



# Endodontic Management of Elusive Middle Mesial Canal in Mandibular Second Molar

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## ABSTRACT:

A successful endodontic outcome relies on the localization of all canals and complete debridement of root canal system. The success of any endodontic therapy becomes a challenge when aberrant root canal morphology is present, especially when this anatomy is difficult to visualize from radiographs. The present case report is about endodontic management of a mandibular second molar that presented with a middle mesial canal. This is an exceedingly uncommon morphology and this case report is expected to increase clinician knowledge of a variable root canal anatomy associated with this tooth.

**KEYWORDS:** Mandibular second molar, Middle mesial canal, aberrant root canal anatomy, endodontic failure.

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## INTRODUCTION

Root canal morphology of a tooth may vary according to gender and ethnicity of a population.<sup>1</sup> For a successful outcome, it is important that a clinician is able to identify aberrant or unusual root canal anatomy before or during endodontic treatment.<sup>2</sup> Failure to identify such variants may result in procedure related complications such canal perforation, ledge formation, and/or apical zipping, which ultimately contribute to treatment failures.<sup>3</sup> A mandibular second molar usually erupts at the age of 12-13 years.<sup>4</sup> It most often requires endodontic treatment due to distal surface caries which occur due mesial angulated mandibular third molar.<sup>5</sup>

The most frequent root canal configuration reported for mandibular second molar is the presence of two roots with three to four canals. The mesial root usually has two canals while the distal root may have one or two canals.<sup>2</sup> However, the total number of canals in mandibular second molar may vary from one to six canals.<sup>6</sup> The other most common variant reported for mandibular second molar is the presence of a C-shaped canal. The formation of such an atypical anatomy is due to the failure of HERS (Hertwig's epithelial root sheath) to merge on either lingual or buccal surface of

mandibular second molar. Multiple types of C shaped canal has been reported and more than one type may coexist with a tooth at different depths making an endodontic procedure more challenging.<sup>7</sup> Silva *et al.* reported that the frequency of C shaped canal in mandibular second molar is 8%.<sup>8</sup> However its prevalence may vary according to different ethnic groups.<sup>8</sup>

Another rare variant reported for mandibular second molar is the occurrence of middle mesial canal, which is present in a developmental groove in between mesiobuccal and mesiolingual orifice. It is most commonly reported for mandibular first molars upto 15%<sup>9</sup> and is rarely reported for mandibular second molars. Caliskan *et al.* reported that middle mesial canal is present 2% of mandibular second molars.<sup>10</sup>

This case report accounts the presence and management of a middle mesial canal in the mandibular second molar.

## CASE PRESENTATION

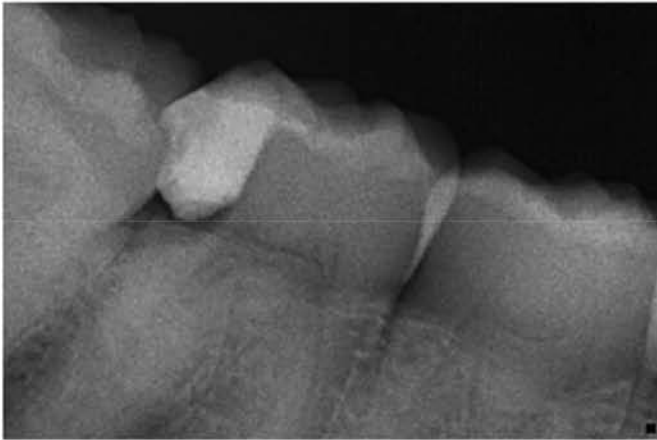
A 38-year-old man presented with the history of intense pain associated with sensitivity since three days in the lower right jaw with spontaneous pain. The pain was localized and relieved temporarily on taking analgesics. His medical history was unremarkable.

