

Clinical management of a mandibular first molar with multiple mesial canals

Language: English

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Introduction

The main objective of root canal treatment is the thorough mechanical and chemical cleansing of the entire pulp space followed by complete obturation with an inert filling material.¹ Therefore it is imperative that aberrant root canal anatomy is identified prior to and during root canal treatment of such teeth. Mandibular first molar is the earliest permanent posterior tooth to erupt and most often requires root canal treatment. Usually it has two roots with two canals in mesial root and one in distal root, but sometimes additional mesial or distal canals may be present. Unusual canal anatomy associated with the mandibular first molar has been reported in several studies.²⁻¹¹ In 1981, Pomeranz et al became the first to address treatment considerations for the middle mesial canal of the mandibular first and second molars. They reported on 100 first and second mandibular molars consecutively treated in private practice. Twelve separate middle mesial canals were identified and treated (12%). They classified three separate morphological possibilities in the mesial root:

1. Fin - when an instrument could pass freely between the mesiobuccal or mesiolingual canal and the middle mesial canal;
2. Confluent - when the prepared canal originated as a separate orifice but apically joined the mesiobuccal or mesiolingual canal; and
3. Independent - when the prepared canal originated as a separate orifice and terminated as separate foramen.⁶

In a radiographic study of extracted teeth, Goel et al reported mandibular first molars had three mesial canals in 13.3% of specimens, four mesial canals in 3.3% of specimens, and three distal canals in 1.7% of specimens. Furthermore their study showed one apical foramen was present in 30%, two in 60%, three in 6.7%, and four in 3.3% of the cases.⁹

Clinical Case

A 21 year old female patient presented to the department of Conservative Dentistry and Endodontics with a chief complaint of spontaneous pain in lower left back tooth since two days. There was also a history of periodic discomfort to biting on the tooth. Medical history revealed that the patient had bronchial asthma since last six years. Clinical examination revealed carious mandibular left first molar which gave delayed response to electric pulp test when compared to adjacent as well as contra-lateral teeth. Radiographic examination revealed radiolucency in the crown of mandibular left first molar approximating the pulp. (Figure 1) Based on the subjective and objective findings, a diagnosis of irreversible pulpitis was made.



Fig. 1: Preoperative Radiograph

Material and Methods

After administering local anaesthesia and adequate isolation, caries was excavated and access gained to the pulp chamber. The coronal necrotic pulp tissue was removed and the chamber irrigated with 5.25% sodium hypochlorite solution. Four root canal orifices were detected, two mesial and two distal. Exploring the fissure between the main mesial canals, with a sharp endodontic explorer, a "stick" was encountered. A middle mesial canal orifice was found which was closer to the mesiobuccal canal orifice. (Figure 2) A small precurved size 08 K-file (Dentsply Maillefer) was inserted into the middle mesial canal orifice. With clockwise and counter-clockwise rotational movements, the instrument was advanced till the predetermined working length (as per preoperative radiograph). The working length was then confirmed with another radiograph. The radiograph confirmed three separate mesial root canals with separate apical foramina. (Figure 3) Cleaning and shaping was completed using K-files under constant irrigation with 5.25% sodium hypochlorite and all the canals were obturated with gutta-percha and zinc-oxide eugenol based sealer at the next appointment. (Figure 4 and 5)



