

Endodontic Management of Mandibular Second Molar Tooth with Anomalous Root Canal Morphology & Variation: A Case Report

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Abstract:

Background: This clinical work was performed to present a less common anatomical configuration with anomalous curvature of mandibular second molar with four canals.

Materials and Methods: Endodontic treatment of a carious symptomatic mandibular second molar tooth with irreversible pulpitis was performed by confirming anatomical configuration with a cone beam computed tomography (CBCT) image analysis.

Results: By performing cone beam analysis of mandibular second molar tooth described here, showed the presence of two mature normal length roots with double curvature and four root canals.

Conclusion: A configuration with four root canals and double curvature in mandibular second molar tooth is a less common finding which possesses challenge to a clinician. But with the aid of recent advancements in radiodiagnosis like CBCT image analysis, the four canals with anomalous canal curvature were detected and subsequent endodontic management could be performed.

Key Word: Mandibular second molar tooth, Anatomical variation, C-shaped canals, CBCT

Date of Submission: 12-04-2023

Date of Acceptance: 25-04-2023

I. Introduction

Any tooth can have anatomic variation but with knowledge of typical morphology and their variations during root canal therapy helps to enhance the chance of successful treatment¹. Mandibular second molars usually have two roots with three root canals, two in the mesial root and one in the distal root; however, these teeth can present severe anatomical variations, such as the presence of three canals in the mesial root, two canals in the distal root, or supernumerary roots².

The clinical relevance or the main purpose of this case report is to report a less common case of mandibular second molar tooth with double curvature and four root canals, namely one mesiolingual, one mesiobuccal, one distolingual and one distobuccal which were analysed by performing CBCT image analysis.

II. Case Report

A 50 yrs old male patient was referred to the Department of Conservative Dentistry and Endodontics of the Dr. R. Ahmed Dental College and Hospital for endodontic evaluation and management. The patient had a chief complaint of spontaneous pain in the mandibular left side, radiating from the mandibular incisors to the left ear. His medical history had no relevant contribution. An IOPAR (intraoral periapical radiograph) radiographic examination revealed a restorative filling in the distal and occlusal surfaces of the crown of tooth 36 (mandibular left first molar) and deep carious lesion in the mesial and occlusal surfaces of the crown of tooth 37 (mandibular left second molar) (Fig. 2).

The reaction to the cold sensibility test was an intense pain that remained for more than one minute on tooth 37. The other teeth on the lower left side, including tooth 36, had a normal response to the pulp sensibility test and all had a negative percussion test. The diagnosis was irreversible pulpitis with respect to tooth 37 and on

CBCT image analysis (Fig. 1), roots with double curvature and four root canals, namely one mesiolingual, one mesiobuccal, one distolingual and one distobuccal were evident. The clinical condition was explained to the patient. Endodontic treatment was proposed and accepted.

The tooth was anaesthetized with a mandibular block infiltration using 1.8 ml of 2% lignocaine with 1:80,000 epinephrine (Indoco remedies ltd.,India), proper rubber dam isolation was obtained, and the access cavity was prepared. After canal identification and negotiation, the working Length (W.L.), was determined by an electronic apex locator (Root Zx II, Morita, USA) (Fig. 3A). Mechanical instrumentation of the root canals was performed with Hiflex-CM NiTi rotary files (Coltene,USA) according to the manufacturer's instructions. During instrumentation a copious irrigation with 5.25% sodium hypochlorite was done.

Because of the time limitations, the therapy was accomplished in two appointments. After the bio-mechanical preparation, the root canals were dried with paper points and a paste of calcium hydroxide (Ultracal, Ultradent, USA) was used as intracanal medication. Cavit (Cavit W, 3M ESPE, Germany) was used as a provisional restorative filling between the two visits.