On extra oral examination, limited mouth opening of approximately 18mm was recorded. TMJ examination

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revealed no tenderness, crepitus or any deviation on opening or closing. Intra oral examination revealed a deep temporary restoration in # 47 along with impacted mesio-angular third molar. The initial periapical radiograph showed a dislodged temporary restoration and the cavity which was encroaching the pulp in # 47 as shown in Fig. (1). There was evidence of alveolar bone loss on distal aspect of right mandibular second molar. Diagnosis of irreversible pulpitis in # 47 was made secondary to the deep distal carious lesion encroaching the pulp.

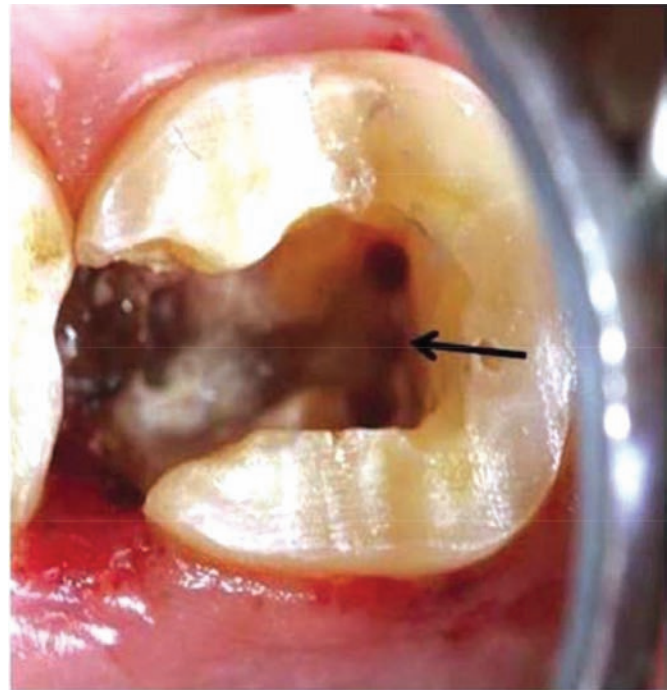


**Fig. (1).** Pre-operative periapical radiograph showing dislodged temporary restoration in mandibular second molar restoration and mesially tilted mandibular third molar.

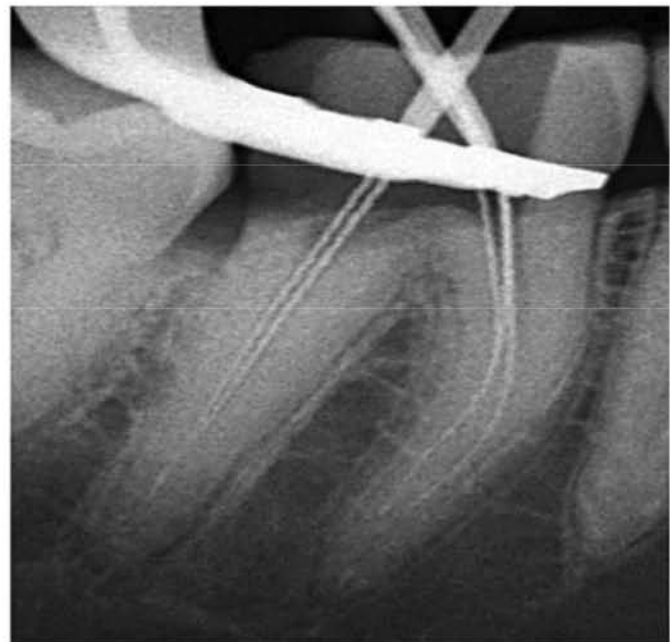
### TREATMENT

The ideal treatment plan was extraction of right mandibular third molar followed by endodontic treatment and full coverage indirect restoration on mandibular right second molar due to extensive tooth structure loss secondary to caries. The treatment plan was discussed with the patient and pros and cons of the procedure were thoroughly explained. The patient was not willing for the extraction and wanted endodontic treatment first. After obtaining an informed consent the treatment was initiated. The tooth left mandibular second molar was anesthetized using block anesthesia with 2% lidocaine with 1:80 000 epinephrine (Xylestesin-A) and isolated with rubber dam.

