad Institute of Dental Sciences, New Delhi – 110002, India

Abstract

Root canal treatment of teeth with dilacerations and Sshaped curvature often presents a challenging situation to the clinician. It is important to visualize the severity of curvature in a preoperative radiograph for successful treatment. Negotiation of such curvature requires coronal preflaring and precurved instruments. Controlled memory Ni-Ti files (Hyflex EDM) can be precurved and used with passive Tactile Controlled Activation (TCA) to negotiate the severe root canal curvatures. This case report presents endodontic management of dilacerated maxillary molar which was handled with Hyflex EDM files and TCA technique.

Keywords: Controlled Memory Ni-Ti files, Dilaceration, Tactile Controlled Activation

1. Introduction

Severe root canal curvatures are difficult to negotiate, hence endanger the principles of biomechanical preparation. Procedural errors such as ledge formation, zipping, elbow creation, blockage of the canal, root canal transportation and fractured instruments can result in endodontic treatment failure in such cases[1] mean data were analyzed by using multiple factor analysis of variance and the Dunnett post hoc test (P<.05).

Abrupt curvatures will result in an increased incidence of procedural errors with the use of traditional hand files and Austenitic Ni-Ti files especially when larger apical preparations are required. Though smaller flexible hand (#6- #15) K-files can be used for negotiation of curvatures[2]. A novel technique of Tactile Controlled Activation (TCA) has been described in the literature for effective management of dilacerated root with the use of Controlled Memory (CM) files which have the capability of precurving, facilitating the negotiation of dilacerated canals[3]. This technique involves an outstroke activation of an engine-driven file only after it becomes fully engaged inside a patent canal. So, the first step is to passively insert an engine-driven file up to the curvature or first resistance, then as soon as the point of maximum engagement around an abrupt curvature is reached, it is activated by maintaining apical pressure and moved outwards. This is repeated again and again with slight apical advancements and irrigation in between, while tactile feedback from the canal anatomy is maintained throughout the shaping procedure. Finally, complete shaping will take place as there will be no engagement of file into the canal[3]. This case report presents the endodontic management of dilacerated maxillary first molar which was carried out using the TCA technique and CM wire files.

2. Case Report

A 21yearold male reported to the Outpatient Department of Conservative Dentistry and Endodontics with the chief complaint of pain in the right upper back tooth region for the past three days. On further questioning, patient

*Author for correspondence

revealed that sharp pain occurs after having cold food which lingers for more than half an hour. Medical history was non-contributory. On clinical examination, caries was noted with fractured composite restoration in relation to tooth number 16, which showed an exaggerated response on the cold test (Endo-Frost; Roeko, Langenau, Germany) examination. Anintra Oral Periapical Radiograph (IOPA) revealed caries approaching the distal horn of the pulp chamber with fractured restoration, the periapical tissues appeared to be normal. Also, it was observed that mesial root had severe curvature distally in the middle third whereas distal root had apical third curvature (Figure 1A). Based on the history, clinical examination and radiographic findings a diagnosis of symptomatic irreversible pulpitis was established and endodontic treatment was planned. Valid, informed consent for the treatment was obtained from the patient. 2% lidocaine hydrochloride with 1:80,000 epinephrine, (Lignospan Special, Septodont, Raigad, India) was administered and a rubber dam was applied. After the removal of old composite restoration, endodontic access was made using Endo access bur (Dentsply, Maillefer, Ballaigues, Switzerland). DG-16 endodontic explorer was used to locate all the root canal orifices. Under the magnification of loupes (Zumax medical co. Ltd, 2.5X), the MB2 canal was also located. Initially, #6 k file (Dentsply Maillefer, Ballaigues, Switzerland) was precurved at apical 2 mm and then introduced into the mesial canal to negotiate the curvature with slight apical pressure, thus canal patency was established and orientation of curvature was recorded. For cleaning the apical portion of curvature, short amplitude filing was done. Orifice enlargement was done with the use of orifice opener (25/12%, Hyflex EDM, Coltene/Whaledent, Altstätten, Switzerland, LOT - 15485). Sequential use of #8, #10, #15 k-file in balanced forced motion was done to obtain a glide path in the mesial canal. Then similar steps were followed to enlarge the canal to #15 k file size in all other canals. Working length was measured using an electronic apex locator (DentaportZX, J Morita, Kyoto, Japan) and confirmed with a periapical radiograph (Figure 1B).

