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CASE REPORT

Three Independent Canals in the Mesial Root of a Mandibular Second Molar

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ABSTRACT

Introduction: The aberrant canal configuration of a mandibular molar can be a challenging root canal treatment.

Materials and methods: This case report presents the clinical management of a mandibular second molar with three separate mesial canals including middle mesial (MM) canal, which was confirmed by operating microscope. There are reports that deal with three orifices in the mesial root, but very rarely describe three independent canals, indicating a rare anatomical configuration.

Results: The results illustrate that three independent root canals in the mesial root obturated efficiently with the help of posttreatment images to the accepted lengths in all three canals.

Conclusion: This case report highlights the very rare occurrence of independent MM canal in mandibular second molar

Keywords: Independent canals, Mandibular second molar, Mesial canals, Obturation.

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INTRODUCTION

The main objective of root canal treatment (RCT) is the thorough mechanical and chemical cleansing of the entire pulp space followed by complete obturation with inert filling material.[1] Therefore, it is imperative that aberrant anatomy is identified before and during of such teeth.

Since Vertucci and Williams[2] first reported the presence of a middle mesial (MM) canal in a mandibular molar with a separate orifice and a separate apical foramen, there have been multiple case reports of aberrant canal morphology in the mesial root.[3-9] Among these MM canals, only 6.7% of were independent. In a study by Ahmed et al[10] using a clearing technique, the prevalence of three mesial canals was 4% in mandibular first molars and 10% in mandibular second molars in Sudanese population.

Reuben et al[11] evaluated root canal morphology of 125 extracted mandibular first molars in an Indian population using spiral computed tomography; they did not find mesial roots of mandibular molars with three mesial canals.

Fabra-Campos[5] in a clinical study of 145 mandibular first molars found four molars (2.07%) with five canals—three in mesial root and two in distal. In the four cases, the MM canal did not show an independent apical foramen. On the contrary, very few mandibular first and second molars with three separated canals in mesial root have been reported.[6,7,12]

The present report describes RCT in a mandibular second molar containing three independent canals in its mesial root.

CASE REPORT

A 48-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Army College of Dental Sciences with complaint of pain on the lower left posterior region since 3 days. Pain was moderate, intermittent, and increased while chewing food. Dental history revealed that he had undergone extraction of left mandibular first molar 1 month earlier by a general dental practitioner.

On clinical examination, mandibular first molar of left side was missing and in mandibular second molar caries was present in disto-occlusal aspect.

Radiograph revealed carious destruction on the distal aspect involving the pulp and widening of the lamina dura for the distal root (Fig. 1). Based on clinical and radiographic findings, the tooth was diagnosed for irreversible pulpitis with apical periodontitis.

Endodontic treatment was planned for the same. After administering local anesthesia and rubber dam isolation, all carious tissue was removed and an access cavity was prepared. Four orifices and canals (three mesial and one distal) were located in the first appointment. Working lengths were estimated by using an electronic apex

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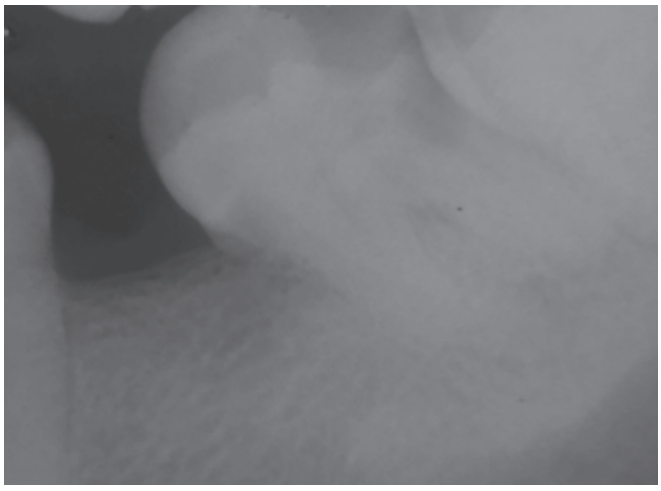
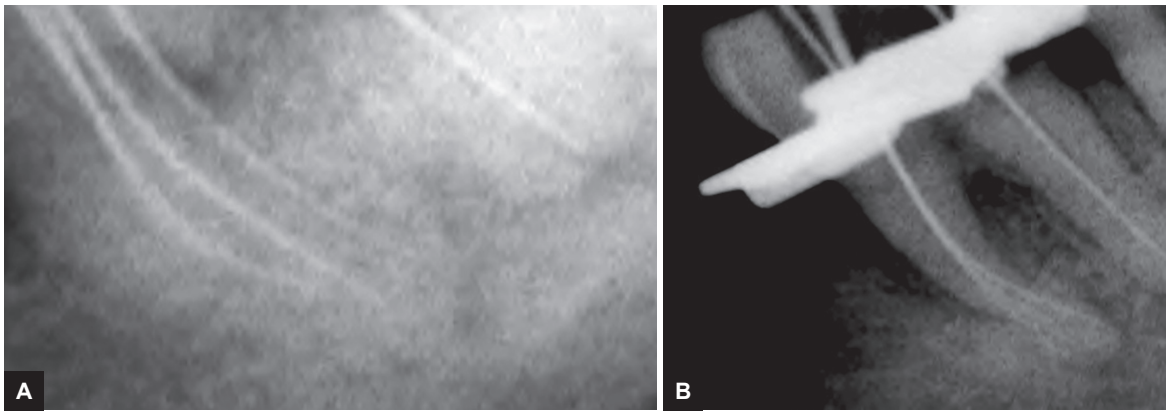


Fig. 1: Preoperative radiograph

Fig. 2: Three distinct independent canals



Figs 3A and B: (A) Magnified view showing three independent canals; (B) view taken from distal angulation

locator (Propex II, Dentsply) and then confirmed with a radiograph (Fig. 2). All canals were cleaned and shaped with Mtwo instruments (VDW GmbH) under copious irrigation with 5.25% sodium hypochlorite.

