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MANAGEMENT OF DILACERATED ROOT CANAL - AN ENDODONTIST'S CHALLENGE

Dentistry

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ABSTRACT

Dilacerated root canals present significant challenges in endodontic therapy due to abrupt curvatures, increased risk of procedural errors, and difficulty in instrumentation. This case report describes the successful management of a severely dilacerated mandibular molar using careful radiographic assessment, glide path preparation, and flexible nickel–titanium rotary instruments. The case highlights the importance of proper diagnosis, modified access, and controlled instrumentation techniques in achieving favorable outcomes.

KEYWORDS

Dilaceration, Curved Canals, Endodontic Treatment, Niti Rotary Instruments, Glide Path.

INTRODUCTION

Dilaceration refers to an abnormal curvature or angulation in the root or crown of a tooth, often resulting from trauma during tooth development. In endodontics, such anatomical variations pose a significant challenge, increasing the risk of complications like ledge formation, canal transportation, instrument separation, and perforation.

Successful management requires:
- Accurate radiographic interpretation
- Use of flexible instruments
- Preservation of original canal anatomy

Case Report

A 46-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in the upper left posterior region for the past few days. The pain was spontaneous, intermittent, and aggravated on mastication.

Clinical Examination

Intraoral examination revealed:
- Distal caries in maxillary left first premolar (tooth 24)
- Mesial caries in maxillary left second premolar (tooth 25)
- Tooth 24 was tender on percussion
- No swelling or sinus tract was observed

The patient's medical history was non-contributory.

Radiographic Examination

Intraoral periapical radiograph showed:
- Deep carious lesion involving enamel, dentin, and pulp in relation to tooth 24
- Caries involving enamel and dentin in tooth 25
- Pronounced curvature in the apical third of the roots of tooth 24

Advanced Imaging (CBCT Findings)

To further evaluate the complex root canal morphology, cone-beam computed tomography (CBCT) was performed using Orthophos SL CBCT system.

CBCT analysis revealed:

- Severe dilaceration in the apical third of the root of tooth 24
- Abrupt curvature suggestive of high risk for procedural errors
- No evidence of root resorption or periapical radiolucency beyond initial changes

Diagnosis

Based on clinical and radiographic findings, a diagnosis of Symptomatic Apical Periodontitis in relation to tooth 24 was established.

Treatment plan :

The treatment plan consisted of root canal therapy with 25

After obtaining informed consent, the procedure was initiated under strict aseptic conditions. Local anesthesia was administered, and the tooth was isolated using a rubber dam. Access cavity preparation was performed in relation to tooth 24, ensuring adequate straight-line access while preserving tooth structure.

Initial canal negotiation was carried out using pre-curved stainless steel K-files (#8 and #10) to explore the canal anatomy and establish patency. Working length was determined using an electronic apex locator and subsequently confirmed radiographically.

Biomechanical preparation was initiated with small hand files (#10 and #15 K-files; Mani Inc., Japan) using a gentle watch-winding motion. Lubrication was achieved using 17% EDTA gel, followed by copious irrigation with normal saline and 3% sodium hypochlorite (NaOCl) to facilitate debridement and reduce friction.

Further canal preparation was performed using rotary nickel–titanium instruments (SS White® V-Taper™ 2H system). Sequential enlargement was carried out using #17 (4% taper), #20 (6% taper), and #25 (6% taper) files in a crown-down approach, ensuring minimal stress on the instrument and preservation of the original canal curvature.

Final apical preparation was completed using Cricendo rotary files (Cricdental, India) up to size 25 with 4% taper. Throughout the procedure, frequent irrigation with 3% NaOCl and recapitulation with small K-files were performed to maintain canal patency and prevent debris accumulation.

Following thorough cleaning and shaping, the canals were dried using sterile paper points, and calcium hydroxide was placed as an intracanal medicament. The access cavity was sealed with a temporary restorative material, and the patient was recalled after seven days.

At the subsequent visit, the patient was asymptomatic. The temporary restoration was removed, and the canals were irrigated with saline to remove the intracanal medicament, followed by drying with paper points.

Obturation was performed using a single cone technique with gutta-percha cones corresponding to size 25 and 4% taper, along with zinc oxide eugenol-based sealer. Post-obturation radiograph confirmed adequate filling of the canal while maintaining the original curvature.

Finally, the access cavity was restored with a composite restoration to ensure coronal seal and structural integrity.

