



SINGLE SITTING ROOT CANAL TREATMENT OF MANDIBULAR FIRST MOLAR WITH ABERRANT ROOT CANAL MORPHOLOGY: A CASE REPORT

Dental Science

Dr Navin Mishra*	Assistant Professor Conservative Dentistry & Endodontics, IGIMS, Patna *Corresponding Author
Dr Isha Narang	Endodontist HCMS, Haryana Govt.
Dr Krishna Biswas	senior resident Lady Harding Medical college, New Delhi
Dr Dristi Kaushal	Senior Resident, AIIMS, Rishikesh
Dr Priyanka Singh	Assistant Professor department of Dentistry IGIMS, Patna
Prof Dr AK Sharma	HOD, Department of Dentistry IGIMS, Patna

ABSTRACT

Introduction: The root canal treatment of mandibular molars with aberrant canal configuration can be technically arduous requiring knowledge of anatomy, patience and perseverance. The present case report describes single sitting management in first mandibular molar having three mesial and two distal canals with new generation rotary file system. Neo Endo Flex Rotary File.

Methods: Endodontic management of first mandibular molar with three mesial and two distal canals was done with Neo Endo Flex Rotary Filesystem.

Results: Patient was clinically asymptomatic and radiographically sound on follow up visits

Conclusion: For successful endodontic treatment it is important to detect accessory and aberrant root canals and newer NITI file system can prove to be boon in managing such complicated canal architecture with great ease.

KEYWORDS

Middle mesial canal, Rotary files, Mandibular second molar

INTRODUCTION

In 21st century, endodontics has seen latest advances and applications of technological resources and improving the quality of root canal treatment. The contemporary approach to manage aberrant root canal complexities often leads to surgical intervention or orthograde retreatment on follow ups.. The main aim of endodontics is either to reduce or eliminate the root canal pathogenic flora during endodontic treatment, which may be accomplished by a combination of mechanical instrumentation techniques which includes Hand and rotary instrumentation, irrigation protocols and intracanal antimicrobial medications. [1] The enhanced magnification with loupes or use of microultrasonics invariably leads to better resolution of periradicular lesions with complete three dimensional reconstruction of the periodontal ligament entity in the apical region. New century technologies intended for endodontic treatment has been focused largely on improving the quality of treatment by improving clinicians' ability to detect root canals^[1,2] particularly in teeth in which accessory canals are present. Several investigations have supported the advantage of the microscope over the use of no magnification.^[3,4] One of the teeth with a complex root canal system is the mandibular molar. The mesial root in mandibular molars is commonly considered to have two canals^[5,6] with an isthmus in between.^[7,8] Within this system, the presence of an accessory mesial canal has been identified with a prevalence ranging from 0% to 17%^[9,10,11,12] Apart from the prevalence, the ability to negotiate the detected accessory mesial canals, including the troughing depth required to enable negotiation, has not been well characterized, hence an astute clinician should have thorough knowledge of aberrant anatomy, advanced diagnostic and treatment modalities with the recent modifications in dental materials with regards to biocompatibility because every root canal poses a new challenge to endodontists. Numerous studies describe the morphology of mandibular molars. Pineda and Kuttler, and Vertucci^[13] have all reported on the presence of three or four canals in mandibular molars. In 1974, Vertucci and William, as well as Barker et al.

^[14, 15] described the presence of an independent middle mesial canal. Since then, there have been multiple case reports of aberrant canal morphology of the mandibular first molar.^[16] The incidence of third mesial canal in mandibular first molar varies from 1 to 15 %. But presence of such complexity in mandibular second molar should not be over looked.

Thermal treatment of NiTi alloy has significantly improved its

mechanical properties adding to its overall flexibility and a greater resistance to cyclic fatigue especially in curved root canals.

The present case report describes the presence of third mesial canal in mandibular first molar and its successful negotiation with new generation rotary files Neo Endo files and microultrasonics for a successful outcome of root canal therapy.