A controlled memory Hyflex EDM glide path file (size 10/.05 taper) was pre-curved at 2 mm from the tip after mounting on the hand piece of an endodontic motor (NSK, Endomate DT, Japan) and used in passive TCA technique to negotiate the dilacerations till the desired working length. Thereafter, size 20/.05 taper and a size 25 One file were used at 400 rpm and maximum torque of 2.5 N/cm^2. Palatal canal was enlarged till 40/.04 taper size. Intermittent irrigation was done with sequential use of 3% NaOCl (Parcan, Septodont, Raigad, India) and 17% EDTA (Prime Dental Dentwash, Thane, India) with a 30 gauge needle under positive pressure. Final irrigation was done with 3% sodium hypochlorite and dynamic activation of irrigant was done by endoactivator (Dentsply Tulsa Dental Specialities, Tulsa, OK). Canals were dried with absorbent paper points. Master cone radiograph was taken (Figure 1C). Lentulo spiral was used to coat canal walls with epoxy resin sealer (AH Plus, Dentsply, Konstanz, Germany) and obturation done with lateral cold compaction technique (Figure 1D). Post endodontic restoration was done using composite resin (Filtek Z250 XT, 3M ESPE, St. Paul, MN). The patient was asymptomatic on 6 months follow up and normal periapical findings were observed in radiograph (Figure 1E).

3. Discussion

As expressed by Tomes, Dilaceration is a developmental anomaly in which there is an abrupt change in the axial inclination between the crown and the root of the tooth[4]. Dilacerated canal, Sshaped canal, gradual curvature of the root and sharp curvature in the apical third are amongst different types of curvatures in root canals[5].

The critical step for successful endodontic treatment is thorough cleaning and shaping of the canals. Root canals may have multiple curvatures along their length, which can pose a difficulty in root canal instrumentation and irrigation. Challenges in dilacerated root include accessing full length of canals without encountering a procedural error, maintaining the adequate working length while preparing to adequate size and finally obturating the canal to its full working length[6].

In the present case, curvature of 25-70 degrees (Schnieder method) is considered as dilaceration[7]. This case report presents endodontic management of a severely curved maxillary right first molar.

Endodontic case difficulty assessment has to be done by a thorough analysis of patient history and preoperative radiograph, which helps in the efficient treatment planning. Based on this, appropiate aramentarium and technique have to be chosen by the clinician[8]. A number of techniques and tools have been described in the literature for the management of dilacerated root

which includes modified access cavity preparations, coronal preflaring, use of precurved k-file, avoidance of superelastic Ni-Ti files, balanced forced technique with hand files[2,4]. Recently a novel technique TCA (Tactile Controlled Activation) has been described with the use of CM wire files. The advantages of this technique includes better predictablity and reproducibility[3].

The success of this technique lies in the unique physical properties of CM wire files. These files were found to be extremely flexible, fatigue resistant and without the tendency to restore themselves to their original linear shape. They can be precurved before entering into canals as they do not have restoring forces and thus facilitating their negotiation around abrupt curvatures without any transportation on external curvature[9]. Recently Hyflex EDM files have been introduced, which has advantage of high flexibility, increased cyclic fatigue and fracture resistance. Thus the number of files required for cleaning and shaping has been reduced without compromising the amount of preparation[10]. Thus in the present case Hyflex EDM file was chosen.

TCA instrumentation technique involves the passive insertion of the file into the canal around curvature, after that rotation of file is started at 400 rpm with slight apical pressure. As soon as it becomes fully engaged inside a patent canal outward activation is performed.

