

Middle mesial canal management in mandibular first molar—endodontic perspective

Kajal Bhayani¹, Mihika Menon², Soumyashree Mishra³, Prasad Kharate⁴

¹MDS, Department of Conservative Dentistry and Endodontics, PGI Rohtak, Haryana

²PG Student, Department of Prosthodontics and Crown and Bridge, MRADCH Bangalore,

³PG Student, Department of Conservative Dentistry and Endodontics, PGI Rohtak, Haryana

⁴PG Student, Department of Orthodontics and Dentofacial Orthopaedics, GDC Aurangabad

ABSTRACT

Aim: To report the successful management of the mandibular first molar with middle mesial canal.

Summary: This paper presents the successful management of the mandibular first molar with the presence of middle mesial canal. Nonsurgical endodontic treatment was chosen as treatment modality. Patient was analysed for the relief of symptoms at 1 week after the procedure. Success analysis was based on the clinical and radiographic examination carried out at 6 and 12 months follow up.

Conclusion: This report points out the importance of looking for additional canals and unusual canal morphology, because knowledge of their existence might occasionally enable clinicians to treat a case successfully that otherwise might have ended in failure. In conclusion, every attempt should be made to find and treat all root canals of a tooth.

Keywords: middle mesial canal, anatomic variation, irreversible pulpitis

INTRODUCTION

Endodontic success in teeth with the more than normally found canals requires a correct diagnosis and careful inspection.

This report points out the importance of looking for additional canals and unusual canal morphology of a rare anatomical configuration and successful management of the same.

CASE PRESENTATION

A 40-year-old female patient reported with a complaint of pain in the posterior left mandibular region for the past 1 week. She gave a history of pain during chewing in the same region for the past 1 month. Her medical history was found to be non-contributory. Clinical examination revealed a carious permanent mandibular left first molar (36) with no tenderness on percussion. The clinical findings, radiographical findings and vitality tests led to a diagnosis of irreversible pulpitis of the left mandibular first molar, necessitating endodontic therapy.

INVESTIGATIONS

Intraoral periapical radiograph—radiographical evaluation of the involved tooth did not reveal any unusual anatomy (figure 1).



Figure 1: Clinical procedure – A) Preoperative radiograph B) location of canal orifices C) WL radiograph D) master cone radiograph E) postoperative radiograph F) 6months follow up G) 12 months follow up

Differential Diagnosis

Apical periodontitis and periapical granuloma since patient gave history of pain while chewing food.

Clinical Procedure

After administration of local anesthesia and rubber dam isolation, the old restoration was removed and an endodontic access was made. After the debridement of the coronal pulpal tissue, inspection of the pulp chamber was done and efforts were made to locate the canal orifices. Inspection of the pulp chamber floor showed orifices corresponding to mesiobuccal, mesiolingual, and distal canals. On careful examination of the groove between the mesiobuccal and mesiolingual canal orifices, the middle mesial canal orifice was identified and the canal was subsequently negotiated. The working length was determined with the aid of the electronic apex locator (Root ZX, J Morita, Kyoto, Japan) and confirmed with radiographs using a digital sensor (Carestream RVG 5200, Carestream Health Inc, Rochester, NY). The working length measurement radiograph had confirmed the clinical finding of three independent mesial root canals. The root canals were then prepared to the working length with hand stainless-steel files (Mani Inc., Tochigi, Japan) and the orifices were shaped with Gates Glidden drills. Irrigation was done with copious amounts of 5% NaOCl after each instrument change. After preparation of the canals, the smear layer was removed using a rinse of 5 ml of 17% EDTA solution (Ammdent, Mohali, India). The root canal walls were dried using absorbent points (Meta Biomed, Chungcheongbuk-do, Korea). Tooth was obturated with the gutta-percha (Meta Biomed, Chungcheongbuk-do, Korea) using the lateral condensation technique and zinc oxide eugenol sealer (Neelkanth, Jodhpur, India). Permanent restoration was then placed using composite resin.

Outcome Assessment

Patient was assessed for the relief from the clinical symptoms at one week after the initial treatment procedure and evaluated for the periapical healing at 6 and 12 months.

In present case report, the absence of clinical signs and symptoms associated with the periapical disease in relation to treated tooth and the signs of periapical healing evident on the radiograph at the end of follow up reveals the successful outcome.

DISCUSSION

There are number of reports that reveal the anatomic variations of root canals in mandibular molars (1). The presence of a third canal (middle mesial) in the mesial root of the mandibular molars has been reported to have an incidence of 0.95–15% (1). 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. This additional canal may be independent with a separate foramen or the additional canal may have a separate foramen and join apically with either the mesiobuccal or the mesiolingual canal (2). Aminsobhani et al who found 44.5% middle mesial canal joined the mesiobuccal canal in the apical third and 14.8%, it joined to the mesiolingual canal in the apical area(3). These findings are similar to Campos's study which showed that middle mesial canal joined to mesiobuccal canal in most cases.(1)

Pomenraz et al (4)in their study of over 100 first and second molars found eight fins, two confluent canals and two independent canals. In our case, middle mesial canal originated as a separate orifice and ended up as separate mesial canal. The clinician should accurately observe the pulp chamber floor to locate possible canal orifices.

New technologies, such as the dental operating microscope and dental loupes, offer magnification and illumination of the operating field and substantially improve the visualisation of root canal orifices Although, in present case report, all the present canal orifices were identified by naked eyes, use of the magnifying loupes or the dental operating microscope, methylene blue staining may help in the easy identification of the canal orifices. A round bur or an ultrasonic tip can be used for removal of any protuberance from the mesial axial wall which would prevent direct access to the developmental groove between mesiobuccal and mesiolingual orifices. This developmental groove should be carefully checked with the sharp tip of an endodontic explorer. If depression or orifices are located, the groove can be troughed with ultrasonic tips at its mesial aspect until a small file can negotiate this intermediate canal.

After locating the canal orifices, Negotiation of the canal pathway and curvature is another important step affecting the outcome. Thorough debridement of the root canal system with well cleaned and shaped canal greatly contributes to the successful outcome (10). On the other hand, inadequately debrided root canal system or root canals with an iatrogenic errors such as ledge, blocks or transportations etc. may tend to harbor the microorganisms, which may increase the risk of persistence of disease. Further, presence of three mesial canals in such a small anatomical area also increases the tendency for the presence of anatomic complexities such as fins and isthmuses (10). Canal orifices with closed canal proximity usually lead to merging of canals after the biomechanical preparation. However, in present case report, all the three mesial canal orifices and the root canals remained separated, which forms the rare anatomic variation. Although, successful outcome of mandibular first molar with the presence of middle mesial canal was reported using non-surgical endodontic treatment in present case report, future case reports with current concepts of the endodontic practice with utilization technical advancements may help in the simplifying treatment procedure and improving outcome. There is an abundant amount of reports that relate the anatomical variations of mandibular molars. This should induce the clinician to accurately observe the pulp chamber floor to locate possible canal orifices. Searching for additional canal orifices should be the standard practice for clinicians.

CONCLUSION

Knowing the variations in anatomy of root canal system plays an important role in successful endodontic therapy. Developmental grooves in the pulpal floor plays a very important role in identifying the canal system. Thorough search for additional canals while performing root canal therapy in permanent molars should be carried out.

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