

# The Mandibular First Molar with Three Canals in the Mesial Root- A Case Report

MOHANAVELU DEEPALAKSHMI, RAMACHANDRAN ANUPAMA, HIDAYATHULLA  
SULTHAN IBRAHIM RAJA KHAN, KUMARAPPAN SENTHIL KUMAR

## ABSTRACT

The dynamic concept of the root canal system, which describes a variable morphology of the multiple root canals which are interconnected by anastomoses, has been established as the prevailing state in the mandibular molars. The aim of this case report was to describe the unusual root canal anatomy that was detected in

the mandibular first molar during the routine endodontic treatment. The clinical and the radiographic examinations allowed the detection of the middle mesial root canal between the mesiobuccal and the mesiolingual root canals. This report highlights the importance of such examinations and the need to find and treat the additional canals, to achieve a successful endodontic treatment.

**Key Words:** Middle mesial root canal, Mandibular first molar, Mesial root

## INTRODUCTION

A successful endodontic treatment involves an accurate diagnosis, a good understanding of the biological principles and an excellent execution of the treatment. The variations of teeth have been of an enduring interest to the clinical practitioners and no two teeth are alike. The variations of teeth are normal and it is imperative that the clinicians have a comprehensive knowledge of the root canal anatomy, to locate and treat this anatomy [1].

The mandibular first molars are the first permanent teeth to erupt and most often, they require endodontic treatment. The mandibular first molars normally have two roots, one mesial and one distal, with two canals in the mesial root and with one or two canals in the distal root. The literature is replete with a number of reports on the anatomic variations and the abnormalities which are associated with the first mandibular molars. The variations in the canals include C-shaped canals, 5 canals, 6 canals and 7 canals [2-6].

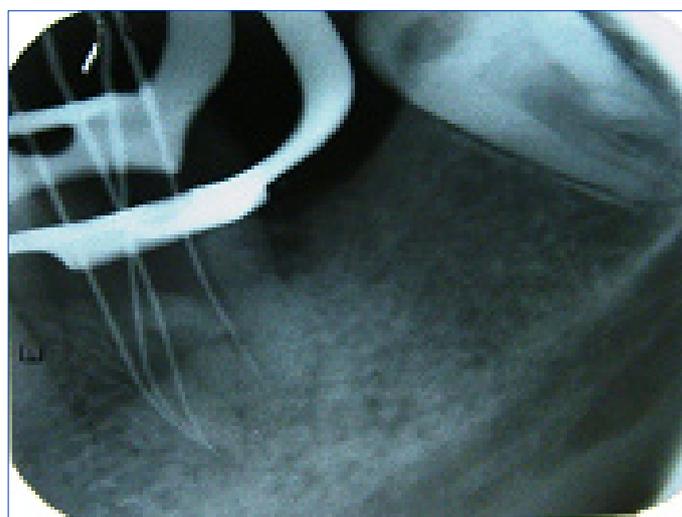
This case report has described the endodontic therapy of a permanent mandibular first molar with 3 canals in the mesial root.

## CASE REPORT

A 33-years-old female presented to the Department of Endodontics with pain in the right mandibular first molar, which was there for the past 3 months. Her clinical examination revealed a deep carious lesion in the same tooth. A preoperative radiographic evaluation of the involved tooth indicated caries which approximated the pulp with the normal root canal anatomy and widening of the periodontal ligament space [Table/Fig -1]. The clinical and radiographic findings led to a diagnosis of apical periodontitis, for which a nonsurgical endodontic therapy was attempted. The patient's medical history was found to be noncontributory. The tooth was anaesthetized by using 2% lidocaine with 1:80,000 adrenaline (Lignox, Indoco Remedies Ltd, Mumbai, India). After its isolation by using a rubber dam, an access cavity was established with a straight line access by using an access cavity bur (Dentsply Maillefer, Ballaigues, Switzerland). A clinical inspection of the pulp chamber under magnifying loupes (Seiler loupes, 3.5X magnification) revealed 3 orifices (two mesial and one distal). On explora-