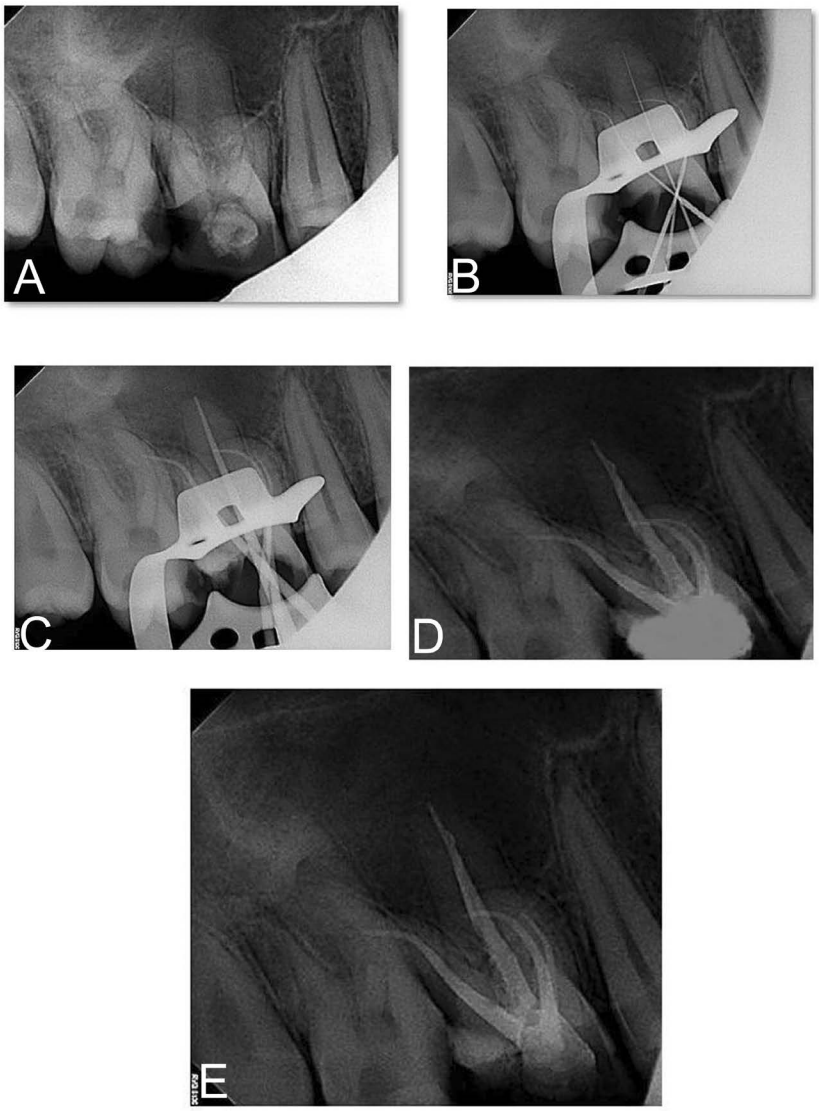


Figure 1. **A.** Pre operative radiograph depicting curved buccal roots of tooth #16. **B.** Working length, **C.** Master cone, **D.** Obturation, **E.** 6 months follow up radiograph.

The main aim of this technique is to minimize file engagement during curved canal management along with maintenance of continuous tactile feedback throughout the shaping procedure. Finally file moves throughout the canal without engagement upon activation[3].

Initially coronal shaping was performed, then negotiation of curvature was done using precurved stainless steel K-file (#6) in short amplitude pull technique and glide path was prepared using K-files (#8, 10, 15) in balanced forced motion till working length. The advantage is the negotiation of curvature with canal centering ability and less apical extrusion of debris[2]. Finally, canals were shaped using Hyflex EDM files with the TCA instrumentation technique. This has resulted in more easier, reproducible treatment and effective cleaning of the apical third of the root canal.

4. Conclusion

Along with thorough knowledge of root canal morphology, selection of the most appropriate instruments and techniques is required for the management of dilacerated root canals. In the present case report, a combination of traditional instrumentation and TCA technique was utilized for the mechanical preparation of a dilacerated tooth. With the use of CM wire files in this manner, biomechanical preparation was easier and efficient. Thus, the risk of iatrogenic errors is reduced, larger apical preparation can be achieved while maintaining the original canal trajectory.

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5. References

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