

Endodontic Management of Mandibular First Molar Having Six Root Canals – A Case Report

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ABSTRACT

Introduction: Success in pulp space therapy is gained after thorough biomechanical preparation and obturation of the root canal system.

Case report: This clinical case describes the traditional root canal treatment of a rare root canal configuration of mandibular first molar with six root canals. A favourable outcome of endodontic treatment in teeth with abnormal morphology is less likely, if the clinician fails to recognize extra root canals through proper clinical and radiographic examination as well as use of dental operating microscope.

Conclusion: Clinicians should use increased magnification and advanced diagnostic aids, to ensure identification and management of additional canals.

Keywords: Six Root Canals, Rare Endodontic Morphology, Extra Canals, Mandibular First Molar

INTRODUCTION

The complexity of the root canal morphology, especially in posterior teeth which are multi-rooted, poses a challenge for precise diagnosis and successful endodontic therapy. Numerous case reports and studies have been published on the anatomic variations and abnormalities seen with the mandibular first molars.¹⁻⁷ As per conventional root canal morphology, mandibular first molars have two roots (mesial and distal) with two canals in the mesial root and one or two canals in the distal root. If an additional third root is present in permanent mandibular first or second molar, in a distolingual location it is known as Radix Entomolaris, and when an additional third molar is present in a mesiobuccal location, it is called Radix Paramolaris. Knowledge of such variations in the anatomy of roots and root canals and good pre-operative radiographs are crucial for successful endodontic management of patients in day-to-day clinic.

CASE REPORT

A 37-year-old male patient without a significant medical history was referred for the endodontic evaluation of left mandibular molar (tooth no 36) to the department of Conservative and Endodontics.

He complained of a localized, sharp shooting and momentary pain in his left lower jaw region since last 2 weeks, which aggravated on taking hot and cold food.

The clinical examination was performed and the tooth showed no signs of swelling and sinus tract was absent. The tooth was tender on percussion but there was absence of any tenderness on palpation or associated mobility. The pulp sensibility tests were performed using thermal and electrical pulp tests. The response was recorded as exaggerated,

suggestive of irreversible pulpitis.

On radiographic examination, there was a radiolucent lesion on disto-proximal side of the tooth, approximating the pulp, with presence of a fractured restorative material on the occlusal aspect.

No abnormality in the roots or root canal morphology was detected. According to clinical and radiographic examination, diagnosis of symptomatic irreversible pulpitis was made and endodontic therapy was advised.

Anaesthesia was achieved using 2% lignocaine with 1:80,000 adrenaline concentration and isolation of the tooth was done using rubber dam.

Caries was removed from the walls and access was gained to the cavity using endodontic access bur (Dentsply Maillefer). A straight line access was ensured, following which pulp chamber was thoroughly debrided using saline and 2.5% sodium hypochlorite solution.

The pulpal floor was carefully explored using endodontic explorer (DG 16 probe, Dentsply) and six canal orifices were detected, three canals on the mesial side were located (namely, mesiobuccal, middle mesial and mesiolingual) and three canals were located on distal side (namely, distobuccal, middle distal and distolingual). The root canals' patency was established using number 10 K-file (Mani, Inc. Japan).

The next step was to determine working length using an intraoral periapical radiograph. The radiograph revealed the presence of two mesial roots and one distal root and six canals, as shown in the figure.

