



## ENDODONTIC MANAGEMENT OF A MANDIBULAR MOLAR WITH A SINGLE ROOT AND SINGLE CANAL DIAGNOSED WITH THE AID OF CONE-BEAM COMPUTED TOMOGRAPHY.

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Article Received on 18/05/2016

Article Revised on 07/06/2016

Article Accepted on 28/06/2016

### ABSTRACT

The aim of this article is to present endodontic management of mandibular first molar with a single root and single root canal with the aid of cone beam computed tomography. The accurate diagnosis of this unusual morphology was made with the aid of multiple angulated radiographs and cone beam computed tomography followed by a planned endodontic treatment of the tooth.

**KEYWORDS:** Anatomical variation, CBCT, Mandibular first molar, Multiple pre-operative radiographs.

### INTRODUCTION

A thorough knowledge of root canal anatomy and an understanding of the potential for variations from the norm are essential for successful endodontic therapy.<sup>[1]</sup> The mandibular first molars are more commonly affected by dental caries and often require root canal therapy.<sup>[2]</sup> Normally, the permanent mandibular first molar exhibits two roots, one mesial with two root canals and one distal with one root canal.<sup>[3]</sup> Variations in the form, configuration and number of root and root canals in the mandibular molars have been reviewed and reported.<sup>[3,4]</sup> However, the clinician should be aware of the possibility of existence of lesser number of roots and root canals.<sup>[5]</sup>

Conventional intra-oral periapical radiographs are an important diagnostic tool for identifying root canal morphology. Recently, newer methods of diagnosis like Computed Tomography (CT), Spiral Computed Tomography (SCT), Helical Computed Tomography (HCT), and Cone-Beam Computed Tomography (CBCT) have been employed to overcome the limitations of radiographs by producing a 3-Dimensional image.<sup>[6,7]</sup>

This case report presents successful management of mandibular first molar with an unusual anatomy of single root and single canal and the use of CBCT to confirm the same.

### CASE REPORT

A 38-year-old female patient reported to the Department of Conservative Dentistry & Endodontics with the chief complaint of dull aching pain in right lower back tooth region since 1-month. The patient's medical history was non contributory. Past dental history revealed the patient had undergone amalgam restoration with 46, 47 a year back. Intraoral examination revealed a carious right mandibular first molar with previously existing amalgam restoration which had fractured on the buccal surface. The tooth had mild tenderness to percussion. The tooth was not mobile and periodontal probing around the tooth was within physiological limits. The tooth did not respond to electric and thermal pulp sensibility tests. A preoperative radiograph revealed a coronal disto-occlusal radiolucency involving the pulp space, widening of the periodontal ligament space, break in continuity of lamina dura with periapical radiolucency. The radiograph also revealed an unusual anatomy of involved tooth with a single root and a single canal (Fig.1 a). Multiple pre-operative radiographs at 20° mesial & distal angulations supported the presence of single root and a single canal. For further confirmation of this unusual morphology, the involved tooth was subjected to CBCT imaging. The tooth was focused, and the morphology was obtained in transverse, axial, and sagittal sections of 0.5- mm thickness. The scanned CBCT images also

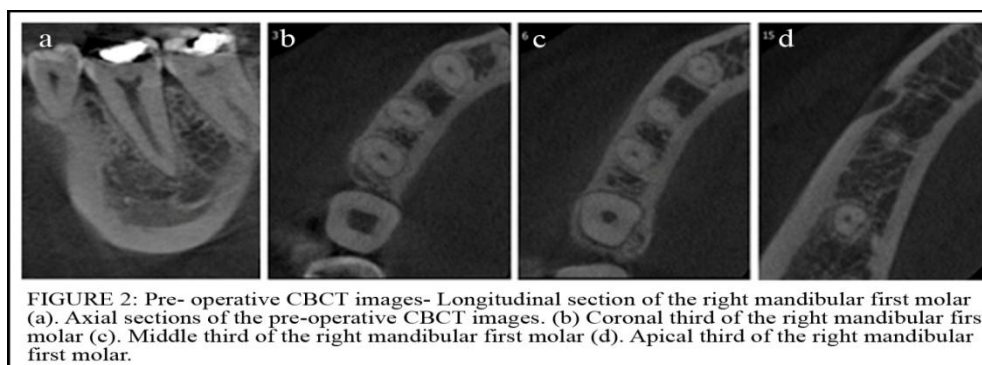
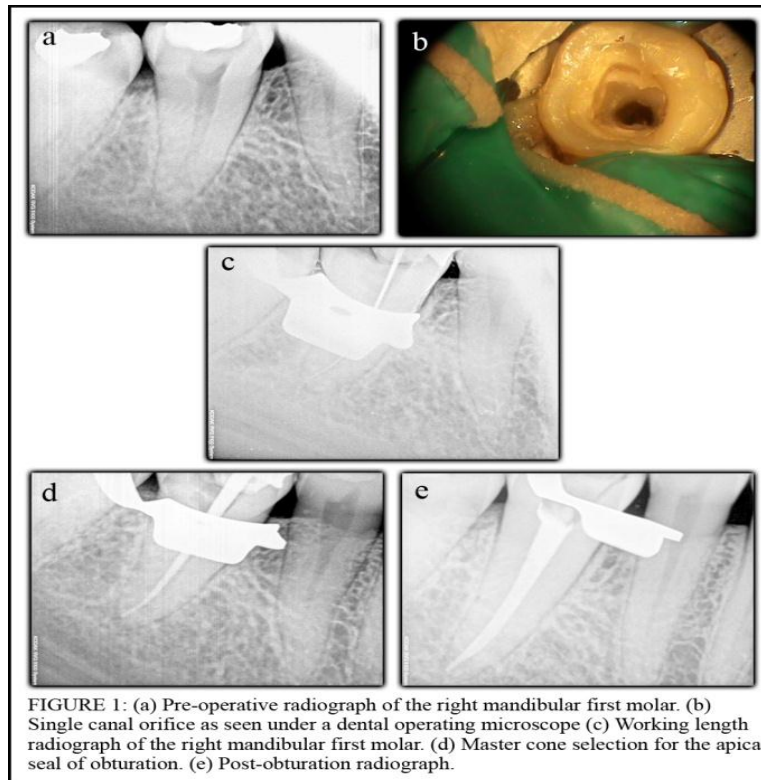
confirmed the presence of a single root and a single canal with single portal of exit. (Fig. 2)