After removing all the temporary restoration with ultrasonic scaler (sonic scaler tip #1 universal, American Distance Education Consortium (ADEC), USA), the access opening was prepared. The pulp chamber was then cleaned and clinical examination was performed with a DG-16 endodontic explorer which disclosed three distinct canal orifices in the mesial root, and one canal in the distal root as shown in Fig. (2).



**Fig. (2).** A clinical picture showing access opening of right mandibular second molar showing middle mesial canal indicated by arrow head.



**Fig. (3).** A working length periapical radiograph showing presence of an additional middle mesial canal.

Working lengths were estimated with an apex locator (Root ZX, J. Morita Corp, Tustin, California, USA) and

periapical radiographs. The middle mesial canal joined apically with the mesiobuccal canal as shown in Fig. (3). Cleaning and shaping was performed using the crown-down technique, all canals were prepared upto F1 with ProTaper Universal Rotary NiTi files (Dentsply) and lubricant used



**Fig. (4).** Access opening of mandibular second molar showing three obturated canals in the mesial root and one in the distal.



**Fig. (5).** Post-operative periapical radiograph of obturated canals of mandibular second molar.

was RC-Prep (Hawe Neos Dental, Bioggio, Switzerland). No intracanal medicament was placed. The access opening was sealed with MD-Temp (Hydraulic Temporary Restorative material, Meta Biomed). Patient was recalled after a week. On follow-up visit all canals were dried with paper points and then obturation was performed using cold lateral condensation technique. The clinical image of access opening after obturation is shown in Fig. (4) and the post-obturation periapical radiograph confirmed root canal filling upto the completed length in all four canals (Fig. 5). Patient was recalled after one week for extraction of third molar and later on, after two weeks for a full coverage restoration.

## DISCUSSION

The usual root canal configuration of mandibular second molar is the presence of two canals in the mesial root and one or two canals in the distal root. In another case report the author reported three canals in the mesial root in which the middle mesial canal was joining apically with the mesiolingual canal.<sup>9</sup> However in our case middle mesial canal was joining with mesiobuccal canal. In another case report middle mesial canal was found associated with extra buccal root (Radix paramolaris).<sup>11</sup> In our case on a two dimensional periapical radiograph only one mesial root can be appreciated. A three dimensional cone beam computed tomographic scan could be done to check the presence of any additional root in the third dimension.<sup>12</sup>

For complete debridement of the root canal space, every effort should be made to visualize the complete chamber floor and additional aids used for orifice location whenever any variable root canal anatomy is suspected. Any additional canal, if missed, serves as substrate for bacterial inoculation, with chances of endodontic flare-up or post treatment disease, enforcing both health as well as financial burden on the patient.<sup>1, 7, 8</sup>

Various aids that help in locating root canal orifices include radiographs with various angulations, troughing the groove with ultrasonic instrument, staining with methylene blue, using dental loupes under illumination or using an endodontic microscope for increased visibility and enhanced lightening. With the advent of cone beam computed radiography (CBCT), the probability of finding and treating an extra canal have greatly improved which ultimately increases the chances of success in difficult cases.<sup>13</sup>

## CONCLUSION

In the present case report, all canals including middle mesial canal were identified, debrided and obturated upto

length. The patient was asymptomatic after the procedure, accounting for successful endodontic treatment. For endodontic treatment, it is very important the all canals should be located and thoroughly instrumented. The clinician should keep the presence of aberrant anatomy under consideration during any endodontic treatment, even if the occurrence of such variation is rare. A clinician should be vigilant and use additional aids for canal negotiation, whenever an additional or aberrant canal anatomy is suspected.

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