

ENDODONTIC MANAGEMENT OF MANDIBULAR FIRST MOLAR WITH FIVE CANALS: CASE SERIES

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ABSTRACT

Lack of knowledge of anatomic variations and their characteristics in different teeth has been one of the main causes of endodontic therapy failure. Mandibular 1st molars commonly have three canals or four canals, five canals are rarely present. In this report, the authors describe the endodontic treatment of a mandibular first molar with five root canals, evaluate the rate of occurrence of this number of canals, and discuss the importance of their identification and treatment.

Key words:

Endodontic management, mandibular 1st molar, five root canal

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INTRODUCTION

Knowledge of root canal anatomy is of utmost importance to the success of endodontic treatment. Incomplete instrumentation, inadequate cleaning and shaping, and the subsequent defective obturation of root canals are the main causes of endodontic treatment failure¹. Anatomical characteristics of the different types of teeth and their possible variations are challenges that are routinely faced by practitioners performing endodontic treatment.

The correct access to pulp chamber is a fundamental step in endodontic therapy as it enables the identification of any variation in the number and position of root canals². Several studies have evaluated the degree of variation in the number of roots and root canals in mandibular first molars. Mandibular first molar is a frequently treated tooth and has a wide variety of root canal configurations³. Variations in the morphology of the dental pulp are caused by genetic and environmental influences⁴. The major variant in mandibular first molars is the presence of a supernumerary root that can be found distolingually and has a curve at the apex. This macrostructure, first mentioned by Carabelli³, is called radix entomolaris, which in general is smaller than distobuccal and mesial roots and can be separate from or partially fused with these other roots². The morphology and buccolingual width of the mesial root allow for intracanal communications and isthmuses. Commonly mandibular first molar exhibits three canals in 78 % of cases i.e. two mesial and one distal, 18%

with four canals i.e. two mesial and two distal, 2.3% radix entomolaris, 1 % five canals and 0.7 % with six canals. It is important for the clinicians to be aware of the morphology in order to achieve success in the treatment

This clinical case describes a mandibular first molar with five canals, three distal and two mesial. The three distal canals emerge as one orifice, then separate at the cervical level and fused to exit as one foramen.

Case Report

Case 1

A 23 years old male visited to the department of conservative dentistry and endodontics M.A. Rangoonwala dental college and hospital, pune with the chief complaint of pain in the lower left back teeth region since 6 days. He described pain as severe continuous aggravated on having food and relived on medication.



Fig 1 Preoperative image

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On examination, deep proximal caries were present with 36, the tooth was tender on percussion, the IOPA revealed deep proximal caries involving pulp fig 1: and hence based on the clinical and radiographic findings the tooth was diagnosed as acute irreversible pulpitis with apical periodontitis and endodontic treatment was initiated.

Endodontic treatment

Prior to beginning of treatment an informed consent of the patient was taken. Endodontic therapy was initiated under local anaesthesia and rubber dam isolation. Access cavity preparation was done with Endo access bur no A0164 (Dentsply) followed by safe ended bur. Two mesial and a large distal canal was visualised and extra canals were suspected in the large distal canal with a single orifice. Exploration of canals was performed using no 10 k file (Dentsply), mesiobuccal, mesiolingual, distobuccal, distolingual and middle distal canals were located and confirmed with mesial angulation using radiovisualgraphy (RVG). The working length determination was done using electronic apex locator (J Morita) followed by confirmation with digital radiograph fig2. All the canals were prepared to size 20 k file followed by use of Protaper universal rotary files using crown down technique up to size 20 .07. along with copious irrigation of 5.25% sodium hypochlorite and normal saline which was activated using endoactivator (Dentsply Tulsa, USA) fig 3. A calcium hydroxide intracanal medicament was placed for 1 week followed by obturation with Gutta percha and AH plus sealer using a lateral condensation technique Fig 4.

Rangoonwala dental college and hospital, pune with the chief complaint of pain in the lower right back teeth region since 3 days. she described pain as severe lancinating continuous and referred to lower jaw and head, the pain aggravated on having food and relived temporary on medication. On examination, occlusal composite filling were present with 46, the tooth was tender on percussion, the IOPA revealed occlusal filling with secondary caries involving pulp fig 1: and hence based on the clinical and radiographic findings the tooth was diagnosed as acute irreversible pulpitis with apical periodontitis and endodontic treatment was initiated.

