

RE-TREATMENT OF A MANDIBULAR FIRST MOLAR WITH AN INDEPENDENT MIDDLE MESIAL CANAL- A CASE REPORT

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ABSTRACT

With increasing reports of aberrant canal morphology, the clinician needs to be aware of varied anatomy in teeth. The purpose of this article is to report the successful non surgical endodontic re-treatment of one such clinical case of mandibular first molar with three mesial canals in which the middle mesial canal had an independent foramen.

KEY WORDS: Mandibular first molar, Endodontic Retreatment, Middle mesial canal.

INTRODUCTION

The main aim of endodontic treatment is chemo-mechanical cleansing of the root canal and its hermetic obturation with an inert material. Ingle et al¹ have suggested that apical percolation is one of the main causes of endodontic failure. The main reason for this failure is incomplete canal obturation or the presence of an untreated canal. Knowledge of the most common anatomical characteristics and their possible variations is fundamental because non treatment of even one canal can lead to endodontic failure.

Since, the mandibular first molar is one of the most frequently endodontically treated tooth, it is imperative to have a thorough knowledge of root canal anatomy in order to improve the treatment outcome. Mandibular first molar normally has two roots, one mesial and one distal, and their usual canal distribution is two in the mesial root and one or two in the distal root.² Clinicians must be aware of the finding that the presence of a third canal, the middle mesial or mid mesial canal in the mesial root of the mandibular first molars which has been reported to have an incidence rate of 1% to 15%.³ This canal may be located anywhere between the mesiobuccal and mesiolingual orifices. The canal itself may be independent with a separate foramen or may join apically with either the mesiobuccal or Mesiolingual canal.

There have been comprehensive studies to show that there are mandibular first molars with more than four canals (**Table 1**).

The morphological pattern of separate apical terminations of the three mesial root canals is a very rare one⁴. In a series of studies conducted in 100 extracted mandibular molars, Vertucci⁵ observed that 1% of the cases had a middle mesial canal in the mandibular first molar. In 1981, Pomeranz et al⁶ treated 100 mandibular first and second molars *in vivo* in which, 12 separate middle mesial canals were identified and treated. In a clinical evaluation of 145 mandibular first molars, Fabra-Campos found four molars (2.1%) with five canals – three in the mesial root and two in the distal^{7,8}. Goel et al⁹ reported the incidence of middle mesial canal as 15%. Since then, many clinical surveys and case reports have pointed out the complicated root canal anatomy of mandibular first molars, but very few have mentioned re-treated cases¹⁰. The purpose of this article is to report the successful endodontic re-treatment of mandibular first molar with 3 mesial canals.

Case Report

A 32 year old male patient was referred to the Department of Conservative Dentistry and Endodontics, Sri Sai College Of Dental surgery, Vikarabad, with a chief complaint of pain in his lower right back teeth region. Patient gave history of

Table 1. Mandibular First Molar-- comprehensive studies⁵⁻⁹

Investigator	year	Teeth	Method	Roots	Three canals
Vertucci ⁵	1984	100	In vitro	Mesial Distal	1.0% -
Pomeranz et al ⁶	1981	100	In vivo	Mesial Distal	12% -
Fabra-Campos ⁷	1985	145	In vivo	Mesial Distal	2.1% 0.6%
Fabra-Campos ⁸	1989	760	In vivo	Mesial Distal	2.6% -
Goel et al ⁹	1991	60	In vivo	Mesial Distal	15% -

