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Case Report

Management of middle mesial canal under dental operating microscope

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Introduction

A thorough understanding of the morphological variations of the root canal system is of paramount importance for successful endodontic treatment and to have favourable prognosis.[1] Anatomical variations aren't uncommon and the chances of finding multiple root canal systems and roots have increased recently due to the availability of contemporary equipments like dental operating microscope (DOM).[2] The usual anatomy of the mandibular first molar has two roots with two canals in the mesial root and either two or one canal in the distal root. Some deviations of the internal anatomy like radix entomolaris, C-shaped canals and multiple canals have been discussed in the literature.[3]

In addition, literature also describes occurrence of an extra canal in the mesial root of the mandibular molars referred to as "intermediary mesial canal" or the "middle mesial canal".[4] The percentage of this clinical phenomenon is low and usually cited subsequent to careful exploration of the isthmus connecting the main mesiobuccal (MB) and mesiolingual (ML) canal. This paper describes successful non-surgical management of two cases of mandibular first molar with middle mesial (MM) canal under DOM.

Case report

Case 1

A 24-year-old male patient with noncontributory medical history was referred to the dental clinic with the chief complaint of pain in the lower left back teeth region for the past two months. Clinical examination revealed dental caries in left mandibular first molar (36). Intra oral periapical radiograph (IOPA) revealed carious lesion involving the pulp (Fig. 1a). Clinical and radiographic evaluations were suggestive of irreversible pulpitis of 36.

After obtaining the informed consent of the patient, the tooth was anaesthetized using 2% lignocaine (Lignox, Indoco Remedies Ltd, India) and was isolated using rubber dam. Endodontic access cavity was prepared using endo-access bur under DOM (Seiler Revelation®, Seiler Instruments, St Louis, Missouri, USA). Initial exploration of the floor of the pulp chamber using an endodontic explorer revealed two mesial and two distal canals.

Careful examination of the fissure connecting the mesiobuccal and mesiolingual orifices at the floor of the pulp

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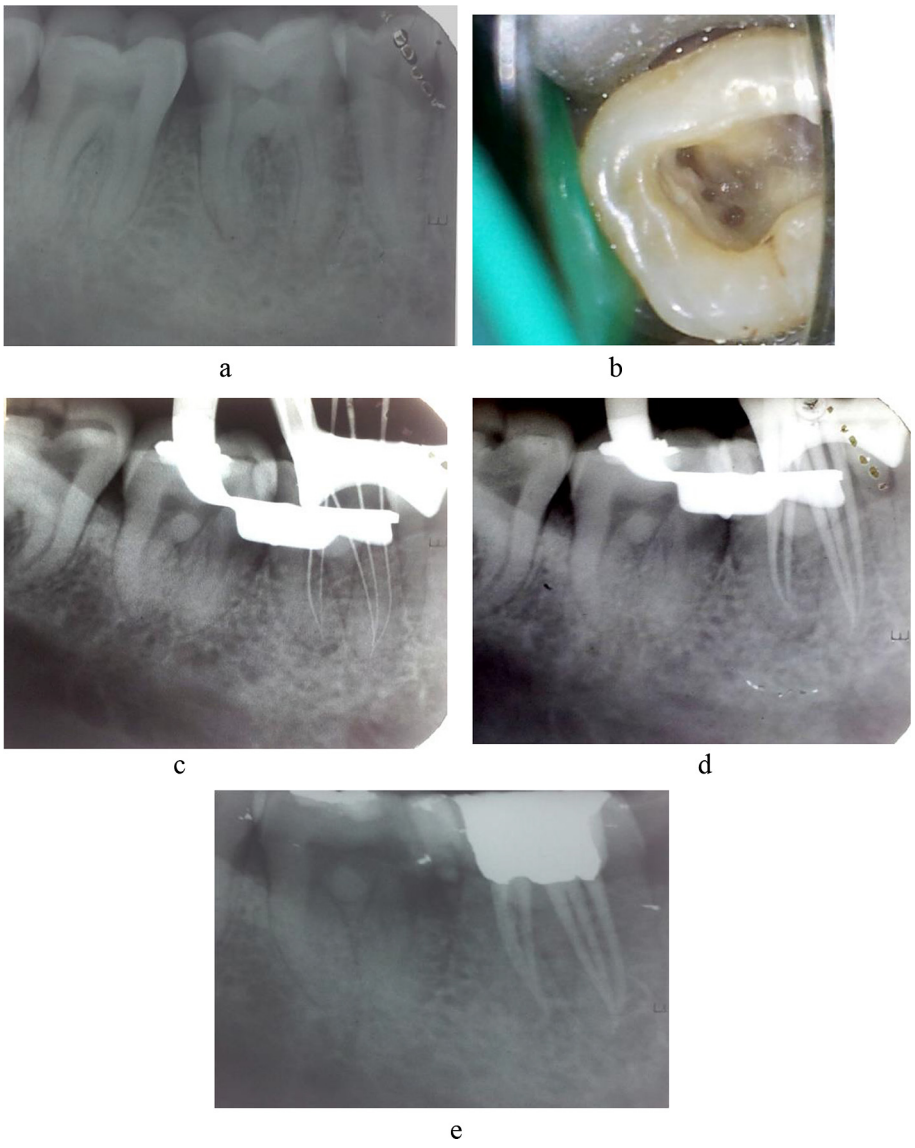

