

## Middle Mesial Canal in Mandibular Second Molar

Seema Yadav

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### Abstract

The success of endodontic therapy relies on thorough debridement, shaping and completely filling the entire root canal system. Failure to recognize additional canal results in poor prognosis of the treatment. The advances in the technology and knowledge and experience of the clinician has led to meticulous attention in locating as well as treating these extra canal successfully. Middle mesial canal is an additional canal found in the mesial root of mandibular molars. These canals may either merge with the main canal or may leave as an independent canal. The present case report describes the successful treatment of three independent mesial canals in mandibular second molar

**Keywords:** Middle Mesial Canal; Mesial Root; Mandibular Second Molar.

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### Introduction

Vertucci and Williams [1] in 1974 were the first to report the middle mesial canal in the mandibular first molar. Thereafter many clinical studies and case report with unusual middle mesial canal associated with mandibular molars has been reported. Pomeranz et al [2] studied 100 mandibular molars and found 12% middle mesial canals in the mesial roots. They categorized them into three morphologic types namely fins, confluent and independent.

Mandibular second molar usually have two roots and three root canals. However various studies have been reported with diverse anatomy. The middle mesial canal is one of the variation found in mandibular molars. The incidence of these ranges from 1 to 15% [5]. The middle mesial canal are more common finding in mandibular first molar [2] and are less frequently seen in mandibular second molar [3]. Very few case report were reported with independent middle mesial canal in mandibular

second molar (Table 1). The case report presented here shows endodontic management of three independent canals in mesial root and one canal in distal root of mandibular second molar.

### Case Report

A 28 year old female patient visited the department with chief complaint of sharp shooting pain in the lower right region. Medical history was noncontributory. On clinical examination, there was carious exposure evident in the lower right second molar. There was no response to electrical pulp test. There was severe sensitivity to percussion. Palpation of the buccal and lingual mucosa of the tooth did not reveal any tenderness. There was no intraoral or extraoral swelling present. The tooth was firm with normal periodontium. Radiograph revealed carious exposure with periapical radiolucency in the distal root (Figure 1a). Based on the clinical and radiographic findings, diagnosis of pulpal necrosis with symptomatic apical periodontitis was made for tooth 47 and root canal treatment was initiated.

Rubber dam was placed and access preparation was made on 47. The distal, mesiobuccal and mesiolingual orifices were located. However with further probing with the help of DG16 along the groove between mesiobuccal and mesiolingual orifices, an additional canal orifice was identified

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**Author's Affiliation:** Professor, Deptt. of Conservative Dentistry and Endodontics, Maulana Azad Institute of Dental Sciences, New Delhi, Delhi 110002.

**Reprints Requests:** Seema Yadav, Professor, Deptt. of Conservative Dentistry and Endodontics, Maulana Azad Institute of Dental Sciences, New Delhi, Delhi 110002.  
E-mail: [seemayadav2008@gmail.com](mailto:seemayadav2008@gmail.com)

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closer to the mesiobuccal. On manual exploration with 10no Kfile, the additional canal was found to be independent. The working length of the three mesial canals was determined with apex locator and later confirmed with radiograph (Figure 1b). For mesial canals, coronal orifice enlargement was done with GG drills no1 & 2. Subsequently prepared with stainless steel hand K file till ISO 25/02(Mani Inc, Japan) followed by Hero Shaper file no 30/04 (Micromega) was used. The distal canal was prepared with Protaper till F2. Irrigation was performed with 2.5% sodium hypochlorite and normal saline solution. Final irrigation was performed with 17% EDTA solution. Calcium hydroxide paste was placed.