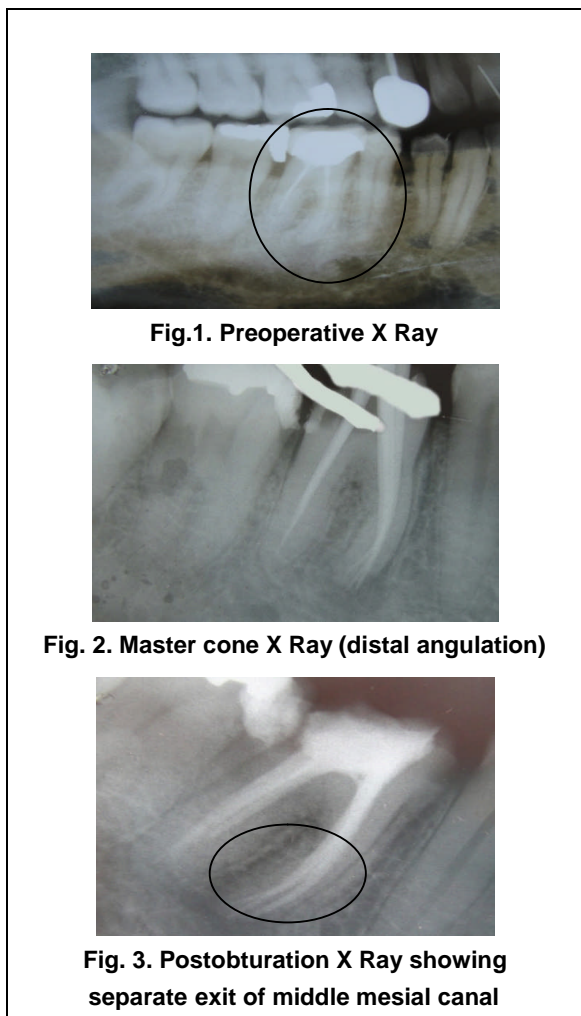
previous root canal treatment in the same tooth which was restored with a metal ceramic crown. The tooth was tender on vertical percussion with periapical radiolucency revealed on radiographic examination (**Fig.1**). After administering anesthesia, the crown was removed and under proper isolation, the old restoration and all carious tissue were removed. After an adequate access cavity preparation, two mesial and one distal canal orifices were found. The gutta-percha was removed using Protaper retreatment files using Xylene as a solvent. Examining the fissure connecting the two mesial canals carefully, the tip of a # 08 file could be inserted into an orifice located in the middle of the distance between the two mesial canals. The middle mesial canal had a separate orifice and a separate apical foramen. The root canals were copiously irrigated with 5% sodium hypochlorite solution and prepared with Protaper rotary instruments. Calcium Hydroxide intra canal medicament was used in between appointments and the tooth was later obturated (**Fig.2 and Fig.3**).

Discussion

A thorough knowledge of anatomy of root canal system plays a significant role in endodontic success and failure.^{11,12} A statistically significant percentage of failures are related to missed root canals, as these potentially hold tissue, bacteria and related irritants that inevitably contribute to clinical symptoms and lesions of endodontic origin.¹³

In a study, Hoen and Pink¹⁴ screened 1100 failed endodontically treated teeth and reached a

conclusion that, the maxillary first molar was the tooth most often re-treated, followed by the mandibular first molar. They found out in their investigation, that the incidence of missed roots or canals of the retreated teeth was 42%.



The presence of third canal in the mesial root of mandibular first molars may not be a very frequent discovery; review of the literature indicates that its prevalence is 1-15%³. Many reports deal with three orifices in the mesial root, but very few describe three independent canals, indicating a rare anatomical configuration.¹⁰ In 1974, Vertucci and William¹⁵, as well as Barker et al¹⁶ described the presence of an independent middle mesial canal. The occurrence of three independent canals in the mesial root was reported by Pomeranz.⁶ Beatty and Krell¹⁷ described a mandibular first and second molar with three independent canals in the mesial root.

According to Pomeranz et al⁶, this additional canal may be classified as

- (1) an independent canal, which when originates in a separate orifice and terminates in a separate foramen,
- (2) a confluent canal, that originates as a separate orifice but is apically joined to the mesiobuccal or mesiolingual canal, and
- (3) a fin, when the instrument can pass freely between the mesiobuccal or mesiolingual canals and the middle mesial canal during cleaning and shaping.

In the present case, the mid mesial canal had a separate orifice and an independent foramen. According to Pomeranz's classification⁶, the middle mesial canal in this case is classified as an independent canal.

According to Cohen and Burns, canals are often not treated because they are not located.^{1,11} One should perform a thorough examination of the pulp chamber to ensure a more accurate orifice location, and then completely debride all canals. This increases the chance of finding an extra canal and the long-term success rate of endodontic therapy³.

CONCLUSION

Successful and predictable endodontic treatment requires thorough knowledge of root canal anatomy. This case report provides us the evidence that mesial roots in mandibular first molars can contain three canals which demonstrates a rare anatomical

configuration and supplements previous reports of the existence of such configurations in mandibular first molars.

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