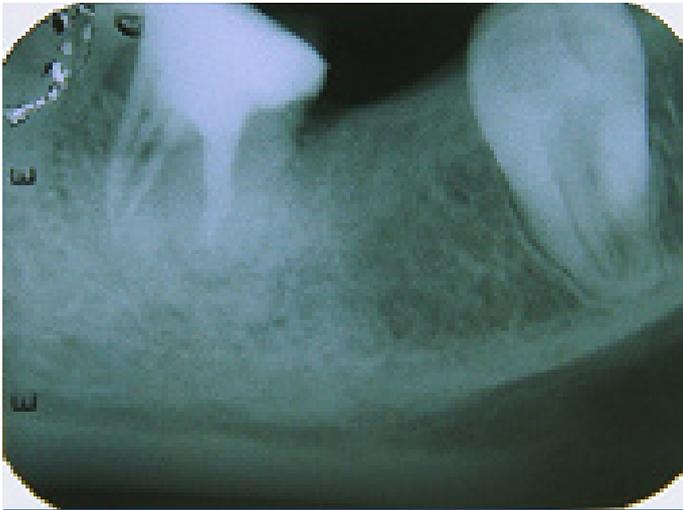


[Table/Fig-1]: Pre-Operative Radiograph

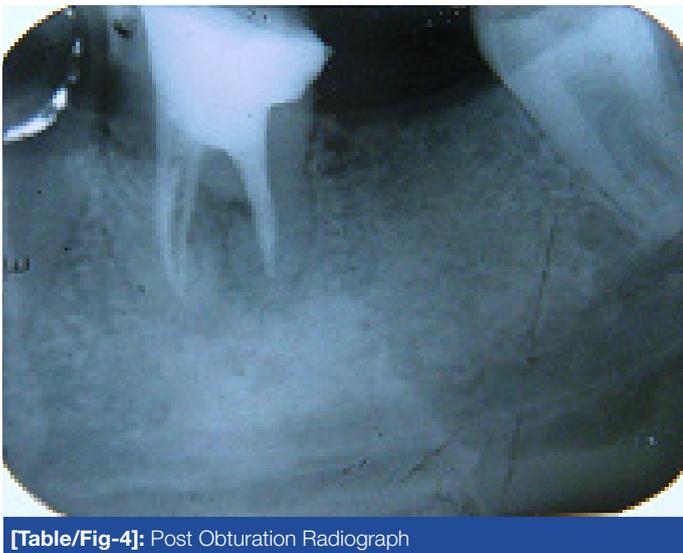


[Table/Fig-2]: Working Length

tion of the mesial canal orifices and their interconnecting groove by using an endodontic explorer, a "catch" was encountered. The canals were explored by using a #10 K-file (Mani, Inc; Tochigi,



[Table/Fig-3]: Post Obturation Radiograph



[Table/Fig-4]: Post Obturation Radiograph

Japan). The working length radiograph confirmed the presence of 4 distinct orifices and 3 apical terminations [Table/Fig-2]. A middle mesial canal orifice was found, which was equidistant between the mesiolingual and the mesiobuccal canal orifices. Totally, there were 4 distinct orifices - 3 which were located mesially (mesiobuccal, middle mesial and mesiolingual) and 1 which was located distally. According to Pomeranz's classification, the middle mesial canal was classified as confluent. The middle mesial canal originated as a separate orifice but it joined in the apical third of the mesio buccal canal (additional type 3-2).

A chemo mechanical preparation was performed by using the crown down technique with Protaper nickel-titanium rotary instruments (Maillefer, Dentsply, Ballaigues, Switzerland), under irrigation with 5% sodium hypochlorite and EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland). The root canals were dried with paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and they were obturated with cold, laterally condensed gutta-percha (Maillefer, Dentsply, Ballaigues, Switzerland) and a resin sealer (AH plus sealer - Maillefer, Dentsply, Ballaigues, Switzerland). The post obturation radiograph confirmed the presence of three distinct orifices with two separate apical terminations of the mesial canals [Table/Fig -3 & 4].