The biomechanical preparation was done to ensure cleaning and shaping of the root canals. ProTaper rotary system (Maillefer, Dentsply) was used and the finishing was done with F2 file. EDTA was used to remove the smear layer and for the conditioning of the dentinal walls. Saline and 2.5% hypochlorite solution were used as irrigants to flush out any pulpal remnants, necrotic debris and disrupt bacterial

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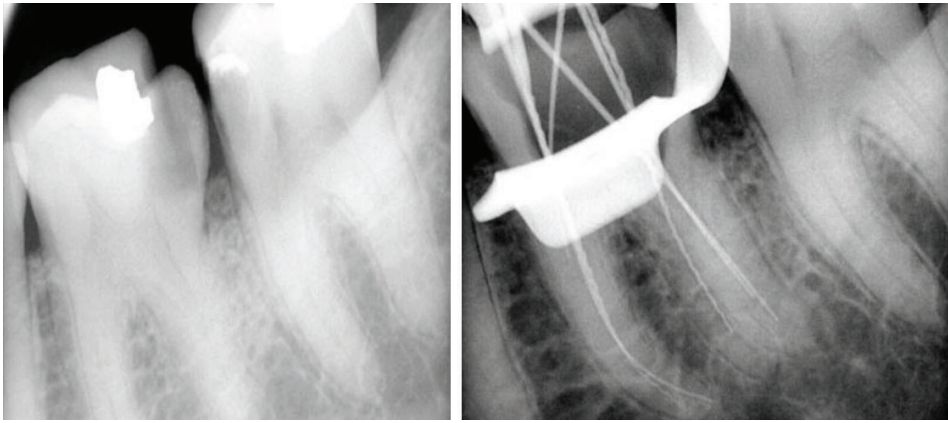


Figure-1: Pre operative radiograph, **Figure-2:** Working Length Estimation Radiograph

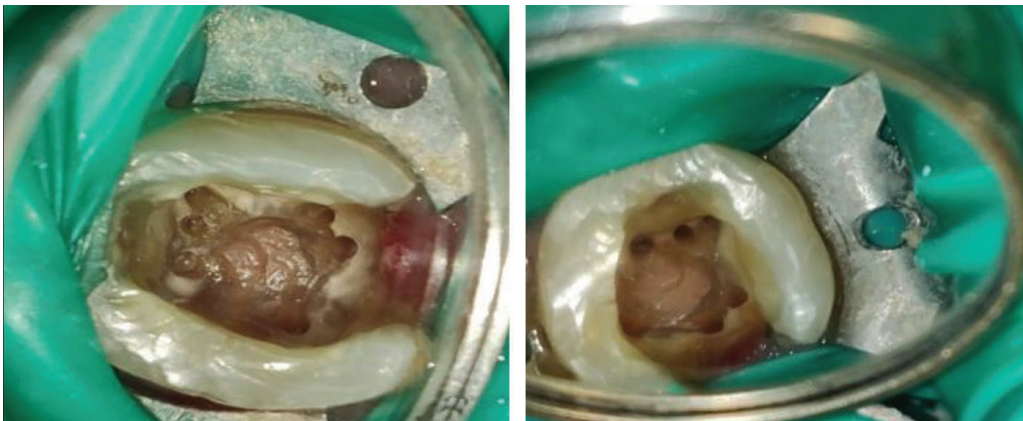


Figure-3 and 4: Clinical photograph depicting the six canal orifices (MB, MM, ML, DB, DM, DL)