From the clinical and radiographic findings, a diagnosis of chronic apical periodontitis was made, and root canal treatment was planned. Treatment was scheduled & initiated after obtaining written informed consent from the patient.

Local anesthesia was induced using 1.8mL 2% lidocaine with 1: 200,000 epinephrine (Xylocaine; AstraZeneca Pharma India Ltd.). Following caries excavation and removal of old restoration the buccal surface of the tooth was restored with resin composite (3M ESPE Dental Products, St. Paul, MN, USA). Rubber dam was placed, endodontic access opening was done with an Endo Access bur (Dentsply Tulsa, Tulsa, OK) under Dental Operating Microscope (Seiler Revelation, St. Louis, MO, USA) and a single large canal was located in the centre of the pulp (Fig. 1b). The working length was determined with the help of an apex locator (Root ZX; Morita,

Tokyo, Japan) and confirmed using a radiograph (Fig. 1c). Cleaning and shaping was done by crown-down technique using ProTaper nickel-titanium rotary instruments (Dentsply Maillefer) till F3 finishing file. Irrigation between each instrument was performed using 2.5% sodium hypochlorite solution, 17% ethylenediaminetetraacetic acid. Final irrigation was done with 2% chlorhexidine gluconate.

A master cone was selected and the fit was confirmed by a radiograph (Fig. 1d). The canals were dried with absorbent points (Dentsply Maillefer), and obturation was performed by a combination of warm vertical condensation and thermo plasticized injectable Gutta-percha (Obtura II, Obtura Corporation). A post-operative intra-oral periapical radiograph (Fig. 1e) was taken to ascertain obturation of root canal space. The tooth was then restored using posterior resin composite (P60; 3M Dental Products, St Paul, MN) and the patient was advised for full-crown restoration with the same.



## DISCUSSION

The mandibular first molar exhibits a variety of canal configuration.<sup>[5]</sup> Variations in the morphology caused by genetic and environmental factors have been well documented. Although extra roots and canals are no exception, the clinician should also be aware of the possibility of fewer roots and root canals than normal canal morphology.<sup>[4,5]</sup> The lower first molar erupts at the age of 6-7 years and apical closure is completed by 8-9 years. The completion of canal differentiation begins at about 3-6 years after root completion. Any disturbances during this phase contribute to varying canal anatomy.<sup>[8]</sup>

This paper presents an interesting case of single rooted, single canalled mandibular first molar as confirmed by axial CBCT sections. Periapical radiographs are limited in revealing the type of complex anatomy. More advanced imaging techniques like CBCT may aid in accurate diagnosis.<sup>[9]</sup>

The systemic review of literature on canal anatomy of mandibular first molar has not documented this type of rare morphology of single root and single canal.<sup>[10, 11]</sup> However, Reuben *et al*<sup>[12]</sup> reported only one case of single rooted, single canalled mandibular first molar amongst 125 samples in an Indian population study. Ioannidis<sup>[13]</sup> presented endodontic management of seven maxillary and mandibular molars with single root and single canal with the aid of CBCT.

Although pre-operative radiographs from 20° mesial-distal angulations enhances the chances to detect unusual canal morphology<sup>[14]</sup>, the complex anatomy of such teeth makes conventional root canal treatment challenging. The pre-operative CBCT was used as an important auxiliary resource in the diagnosis and treatment planning.

## CONCLUSION

This paper presents successful management of an unusual case of mandibular first molar with a single root and single canal.

The aberrations in the morphology of root may not always be in the form of extra roots or extra canals, but can also be in the form of fewer roots and canals. This paper also highlights the use of CBCT as an important tool to ascertain root canal morphology.

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