

ENDODONTIC MANAGEMENT OF A RARE CASE OF MANDIBULAR SECOND MOLAR WITH SINGLE ROOT AND SINGLE CANAL: A CASE REPORT**Dr. Damini Vilas Patil***

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ABSTRACT

Background: The root canals of mandibular molar teeth show a wide variation in their system ranging from single to multiple canals. A thorough understanding of the variations present in the internal anatomy of teeth is imperative for a favorable outcome of endodontic treatment. The tooth morphology should access the variations present related to its root structure, shape, and information regarding the root canal. Before commencing the endodontic treatment, assess the number of orifices and canal configuration. **Case Presentation:** This case report explains the diagnosis and management of a mandibular second molar, the unusual root canal configuration with one canal in a single conical root. Following the case, clinical and radiographic examinations established a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis of tooth #47. Root canal treatment followed, and planned a crown. **Conclusion:** Knowledge of the number of root canals present within the tooth is imperative for successful root canal treatment. Some teeth may show extra canals, while others may show fewer than an average number of canals. Mandibular second molar may present with a single canal and should promptly recognize this. Single canal identification helps conserve the tooth structure by searching for an extra canal, eliminating the need to remove excessive tooth structure.

KEYWORDS: Mandibular second molar, Root canal variations, Single canal, Single Root, One canal.**INTRODUCTION**

The successful outcome of root canal treatment is determined by the awareness, knowledge, and thorough cleaning and shaping of the root canals before the root canal filling. Like the number of root canals, the number of roots may also vary.^[1] This task requires detailed knowledge of pulp space anatomy, including expected and less usual canal morphology. During root canal treatment, variations such as additional canals, bifurcations/trifurcations, lateral and furcal canals, apical deltas, and ramifications in the canals are frequently encountered during root canal treatment. Their occurrence and clinical significance have been reported before.^[2,3] Due to their complex and variable pulpal space anatomy, it is not uncommon to overlook part of this anatomy during the biomechanical preparation phase^[4], which resulted in the emergence of the endodontic disease.^[5]

Studies conducted by Verucci and Weine et al. used clearing and radiographic techniques to evaluate the root canal morphology of the mandibular second molar tooth.^[6,7]

Mandibular second molar tooth most commonly has mesial and distal roots, with two mesial canals

(mesiobuccal and mesiolingual) and one distal canal.^[6,7,8] Nevertheless, other configurations have been reported in mandibular second molar teeth, such as four canals, two canals, a C-shaped canal, taurodontism, and one canal in a single root.^[6-10] According to Vertucci FJ, the second mandibular molar is nearly the same as the first mandibular molar, with only difference observed in root length (shorter) and canal curvatures (more curved).^[11] Mandibular second molars generally present with two distinct roots, mesial and distal roots. The mesial root mainly offers two canals and a distal root with one or two canals. It should be promptly recognized as it may affect the outcome of the endodontic treatment.^[12]

Maggiore C et al. (1998) reported that the lower second molar could range from one to three roots.^[13] Manning SA (1990) studied the morphology of the second molar and reported an incidence of a single root in 22%, two roots in 76%, and three roots in 2 % of the teeth examined.^[14,15] Weine F.S et al. (1988) studied the mandibular second molar extensively for canal variation. He stated that this tooth is most common among the entire molar to show the anatomical variation. He reported a single canal in only 1.3% of the cases. Though present, single Root and Single canal is an unusual and rare occurrence in the mandibular second molar.^[7]

This case report aimed to describe the diagnosis and management of a rare canal configuration of a mandibular second molar, showing one canal in a single root that required endodontic therapy.

CASE REPORT

A 27-year-old male patient reported to the dental OPD with a complaint of pain in the lower right back region of the jaw from the past ten days. The pain was localized, sharp, and constant type. It got aggravated on intake of cold and associated with posture and relieved on medication intake. There was no history of swelling, pus discharge, or fever. His medical history was not significant. No significant findings were found on extraoral examination. Oral examination revealed tooth # 47 with deep occlusal caries. On the cold test application to the tooth, the patient responded with severe prolonged pain compared to adjacent teeth. Tooth #47 was tender to percussion but usually responded to palpation and bite tests. The preoperative periapical radiographs (Figure-1) demonstrated the presence of one large canal along with one conical root, and a slight widening of the periodontal ligament space around the apex of tooth #47 was seen radiographically. A diagnosis of the case was made as symptomatic irreversible pulpitis with symptomatic apical periodontitis of tooth # 47 and planned the root canal treatment followed by crown placement.