At the second appointment, a final irrigation protocol including 17% EDTA irrigation for one minute and one last rinse with 5.25% sodium hypochlorite followed by normal saline was performed and the canals were dried. Gutta-percha master points, master apical cone (M.A.C.) were adapted and root canal lengths were confirmed by a radiograph (Fig. 3B). AH plus (AH Plus, Dentsply, Germany) was used as sealer. The obturation technique chosen was the continuous wave of condensation technique (System B, Sybron Endo, USA, and Obtura II, Obtura Spartan, USA) (Fig. 3C). The final periapical radiograph showed the presence of four root canals, two for each mesial and roots respectively (Fig. 3C). The pulp chamber was restored provisionally with Cavit temporary filling and the patient was scheduled for a permanent restoration.

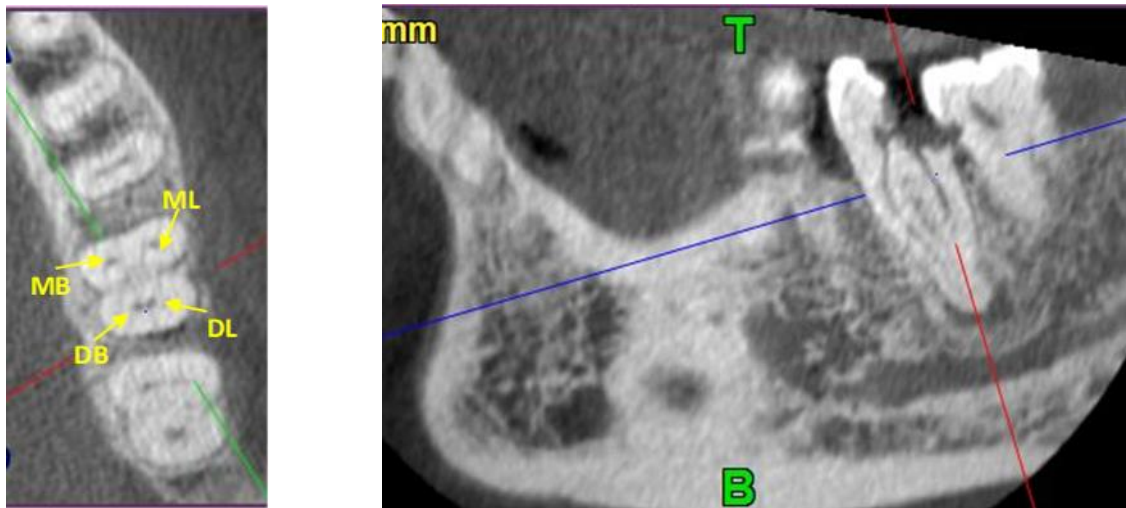


Fig1 : CBCT IMAGE OF MANDIBULAR SECOND MOLAR(#37)



Fig2 : IOPAR OF MANDIBULAR SECOND MOLAR(#37)

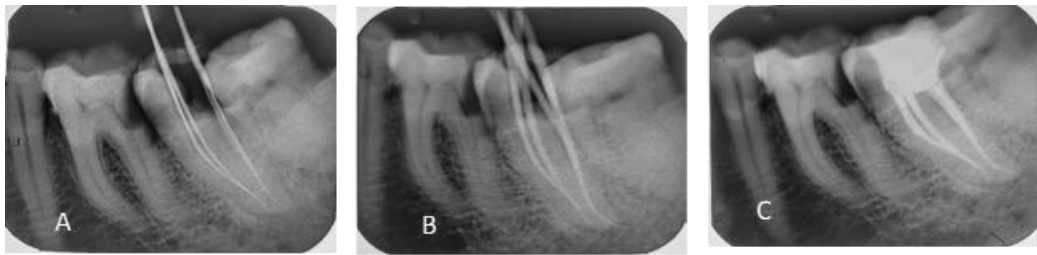


Fig3: Endodontic Treatment Procedure- A)W.L.; B)M.A.C.; C)Post-OP

III. Result

In this case report, the endodontic management of a symptomatic irreversible pulpitis of left mandibular second molar tooth with anomalous root curvature and configuration was treated by performing root canal treatment. The post treatment CBCT image (Fig.4) and follow-up was done which confirmed the absence of any periradicular pathology and also, the treated case was asymptomatic in subsequent recall visits.