Endodontic treatment

Prior to beginning of treatment an informed consent of the patient was taken. Endodontic therapy was initiated under local anaesthesia, rubber dam isolation could not be done as the patient was under orthodontic treatment and it was not feasible to remove them only for the purpose of single tooth endodontic treatment. Access cavity preparation was done with Endo access bur no A0164 (Dentsply) followed by safe ended bur. Two mesial and a large distal canal was visualised and extra canals were suspected in the large distal canal with a single orifice. Exploration of canals was performed using no 10 k file (Dentsply), mesiobuccal, mesiolingual, distobuccal, distolingual and middle distal canals were located and confirmed with mesial angulation using radiovisualgraphy (RVG). The working length determination was done using electronic apex locator (J Morita) followed by confirmation with digital radiograph fig2.

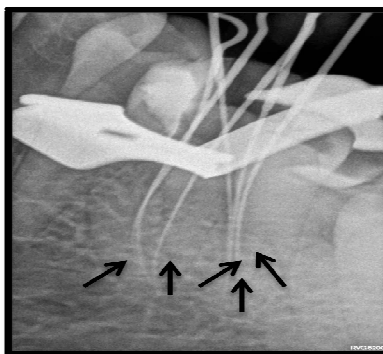


Fig: 2 Working length

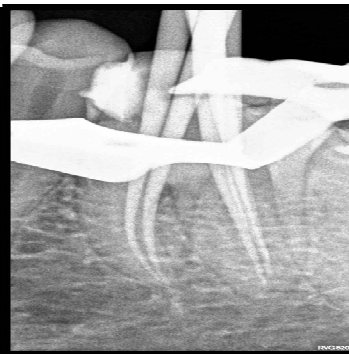


Fig: 3 Master cone



Fig :4 Obturation

Case 2

A 18 years old female visited to the department of conservative dentistry and endodontics M.A.



Fig 1 Preoperative image

All the canals were prepared to size 20 k file followed by use of flexicon rotary files using crown down technique up to size 25.04. Along with copious irrigation of 5.25% sodium hypochlorite and normal saline which was activated using endoactivator (Dentsply Tulsa, USA) fig 3. Followed by obturation with Gutta percha and AH plus sealer using a lateral condensation technique Fig 4.

DISCUSSION

Several studies investigated the anatomy of root canal systems and the anatomical variations found in the different types of teeth to provide information that might improve the outcome of endodontic treatment. However, few studies discussed the occurrence of a third distal canal in the mandibular first molar. Hess³ conducted a study with 512 mandibular first molars and reported that 0.3% of the teeth had only one, 17.7% had two, 78% had three, and 4% had four canals. De Deus⁴ studied 75 mandibular molars and found that 8% had two, 56% had three, and 36% had four canals.



Fig 2 :working length

Fig 3: Master cone selection

Fig 4: obturation (bang on and mesial angulation)

According to Martinez-Berna and Badanelli ⁵, several *in vitro* and *in vivo* studies have investigated the anatomical configuration and the number of root canals of mandibular molars. The most important studies were those conducted by Hess ³, Okumura ⁶, Skidmore and Bjorndal ⁷, Pineda and Kuttler ⁸, and Hartwell and Bellizzi ⁸. However, their studies did not report on any case of mandibular molars with five canals.

Fabra-Campos¹⁰ studied 145 mandibular first molars and found that 2.75% of the teeth had five canals. Martinez-Berna and Badanelli ⁵ conducted a clinical investigation and found 29 teeth with five root canals in a sample of 2362 mandibular permanent molars. Jacobsen *et al.*¹¹ found a substantial rate of occurrence of a third mesial canal in mandibular first molars, and reported that 12 out of the 100 molars studied had a third mesial canal.

According to Ingle ¹², one of the most important causes of endodontic treatment failure is the incomplete obturation of the root canal system. Therefore, the correct location, instrumentation and obturation of all canals are indispensable procedures. Similarly, Vertucci¹³ and De Grood and Cunningham¹⁴ reported that a considerable number of failures could be assigned to anatomical variations, such as the presence of canals not usually found. Jacobsen *et al.* ¹¹ found a substantial rate of occurrence of a third mesial canal in mandibular first molars: they reported that 12 out of the 100 molars studied had a third mesial canal. Clinical evaluations have shown a small but significant number of mandibular molars with five canals ⁵. The region between the distolingual and distobuccal canals should be carefully examined in case of the possible occurrence of a fifth canal.

New technologies, such as dental loops, dental operating microscope, offer superior magnification and illumination of the operating field and hence their use should be encouraged. Carvalho and Zuolo¹⁵ described the usefulness of microscopes in the accurate location of root canal orifices, which may substantially improve treatment outcomes.

CONCLUSION

A thorough knowledge of root canal anatomy is fundamental requirement for endodontic practice. Dental operating microscopes are excellent auxiliary clinical resources to locate root canals after good coronal access.

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