Figure 1: Preoperative photograph tomography (CBCT)

Figure 2: Cone-beam computed

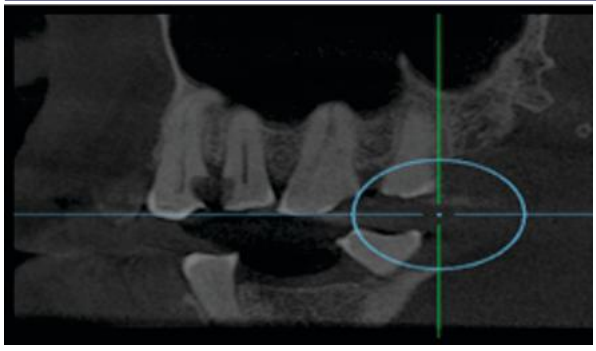

Figure 3: Access opening

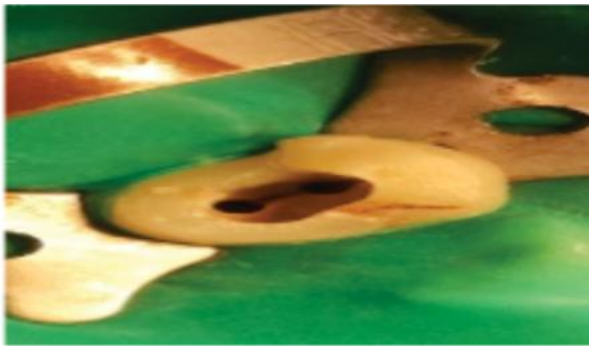

Figure 4: Working length determination

Figure 5: Master cone radiograph

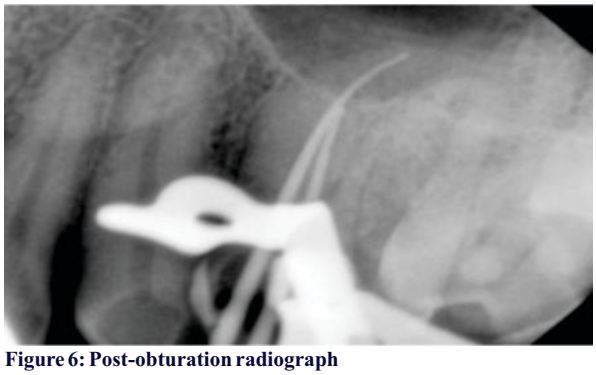

Figure 6: Post-obturation radiograph

DISCUSSION

The morphology of root canal system is usually quite complex and highly variable. In the presence of curvatures, it is very difficult to achieve a proper and complete cleaning and shaping of root canals.

A tooth may have a dilaceration towards mesial or distal direction, or there is a 90-degree angle or greater along the axis of the tooth or root, some authors defined dilaceration as a deviation from the normal axis of the tooth of 20 degrees or more in the apical part of the root.

Determining the direction of curvature will help in maintaining a continuous tapered shapes and prevents structural damage of the endodontic instruments.

Schneider suggested a method to calculate the degree of root curvature based on the angle that is obtained by two straight lines drawn along the flared root canals. And it is categorized as: Straight: 5° or less, Moderate: 10-20° and Severe: 25-70°.

According to Gunday et al, Schneider's technique emphasized more on canal curvature in coronal aspect, whereas long axis technique which is described by Hankins et al considered the apical curvature and does not consider overall root curvature.

According to Gutmann coronal pre-flaring helps in providing a glide path before rotary NiTi files are introduced for biomechanical preparation and also tactile control of the entire curved canal.Also pre flaring holds a greater volume of irrigant that enhance cleaning.

Pre-curving of all the hand instruments especially (K files) and use of smaller files (No. 6 or 8) facilitates easy negotiation of curved canal and reduce the amount of transportation to danger areas.

The balanced force technique is less likely to cause iatrogenic damage, decreases the extrusion of debris apically and maintains the instruments centrality within the root canal.

Ni-Ti alloys are comparatively softer than stainless steel, have a lower modulus of elasticity and are more resilient and show Shape memory and Super elasticity (SE).

The rotary files helps in flaring of coronal third and has advantages such as reduced coronal binding of the instruments, less apical extrusion of debris, and effective irrigation of apical third of the canal.

CONCLUSION

Severe root curvature may pose substantial difficulty in cleaning and shaping as well as obturation of the root canal.

A thorough knowledge about internal anatomy of the tooth, appropriate instrumentation techniques and customized treatment planning depending upon the degree of curvature will help manage curved canals, prevent complications and enhance the quality of the treatment.

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