Figure 1: Pre-Operative Radiograph.

The treatment was then initiated; right IANB anaesthesia was injected with 2% lignocaine with 1:100,000 adrenaline. A rubber dam was used to isolate a single tooth. Excavation of the caries was done with tooth # 47. Access cavity preparation was done with BR-45 (Mani Inc, Japan) round bur and modified using EX-24 (Mani Inc, Japan). Pulp tissue on the floor was removed, and canal was copiously irrigated with 5.25% NaOCl (Prime Dental Products Private Limited, India) for hemostasis. On inspection of the pulpal floor with an endodontic explorer, a single round orifice was seen at the centre of the floor of pulp chamber. (Fig. 2).



Figure 2: Access cavity preparation shows the presence of one large root canal located in the centre of the pulp chamber.

Cavity walls were extended slightly to check for any other canal, but only a single canal was present. The canal patency was obtained using a no. 10 K- file. Numerous angulated radiographs were obtained to assure the presence of a single independent canal. The working length (WL) was determined using a 20K file attached to the apex locator and confirmed using digital radiographs (Fig. 3). The files of sizes 10 and 15K were then pre-curved and placed on the wall of the canal to further investigate the internal anatomy.

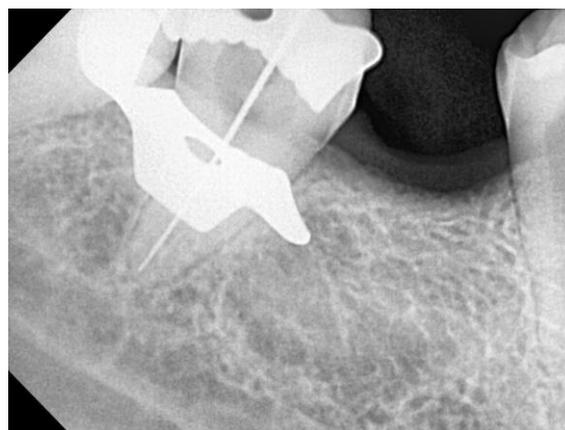


Figure 3: Working length determination radiograph.

Individual canal preparation was carried out using Neohybrid Rotary Files (Neoendo, Orikam Healthcare Solutions, India) till #25/0.06%. The cleaning and shaping procedure was performed with EDTA gel (Glyde File Prep; Dentsply Maillefer, Ballaigues, Switzerland) as a lubricant, and a 5.25% NaOCl solution was used for the irrigation of the canal. Recapitulation and verification of canal patency were frequently performed during this procedure. Final irrigation was performed using 17% EDTA (Prime Dental Products Private Limited, India), after which the canal was dried using sterile absorbent paper points. The snug fit of an F2 master gutta-percha cone was evaluated radiographically (Fig. 4).

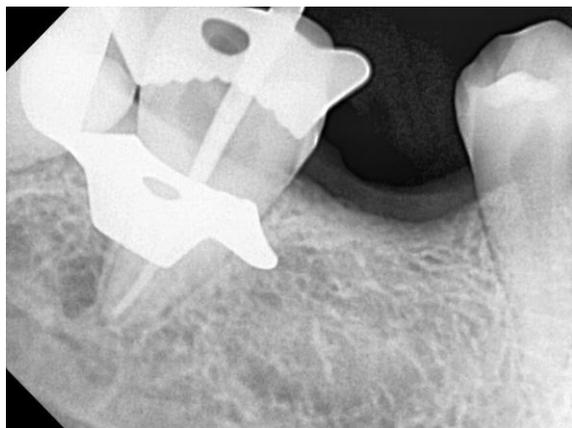


Figure 4: Master cone selection radiograph.

The canal was then obturated with gutta-percha cone and AH Plus sealer (Dentsply Maillefer) using a cold lateral compaction technique (Fig. 5).