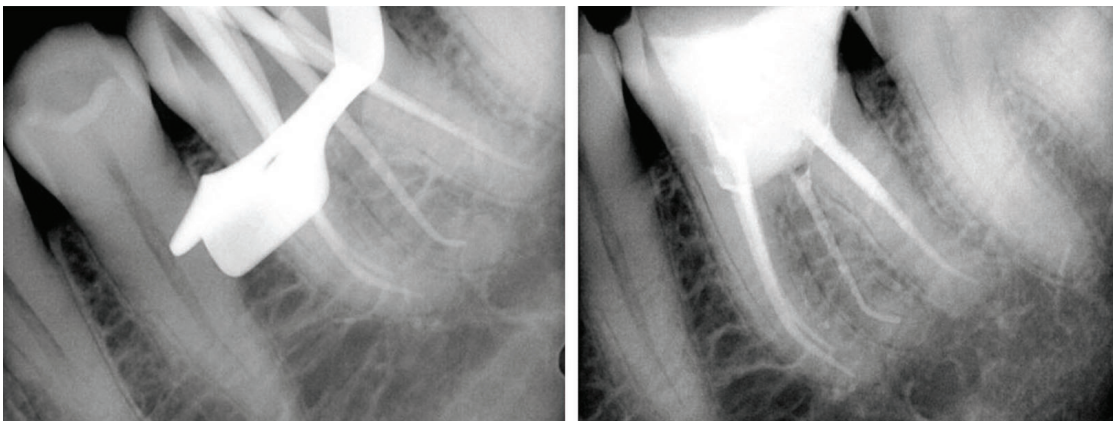


Figure-5: Master cone radiograph, **Figure-6:** Post obturation radiograph

biofilms.

Calcium hydroxide was used as an intracanal medicament and the cavity was temporized using zinc oxide eugenol cement.

The next visit was following 10 days. Once again, the tooth was isolated under rubber dam and the temporary filling material was removed. The intracanal medicament was removed using a number 25 K file and saline irrigation. The canals were once again flushed with 2.5% sodium hypochlorite solution to ensure sterility of the root canals and were thoroughly rinsed using saline.

The canals were dried using absorbent paper points and the master cone radiograph was taken to confirm the working

length.

Once the radiograph was obtained and working length and master apical cone size confirmed, ensuring that canals were dry, obturation was performed. ProTaper guttapercha cones (Dentsply) corresponding to F2 size were coated with calcium-hydroxide- based sealer (Seal Apex, Kerr Dental) and placed in the canals and sealed. Post-operative radiograph was then taken to assess the quality of obturation. Permanent glass ionomer cement restoration was then placed to ensure adequate coronal seal.

DISCUSSION

Clinicians should be well aware of the variations that are

possible in terms of the number of roots and root canals, before starting every case. There is enough evidence available to manifest that deviations in tooth morphology are not uncommon. Missed canals could be a clinical outcome of anatomic variations resulting in a treatment failure in considerable number of cases.

Rarely, the presence of Radix Entomolaris (RE) as well as Radix Paramolaris (RP) may be seen in mandibular molar teeth. Usually, the angle of curvature and size of these roots point towards more curved and smaller counterparts of the usual roots.⁸

Eventhough there is limited literature reporting the presence of middle distal canal in mandibular molars, studies have recorded the anatomic variation of the distal root with three discrete canals.

Presentation of three distal canals in mandibular first molar have been linked to ethnic diversities. According to J. Kottoor and colleagues, in Indian and Turkish population, it was found to be 1.7%, in Thai community it was recorded as 1.6%, while in Burmese public it was noted as 0.7% and a meagre 0.2% among Senegalese people.⁹

The success in detection of anomalies and complexities of the root canal, which could have been missed clinically, is directly related to adjuncts such as radiographs or other diagnostic aids.

Tagger et al suggests that clinicians should always suspect and strive to explore the presence of extra canals whenever the instrument showcases an aberrant deviation from the centre on deeper penetration.¹⁰

This case is a rare morphological alteration of Mandibular first molar with 3 distinct mesial and distal canals. Pre-operative radiograph helped in the location and confirmation of the extra roots and canals along with their paths, and divulged the presence of 3 roots and 6 canals.

However when radiographs are not lucid and direct vision not plausible, the usage of dental microscopes or magnifying loupes or/ and enhancement of colour contrast by means of dye is recommended.

CONCLUSION

Patients having teeth with morphological or anatomic variations might not be usual but it is imperative for a clinician to having an understanding about it to manage such cases successfully.

A thorough understanding of the root canal anatomy and identification of variations in location and number of canals combined with complete biomechanical preparation and indispensable use of irrigants ensure the success of a root canal procedure. A proper hermetic seal of canals obtained by obturation and a restoration ensuring coronal seal is very pivotal and contributes to the success of the treatment.

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