

Missing Middle Distal Canal in the Lower Molars May Lead to Failure of Endodontic Treatment

Case Report

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Abstract

The goal of endodontic treatment is to limit the infection within the entire root canal system in order to reach a disinfected environment with dense obturation to prevent reinfection. To achieve that, all root canal pathways and anomalies should be traced and cleaned whenever possible with chemical irrigation to ensure the removal of vital/non-vital tissues and debris.

It is impossible to guarantee the number of root canals within human teeth as an absolute rule, and there are always exceptions to the number of canals, which could lead to a subsequent failure of endodontic therapy if they weren't detected and cleaned well.

Microscopic magnification is an important way and useful method adopted in the two following cases, to detect the middle canal in the distal root of the lower molars.

Keywords: Middle Distal Canal; Endodontic Treatment; Microscopic Magnification.

Introduction

The main goal of endodontic treatment is to clean the root canal mechanically and chemically accompanied by a tight compacted obturation [1].

There are many possible causes that lead to failure of endodontic treatment, including: insufficient mechanical and chemical debridement, insufficient coronal sealing, over extrusion of root canal filling, poor obturation, as well as missing of one of the canals without ever being cleaned and disinfected [2].

The isthmus between two mesial canals contains pulp tissue and may contain an additional orifice related to distinct middle mesial canal [3]. Although the distal root often contains one wide canal rather than two, but when it contains two canals it may include isthmus which may involve the middle distal canal [4].

Several cases have been described unusual anatomy of the root

canals of the lower molars and the most common description is the presence of an independent middle mesial canal in the first lower molars [5], and in the second lower molars [6].

The percentage of middle mesial canal (MMC) prevalence in various populations was (0.26% - 53.8%), while percentage of middle distal canal (MDC) was (0.0% - 10%) [5]. Therefore, it is essential to investigate and track anomalies during root canal treatment [7].

There are several methods that facilitate the diagnosis of extra canals such as multiple pretreatment radiographs or 3D imaging systems such as CBCT, probing the orifices of canals with a sharp endoprobe and ultrasonic tips, staining of the pulp chamber floor with 1% methylene blue dye, and using the dental operating microscope or dental loupes at least [8, 9].

The present two cases describe first and second lower molars with three separated middle distal canals merged at the apical foramen.

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Case 1

Middle distal canal in vital first lower molar

A 16-year-old male patient came to the Department of Endodontics with a chief complaint of persistent severe pain in lower right side of the face. After inspection, there was deep occlusal carious lesion in the lower right 1st molar (tooth #46) resulting in irreversible pulpitis. The decision was taken to perform root canal treatment under microscopic magnification to increase the level of success. After exploring the orifices of the main canals, the orifices of the mesial root were divergent and contained in two separated roots as seen on X-rays. The orifices of the distal root were divergent and there was a slippage along the line of the orifices, and when the sticky point was deliberately probed, the middle orifice was detected in the distal root, then the canal was negotiated by K-file (#10) to the apical foramen. After cleaning and shaping. Distal canals were located in a single root with three distinct pathways merged into a single apical foramen (Figure 1). All canals were completely obturated by the lateral condensation method, then symptoms and signs disappeared in the follow-up sessions.

Case 2

Middle distal canal in necrotic first lower molar

A 31-year-old male patient came to the Department of Endodontics with a chief complaint of pain in lower left hemifacial. After inspection, the left 2nd molar (tooth #37) was massively carious, and an X-ray showed an extended radiolucent lesion. No sinus or fistula had been seen. The lesion was diagnosed as an apical periodontitis related to endodontic origin (necrotic pulp). The decision was taken to perform endodontic treatment under microscopic magnification to improve the chances of success. After exploring the pulp chamber and detecting the four distinct orifices of the main canals: mesiobuccal, mesiolingual, distobuccal and distolin-

gual, the orifice of the fifth canal was revealed in the distal root which was located near the orifice of the distobuccal canal, then the canal was negotiated by K-file (#10) to the apical foramen, and after cleaning and shaping, a calcium hydroxide dressing was used for two weeks, and in the next session the five canals were obturated (Figure 2). The patient was asymptomatic at the follow-up sessions.

Discussion

Most of the mandibular molars have two roots, the mesial with two canals and the distal with single wide canal [1]. The percentage of the middle mesial canal is about 1-15 % [7], while the percentage of a middle distal canal is about 0.2-3 % across multiple communities [10].

Several reports mentioned an increased probability of the presence of the middle canal in younger ages, especially ages under 30-40 [6, 9].

The current case described a rare configuration of canals in 1st & 2nd lower molars, whereas the distal root contained three distinct orifices related to three distinct root canals merged in a single apical foramen in accordance with the description of type XVIII (3-1) of the "Sert and Bayirli" canal classification [11]. This type was previously reported in three previous reports [5, 10, 12], while type XV (3-2) of the "Sert and Bayirli" canal classification was reported in other three reports [13-15].

Maniglia-Ferreira reported a case of lower first molar with 6 distinct canals (3 mesial, 3 distal) with independent apical foramen in accordance with a type VIII (3-3) of the "Vertucci" canal classification [16].

Sometimes the presence of the middle mesial canal is a sign of the presence of the middle distal canal [16, 17]. However, this is

Figure 1. Vital lower right 1st molar with 5 canals (the middle distal canal was present and fully obturated).



Figure 2. Negotiation and obturation of necrotic lower left 2nd molar with 5 canals (the middle distal canal was present and fully obturated).



not consistent with the two current cases as there were only two mesial canals in both cases.

The current report and previous presented reports in the same context serve to raise awareness about the diversity of canal morphology, in contrast to well-known standards. This requires clinicians to consider more potential additional canals to be detected with appropriate access [16, 18].

Although extra canals are rare, the importance of finding and treating all root canals must be emphasized to achieve successful clinical outcomes.

Conclusion

Prior knowledge of dental anatomy helps the clinician in exploring the canals, but a lengthy search and use of magnification and illumination equipment help in discovering more canals leading to more comprehensive cleaning and disinfection of the root canal system, which increases the chance of success. Generally, there is no definite rule for the number of canals, so a careful investigation must be carried out in each case.

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