## DISCUSSION

Successful endodontic therapies depend on many factors, the most important step being a sound background knowledge of the internal anatomy of teeth. It is essential, because this initial step

influences and determines the efficacy of all the subsequent procedures, which include canal location mechanical debridement, creation of space for the medicament delivery, and optimized canal geometries for an adequate obturation [7].

Numerous studies which were done in the past decades have described the morphology of teeth, which include the mandibular molars. The morphology of the mesial root canals in the mandibular molars is complex and difficult to find, with a high frequency of inter-canal communications and/or isthmuses [4,8]. The presence of a third canal (middle mesial) in the mesial root of the mandibular molars has been reported to have an incidence of 0.95-15% [5,6]. According to Pomeranz, the mesial canal is called as independent when a distinct coronal orifice and apical foramen are observed, (or) as confluent when it converges to one of the other two main canals and terminates at a common foramen [9]. In most of the clinical cases which were reported, the middle mesial canal joined the mesiobuccal or the mesiolingual canal in the apical third. However, few cases that had three independent canals in their mesial root, have been reported [3-13].

The root canal morphology changes as the teeth develop. The prevalence of intercanal communications was low at the young and old ages, but it was high at the intermediate ages. In general, young individuals have single large root canals and with age, the deposition of secondary dentin results in the formation of partitions which often cause extensive differentiation, resulting in the development of separate canals and transverse connecting systems [14]. The mesial roots of the mandibular first and the second molars had mostly one large canal until 11 and 15 years of age; due to secondary dentine depositions at 30-40 years of age, the canal system in the apical and the middle third of the root was completely established. In this present case, a failure to recognize the middle mesial canal might have resulted in an incomplete treatment and an endodontic failure. A prudent pulp chamber floor can alert the presence of variations. The classical 'white line' between the mesiobuccal and mesiolingual orifices should invite further exploration in this area. This area can be chased and subsequently explored with small hand files for a 'catch', which can lead to a successful treatment [14].

Over the past 20 years, numerous articles have appeared in the endodontic literature, which have suggested that the middle mesial canal is an anomalous condition. The recent articles, however, have demonstrated that the "middle mesial canal is a reality rather than an anomaly". By removing this additional tissue from the root canal system, the clinicians may be able to increase the success rate of the endodontic therapy.

## CONCLUSION

Special attention must be given to all the steps of the preparation, which is the key to finding a successful treatment. The concept of two canals in the mesial root of the mandibular first molar should not be considered as a rule. Clinicians always search for additional canals whenever they perform root canal therapies.

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**AUTHOR(S):**

1. Dr. Mohanavelu Deepalakshmi
2. Dr. Ramachandran Anupama
3. Dr. Hidayathulla Sulthan Ibrahim Raja khan
4. Dr. Kumarappan Senthil kumar

**PARTICULARS OF CONTRIBUTORS:**

1. Senior Lecturer, Department of Conservative Dentistry & Endodontics,
2. Senior Lecturer, Department of Conservative Dentistry & Endodontics,
3. Senior Lecturer, Department of Conservative Dentistry & Endodontics,
4. Professor and Head, Department of Conservative Dentistry & Endodontics, Chettinad Health City and Research Institute.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Mohanavelu Deepalakshmi,  
Senior Lecturer, Department of Conservative  
Dentistry & Endodontics,  
Chettinad Health City & Research Institute,  
Old Mahabalipuram Road, Kelambakkam,  
Chennai, India.  
Phone: 00 91-44 27475123  
Fax: 0091-44 27475959  
Mobile: 0091-9840195698  
E-mail: drdeepalakshmi@yahoo.co.in

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