Fig. 1 – (a) Preoperative IOPA. (b) MM canal under DOM. (c) Working length IOPA. (d) Master cone IOPA. (e) Completed obturation.

chamber under the operating microscope of X5 magnification revealed an extra orifice in between the two mesial canals suggestive of middle mesial canal (Fig. 1b). No. 10 K-file (Mani, Inc; Tochigi, Japan) was inserted in all the canals and a radiograph was taken with 20° mesial angulation to authenticate the intraoperative finding of middle mesial canal. Radiographic finding confirmed the presence of middle mesial canal (Fig. 1c).

The working length was established using an electronic apex locator (Root ZX, J. Morita Corp., Tokyo, Japan) and confirmed with the radiograph. Cleaning and shaping of the root canal was carried out using Mtwo (VDW GmbH, Germany). Rotary system well supplemented by Sodium hypochlorite along with 17% EDTA. Calcium hydroxide (Metapex, Meta Biomed Co., Ltd.) intracanal medicament was given and the patient was recalled after a week for obturation. Appropriate gutta percha (GP) mastercones (Dentsply Maillefer, Ballaigues, Switzerland) (Fig. 1d) were selected and the canals were obturated by cold lateral condensation method using AH plus (Dentsply DeTrey, Konstanz, Switzerland) resin sealer (Fig. 1e). Subsequent follow up revealed the patient was asymptomatic.

Case 2

A 22-year-old male patient reported with pain in his lower right back tooth for past 3 months. Clinical and radiographic evaluation was suggestive of irreversible pulpitis in right mandibular first molar (46) (Fig. 2a). The local anaesthetic was administered and the access cavity was prepared under DOM. Examination of the floor of the pulp chamber under DOM with X5 magnification suggested the presence of middle mesial canal (Fig. 2b). The extracanal was explored using no. 10 K-file and confirmed with 20° mesially angulated IOPA. The working