After one week, the patient was asymptomatic and



Fig. 1a:

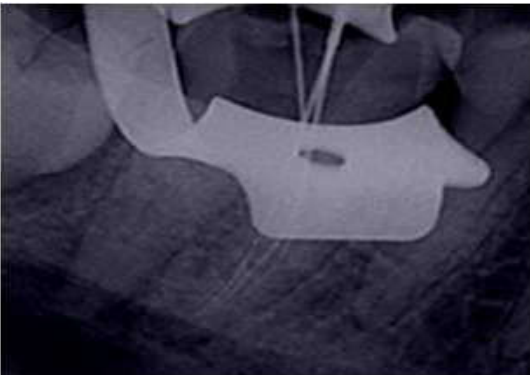


Fig. 1b:



Fig. 1c:

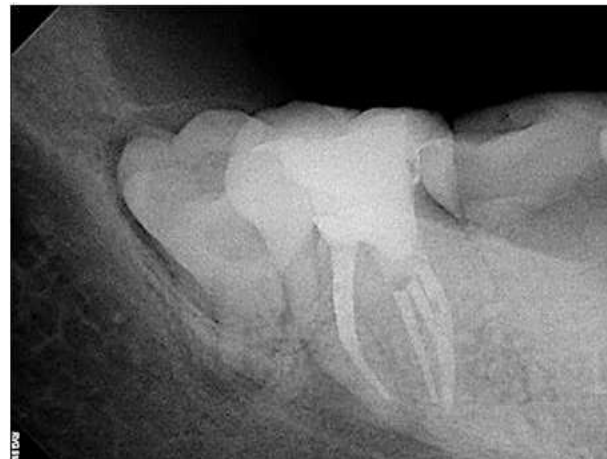


Fig. 1d:

obturation was performed using cold lateral condensation of gutta percha and AH plus sealer (Figure 1c). The tooth was then restored with composite resin (Figure 1d).

Table 1:

Author	Year	Case Reports		Identification method
		Year	Tooth	
JV karunakaran <sup>14</sup>	2012		37	Probing with explorer
Reddy <sup>13</sup>	2013		37	Surgical operating microscope(8X)
Ragavendran <sup>15</sup>	2014		37	Manual Probing, radiograph with instrument
Paul <sup>11</sup>	2015		47	Manual Probing, radiograph with instrument
Present case report	2016		47	Manual Probing, radiograph with instrument

## Discussion

Various studies has been published related to the anatomic diversity of mandibular molars along with

middle mesial canal. The middle mesial canal is an additional canal located in the mesial root of mandibular molars. Additional canal identification and management can be challenging but if not

detected will result in failure of endodontic treatment. The middle mesial canal may be confluent and merge with either mesiobuccal or mesiolingual canal in the apical third [5] or it may exit as an independent canal [12]. The confluent anatomy [6,7] in middle mesial canals were the most commonly found configuration followed by fin anatomy and least were with independent anatomy [8]. The three independent mesial canal with different apical foramen is the most uncommonly seen morphological types [9].

There are various methods for locating the extra canal. Careful exploration with sharp explorer, bleeding spots, scrutiny of the dentinal map, removing calcification from the chamber floor and angled radiographs with instrument within the canals helps in identification of the additional canal [10]. For middle mesial canal, the dentinal map between mesiobuccal and mesiolingual orifices should be carefully explored with the sharp explorer and small files. The middle mesial canal in this case was identified with the DG16 explorer and confirmed by angled radiograph with 10 no Kfile placed in the canal. Various authors have used different methods for identification of the middle mesial canal such as DG16 explorer [11], CBCT imaging [12], dental operating microscope [6], Troughing technique along with dental operating microscope [7], angled radiograph with instrument, gutta percha [5] placed in the canal.

Sherwani et al [8] studied the location of the orifice of middle mesial canal in relation to the orifice of the main mesial canals from 73 located cases of middle mesial canal from 258 mandibular molars and found that the middle mesial orifices were located in the middle in 67% of the cases followed by 20% closer to the orifice of the mesiolingual canal and 12% closer to the orifice of the mesiobuccal canal. However in this case report the middle mesial canal orifice was located closer to the mesiobuccal orifice.

The incidence of middle mesial canal is also related to the age of the patient. The younger age group has higher incidence of presence of middle mesial canal. Nosrat et al [6] found that the incidence of middle mesial canals was 32.1% in patients  $\leq 20$  years old, 23.8% in patients 21–40 years old, and 3.8% in patients  $> 40$  years. As the age advances, the calcification in the chamber and the canal may reduce the chances of locating these canals [4,8].

## Conclusion

Clinician should bear in mind the possibility of middle mesial canal in the mesial root of mandibular

molar and its management. Failure to identify these canal can lead to unfavourable prognosis of the endodontic therapy.

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