On the next appointment, using the surgical operating microscope with 8× magnification, the MM canal was identified as independent by Pormeranz's classification. A gutta-percha cone fit radiograph was made and the canals were obturated using cold lateral compaction of gutta-percha and a resin sealer (AH Plus, Dentsply, Germany) (Figs 3 and 4). After an interval of 5 days patient experienced no posttreatment discomfort and the tooth was referred for a full coverage restoration (Fig. 5).

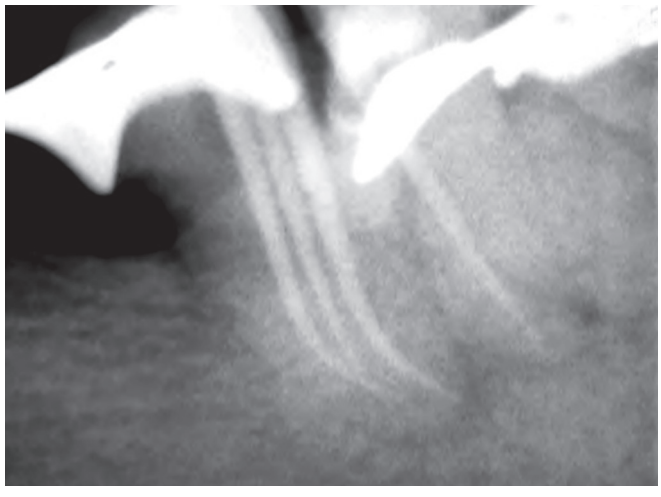


Fig. 4: Obturation demonstrating three independent canals in the mesial root

DISCUSSION

All canals should be accessed, cleaned, and shaped to achieve a hermetic obturation of the entire root canal space.

There are abundant reports that relate the anatomic variations of mandibular molars.[13] This should induce the clinician to accurately observe the pulpal floor to locate extra canal orifices. Searching for additional canal orifices should be standard practice for clinicians. To remove any protuberances from the mesial axial wall to secure the access to developmental groove in mesiobuccal and

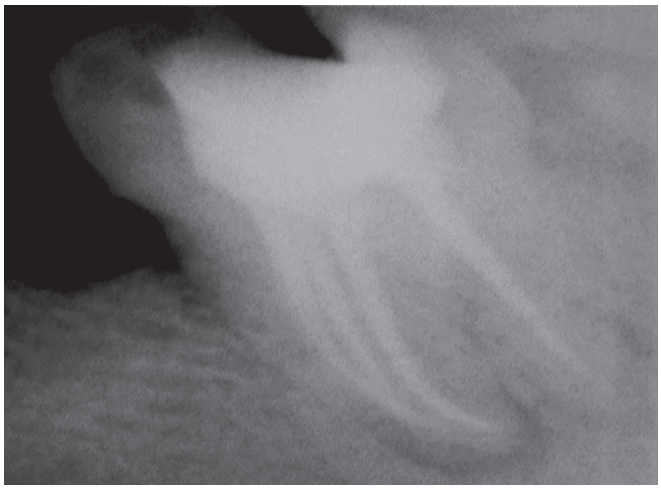


Fig. 5: Follow-up after 2 weeks

mesiolingual orifices, where endodontic explorer with sharp tip can be used to check developmental groove 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.[14] New technologies, such as the dental operating microscope and dental loupes, offer magnification and illumination of the operating field and substantially improve the visualization of root canal orifices.[15,16] New technologies, such as the dental operating microscope and dental loupes, offer magnification and illumination of the operating field and substantially improve the visualization of root canal orifices.[15,16]

The morphology of the mesial root canals in mandibular molars is complex and difficult to find, with a high frequency of intercanal communications and/or isthmuses.[1,9,10]

The presence of a third canal MM in the mesial root of the mandibular molars has been reported to have an incidence of 0.95 to 15%.[1,5,14,17,18]

In almost all of the clinical cases reported, the MM canal joined the mesiobuccal or mesiolingual canal in the apical third.[5,6,12,19,20] However, a few mandibular first molars that had three independent canals in their mesial root have been reported, and further less in the mandibular second molar.[4,6-8,12,21,22]

Most of the reported and reviewed cases in the literature are of first mandibular molars and only a few clinical cases of the second mandibular molars have been reported. Also, mostly it is related to the mesial root. The larger mesiodistal dimension of the distal root, compared with that of the mesial root, may account for the rare incidence of third canal created by dentin apposition in distal roots.

Careful evaluation of research material has, however, shown that deviations from the norm in tooth morphology are not uncommon.

CONCLUSION

When RCT is to be performed, the clinician should be aware that the root canal anatomy may be abnormal.

Every attempt should be made to find and treat all root canals to ensure successful endodontic treatment. The importance of an accurate clinical evaluation of root canal number and morphology in mandibular molars cannot be overemphasized.

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