Figure 5: Post Obturation Radiograph.

The pulp chamber was then cleansed using a cotton pellet moistened with alcohol, after which the access cavity was temporized with Cavit. After one week, the patient reported after complete resolution of the symptoms. The tooth was restored using post-retained composite build-up and then referred for the fabrication of a full-coverage restoration. The patient gave his informed consent for the publication of this case.

DISCUSSION

The endodontic therapies of multi-rooted teeth are often challenging, mainly due to countless variations of root canal systems. The knowledge of this complex root canal morphology is essential for the success of endodontic therapy since missing even one canal can lead to failure.^[16] The diversities in multi-rooted teeth are seen in several roots, root canals, ramifications, and apical deltas.^[17] The pattern of such complexity is determined by the individual's age, sex, and ethnicity.

In case of mandibular molars, mandibular 2nd molar shows more variation than mandibular 1st molar. One of the deviations includes a fusion of roots. The external morphology of mandibular 2nd molars seems to be

conical or square-shaped. The buccal or lingual aspect of fused roots shows the presence of radicular grooves. The extensions and depth of grooves decide the internal canal anatomy. A single wide canal is expected if the groove is shallow, whereas if the groove is deep, C-shaped anatomy is expected.^[18]

Previous studies conducted on the root canal anatomy of mandibular second molars confirmed the rare occurrence of our reported case. For instance, such observation was not documented in earlier studies among American^[6], Turkish^[19], Thai^[20], Malaysian^[21], and even Saudi Arabian populations.^[22] Weine et al., Demirbuga et al., and Gulabivala et al. reported a low prevalence rate of 1.3%, 2.1%, and 2.2% among American, Turkish, and Burmese populations, respectively.^[7,23,24] Rahimi et al. evaluated the root canal configuration amongst Iranian subpopulations of mandibular second molar using a clearing technique. In their study, 4.3% of the teeth demonstrated the presence of the Vertucci Type I configuration discussed in this case report.^[25] Panciera & Milano found 6 out of 102 (5.88%) mandibular 2nd molars having a single root and single root canal.^[26] The present two cases also showed single root and single canal configurations. Sabala et al. stated that "the rarer the aberration, the more likely it is bilateral."^[27] Hence suspecting similar morphology on the contralateral side, evaluated a periapical radiograph. But found no such configuration on the contralateral side.^[28] The information obtained from the different studies on root canal anatomy of teeth has important clinical implications. While some the endodontic procedural errors are encountered during the search for missing or additional root canals, these mistakes can be minimized if the clinician has a knowledge of the location and the pulp chamber dimension as well as an understanding of the usual and less frequent root canal configurations.^[29]

For the diagnosis of such cases, a periapical radiograph is commonly used. However, the limitation of such 2D vision is well documented. 3D radiography, such as CBCT, allows studying external and internal morphology. With the aid of CBCT, the differentiation of a shallow groove with a single wide canal and a deeper groove with a c-shaped canal is possible. In search of a canal in a fused molar, the possibility of perforation is higher. It can be eliminated with proper illumination and magnification and minimally invasive technique.^[30,31,32] Since the canal is wider and tapering; the chemo-mechanical preparation should be such that it should be able to eliminate all the debris. The obturation technique used can be cold lateral condensation, warm lateral, and thermo-plasticized techniques. The thermo-plasticized gutta-percha offers better adaption to canal irregularity; however, in the present case, conventional gold standard lateral condensation has been used for obturation.

CONCLUSION

This case report presented the endodontic management of the unusual root canal configuration of a mandibular second molar, a single root canal from an orifice to an apex. This report highlighted the importance of radiographic examination and careful intraoperative exploration as the main cornerstones in investigating pulp space anatomy. Clinicians need to employ the diagnostic and therapeutic tools available at their disposal in order to optimize the quality of care provided to their patients. Furthermore, clinicians should be aware of the knowledge of the number of root canals present within the tooth is imperative for successful root canal treatment. Some teeth may show extra canals, while others may show fewer than a normal number of canals present. Mandibular second molar may present with a single canal, and this should be promptly recognized. Single canal identification helps to conserve the tooth structure by eliminating the need for the removal of excessive tooth structure in search of an extra canal.

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