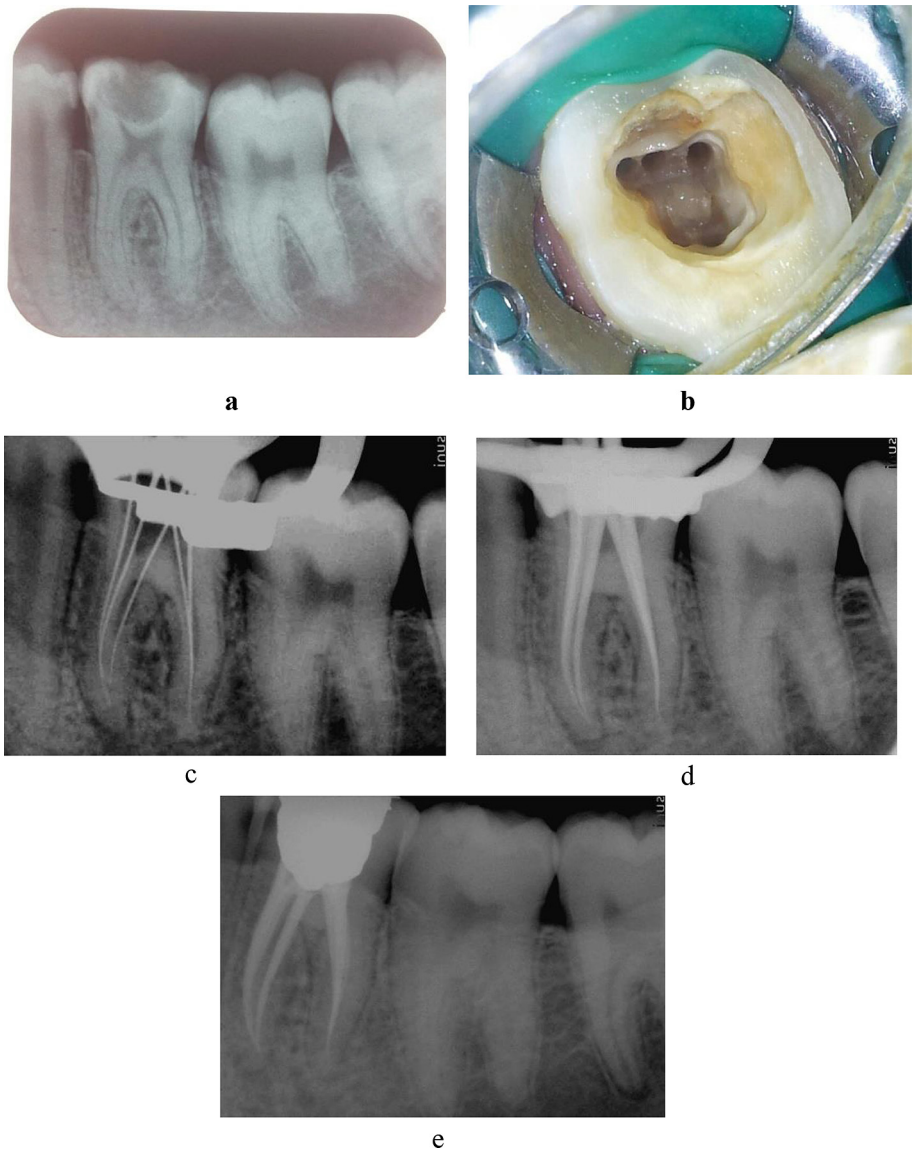

Fig. 2 – (a) Preoperative IOPA. (b) MM canal under DOM. (c) Working length IOPA. (d) Master cone IOPA. (e) Completed obturation.

length was established using an electronic apex locator and confirmed with the working length radiograph (Fig. 2c).

Cleaning and shaping of the root canal system was done using Mtwo rotary system and the canals were obturated using appropriate GP cones with AH plus resin sealer (Fig. 2d and e). Review visits showed the patient was asymptomatic.

Discussion

Mandibular first molar is a tooth of clinical interest with well documented morphological variations. The middle mesial canal is a rare entity and its clinical occurrence ranges between 1 and 15%.[5] Literature search indicates that the MM can be either independent or can confluence with the main mesial canals, MB or ML. The percentage of independent MM is least documented in literature and its incidence is as low as 0.13%.[6]

According to a study by Peiris et al.,[7] mostly the mesial roots of mandibular first and second molar have single large canal until the age of 11 and 15 years of age, formation of the root canal system subsequently occurs due to the deposition of secondary dentin that occurs in the later age.

Missed anatomy is one of the principal factors for root canal treatment failure. The incidence of apical periodontitis is directly proportional to complexity of the root canal system. Based on few epidemiological and retrospective studies Cantatore et al.[8] had discussed that mishap of missed canal resulted in high percentage of apical periodontitis of failed endodontically treated teeth. The prevalence of post treatment disease was more inclined towards the multirooted molars where the possibility of missing an extra canal is more than the incisors.

Few studies have indicated the use of adjuvant methods to locate the additional canal like methylene blue dye test,

champagne bubble test, white line test and red line test.[9] Contemporary diagnostic aids like CT (computed tomography) and CBCT (cone beam computed tomography) have emerged as valuable diagnostic aids to manage canal aberrations like MM canal.[10] de Toubes et al.[11] performed an invitro study to compare four (CBCT, DOM, clinical inspection, digital radiography) diagnostic methods for locating MM canal in mandibular first molar. The study concluded that the percentage of locating and negotiating MM canal is more when DOM was used.

In the presented case reports, the MM canal is independent from orifice to apical foramina. In the first report, the MM canal is located almost equidistant from the MB and ML canal, while in the second report the MM canal is located very close to the MB canal. Moreover, both the case reports had type VIII Vertucci canal configuration, which is a rare clinical entity. This case series highlights the importance of magnification and illumination when canal aberrations are encountered.

Conflicts of interest

All authors have none to declare.

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