Fig. 2: Intraoral photograph showing three separate mesial canal orifices

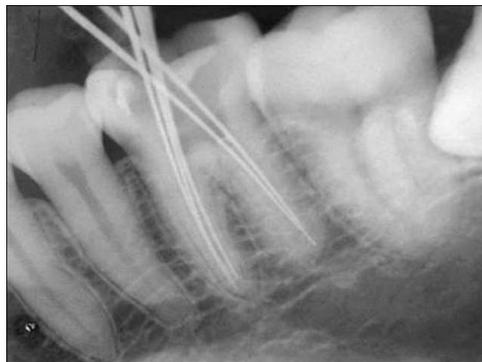


Fig. 3: Working Length Radiograph

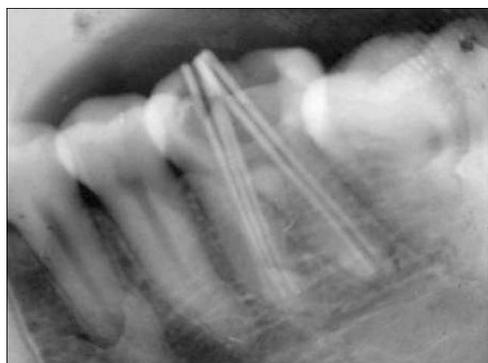


Fig. 4: Master Cone Radiograph

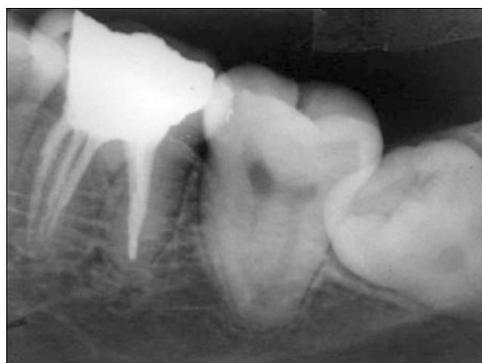


Fig. 5: Radiograph after Obturation

Conclusions

Many dental clinicians have the perception that a given tooth will contain a predetermined number of roots and/or canals. Careful evaluation of research material has, however, shown that deviation from the norms in root canal morphology are not uncommon. Among these anatomic variances, multiple canals in the mesial root of mandibular molars have been reported in the literature as having an incidence of 2.07% up to 13.3% of the examined cases.^{5,9} Although many authors have agreed on the presence of three foramina in the mesial root, only a few have reported the presence of three independent canals, which presents itself as a rare anatomic variant.¹²

Dental clinicians should keep this possibility in mind whenever they perform root canal treatment. The detection of additional root canals requires a careful clinical and radiographic inspection. Diagnostic tools such as multiple radiographs from different horizontal angulations, careful examination of the pulpal floor with a sharp endodontic explorer, and better visualization using devices such as loupes or dental operating microscope are all important aids in the detection of additional root canals. Recently, various attempts have been made to use CT imaging for the confirmatory diagnosis of morphologic aberrations in the endodontic field. Cone-Beam CT has been successfully used in endodontics for better understanding of the root canal anatomy, evaluation of root canal preparation/obturation, detection of bone lesions, and vertical root fractures.¹³⁻¹⁵

Although such root canal variations occur infrequently, these canal systems do exist and alert the clinician to proceed with thorough examination of the pulp chamber floor even after the expected number of canals have been identified. Over the past 20 years, numerous articles have appeared in endodontic literature, suggesting that the middle mesial canal is an anomalous condition. 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 clinician may be able to increase the success rate of endodontic therapy.

There is an old saying: "What the mind doesn't know, eyes cannot see". So, a good knowledge of root canal anatomy and its variations, and expecting the unexpected can spell the difference between success and failure.

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Poster Faksimile:

CLINICAL MANAGEMENT OF A MANDIBULAR FIRST MOLAR WITH MULTIPLE MESIAL CANALS

INTRODUCTION: -
Main objective of root canal treatment - thorough mechanical and chemical cleansing of the entire pulp space followed by complete obturation with an inert filling material. Therefore, it is imperative that aberrant anatomy is identified prior to and during root canal treatment of such teeth.

Mandibular First Molar- Earliest permanent posterior tooth to erupt and most often requires root canal treatment.

INCIDENCE OF EXTRA CANALS: -
Usually it has two roots with two canals in mesial root and one in distal root, but sometimes additional mesial or distal canals may be present.

Goel et al. (radiographic study): -

3 mesial canals	4 mesial canals	3 distal canals	Apical foramen			
			One	Two	Three	Four
13.3 %	3.3 %	1.7 %	30 %	60 %	6.7 %	3.3 %

Pomeranz et al. reported 12% incidence of middle mesial canal and classified three separate morphological possibilities: -
1. Fin - when an instrument could pass freely between the mesiobuccal or mesiolingual canal and the middle mesial canal;
2. Confluent - when the prepared canal originated as a separate orifice but apically joined the mesiobuccal or mesiolingual canal;
3. Independent - when the prepared canal originated as a separate orifice and terminated as separate foramen.



CLINICAL MANAGEMENT

KNOWLEDGE - Most important asset the dentist must possess. Canal variations are not uncommon, they do exist!

DIAGNOSTIC RADIOGRAPHS- Good quality, with different horizontal angulations.

ACCESS CAVITY - Prudent inspection of pulp chamber floor. Remove any protuberance from the mesial axial wall that could prevent direct access to the developmental groove between the MB & ML orifices. Sharp endodontic explorer to explore the groove between main mesial canals until a "stick" is encountered. If a depression or orifice is located, the groove can be troughed with ultrasonic tips until a small file (No. 6 or No. 8) can negotiate the canal. Magnifying loupes or Surgical Operating Microscope can be valuable.


HUNT !!


You won't find extra canals unless you make extra efforts & devote extra time to search for them.

CLINICAL CASE



PREOPERATIVE RADIOGRAPH



INTRAORAL PHOTOGRAPH



WORKING LENGTH RADIOGRAPH



MASTER CONE RADIOGRAPH



RADIOGRAPH AFTER OBTURATION

MIDDLE MESIAL CANAL IS A REALITY RATHER THAN AN ANOMALY.
By removing this additional tissue from the root canal system, the dentist may be able to increase the success rate of endodontic therapy.

THERE IS AN OLD SAYING
" WHAT THE MIND DOESN'T KNOW, EYES CANNOT SEE ".

So, a good knowledge of root canal anatomy and its variations, and expecting the unexpected can spell the difference



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