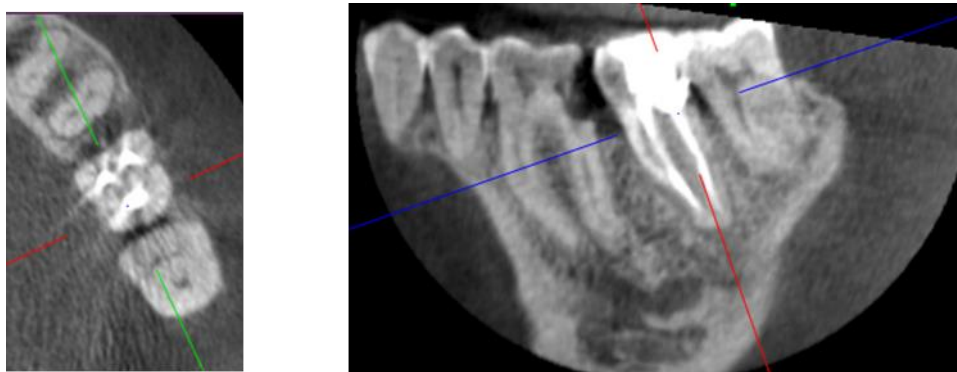


Fig.4: Post-op CBCT

IV. Discussion

The development and formation of one or more than one root is established during the embryological phase of root development. Embryologically, in the bell stage of tooth development, the inner and outer epithelium proliferate to meet at a point called cervical loop, from which Hertwig's horizontal root sheath develops. At the apical end, Hertwig's root sheath bends forming a collar-like structure. This collar like structure grows apically like a tube around the developing pulp in single rooted teeth. But in case of multirooted teeth, the cells of Hertwig's root sheath grow towards centre to meet each other, dividing the initial single collar into several collars, each one for each root.³ In four rooted teeth there is development and formation of four collars by the invagination of epithelium. The mandibular second molar have several anatomical configurations, that have been reported in literature.

A C-shaped configuration is within the anatomical variants that can be found on second molars, this was first described in 1979, by Cooke and Cox⁴ as a consequence of an alteration in root development due to the lack of fusion of the Hertwig's root epithelial sheath of the vestibular or lingual side⁵. The C-shaped anatomical configuration can be as a single ribbon or an isthmus connecting individual root canals^{6,7}. Some studies reported C-shaped root canal prevalence between 2.7% to 8%, more frequent in the Asian population or white race. This variation seems to be associated with their ethnic^{5,7}. Seo and Park observed that these root canals have a high possibility of splitting into two or three canals in the apical third, so this particular canal anatomy is not predictable based only on the shape of the pulp chamber⁸.

On the other hand, mandibular second molars can have root number variations with a supernumerary root. When this additional root is located in a disto-lingual side it is called radix entomolaris, and if is located on the mesio-buccal side it is called radix paramolaris⁹.

In endodontics, one of the best methods for an accurate identification of morphology is CBCT, which allows the endodontist or clinician to make better diagnoses with decision-making before starting the treatment.

This accurate tool offers three planes of analysis of the teeth with more reliable images, compared to a periapical or panoramic radiograph^{10,11}.

The present reported case of mandibular second molar tooth with double curvature and four root canals, namely one mesiolingual, one mesiobuccal, one distolingual and one distobuccal which was analysed by performing CBCT image analysis, has been described as less common in occurrence¹².

V. Conclusion

The mandibular second molar tooth with four canal configuration is low in occurrence in daily scenario. But with the aid of CBCT, this type of clinical condition with the described features may help the clinician to get a desirable outcome after endodontic treatment.

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Dr. Baishakhi Sarkar, et. al.” Endodontic Management of Mandibular Second Molar Tooth With Anomalous Root Canal Morphology & Variation: A Case Report.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 22(4), 2023, pp. 49-52.