Case Report 1

A 24-year-old male reported to the division of Conservative Dentistry and Endodontics, with a chief complaint of pain in the lower left back region since 2 months. The patient's medical history was non-contributory. Extraoral examination did not reveal any significant changes. Clinical examination revealed the decayed mesial surface in the left mandibular first molar (tooth #36) with no sinus or fistula. There was tenderness to palpation and vertical percussion, but the tooth mobility was within normal physiological limits. Thermal testing elicited a delayed and prolonged response in tooth #36. The pre-operative radiograph of tooth #36 taken from 20 degrees mesial angulation showed the presence of two roots with slight widening of the periapical periodontal ligament space in relation to the mesial root apex and periapical radiolucency with respect to the periapex of the mesial root [Figure 1] from the clinical and radiographic findings, a diagnosis of irreversible pulpitis with acute apical periodontitis with tooth #36 was made. Tooth #36 was anesthetized by using 1.8 mL (30 mg) of 2% lidocaine containing 1:200,000 epinephrine (Xylocaine; AstraZeneca Pharma Ind Ltd., Bangalore, India). A rubber dam was placed and with the use of microscope (Carl Zeiss Surgical GmbH, Oberkochen, Germany) endodontic access opening was established in tooth #36. The pulp chamber floor was then explored with DG 16 explorer and Mesio Buccal, Mesio Lingual, Distobuccal and Distolingual canals were then located. After access refinement with ultrasonic tips 1 and 3 (Pro Ultra Endo Tips, Dentsply Maillefer, New York, America) a hemorrhagic point was noted approximately in between the orifices of mesial canals and a middle mesial canal was also located in tooth #36. Coronal enlargement was done with a nickel-titanium (NiTi) rotary file Ultimo 15 no with 5 percent taper (Neoendo flex rotary file system) to improve the straight line access. Working length was determined with the help of an apex locator (Root ZX; Morita, Tokyo, Japan) and later confirmed by using a radiograph [Figure 3]. Cleaning and shaping was performed under rubber dam isolation by using Neoendo Flex Rotary Files at 350 rpm and 1.5 N cm up to file size 25/06. Irrigation was performed using normal saline, 5.25% sodium

hypochlorite solution and 17% ethylenediaminetetraacetic acid. Final rinse was carried out with 2% chlorhexidine solution after saline irrigation. After completion of cleaning and shaping, the root canals were dried with absorbent points (Dentsply Maillefer). Tooth #36 was obturated using 4% and 6 Percent Taper 25 no gutta percha and AH plus root canal sealer. The tooth was permanently restored using composite resin (Z100; 3M Dental Products). The patient was clinically asymptomatic on follow-up visits. Radiographically, there was healing of the periapical lesion after 7 months [Figure 2]

Pre operative X ray



Figure 1. Preoperative Intraoral Periapical Radiograph

Post Operative X ray Follow up 7 Months



Figure 2. Post Operative Intraoral Periapical Radiograph 7 Month

DISCUSSION

One of the biggest challenges a clinician faces while performing endodontic treatment in mandibular molars is the complexity of the root canal systems. Numerous studies have described the morphology of mandibular molars^[17]. The morphology of the mesial root canals in mandibular molars is complex and difficult to find, with a high frequency of inter- canal communications and or isthmuses^[18, 19]. The presence of a third canal (middle mesial) in the mesial root of the mandibular molars has an incidence of 0.95%-15%^[20, 21]. In most of the clinical cases reported this canal joined the mesiobuccal or mesiolingual canal in the apical third^[22, 23]. However a few mandibular first molars that had three independent canals in their mesial root have also been reported^[24]. Hence, identification and treatment of entire root canals of mandibular molars should be the ideal goal of endodontic treatment. But management of such complex entity is impossible to achieve in the very ideal manner. But with endodontic advancement through standardized techniques and armamentarium, reaching this goal is possible. When explored with the aid of the operating microscope, an accessory mesial canal was detected in 17% of first molars and fewer than 5% of second molars compared with 0% when no magnification was used.^[9] Mandibular first molars are known for the presence of three, four or five canals but presence of extra canals is often overlooked while managing mandibular second molars. The present case reports described a successful orthograde endodontic management of middle mesial canal with microultrasonics and rotary Neoendo files which has better centering ability thus minimizing canal transportation and because of extreme flexibility it is very easy to negotiate accessory canals. Treating additional aberrant canals can be challenging, but the inability to find root canals may cause failures. Manning^[25] looked at mandibular second molars and found that 22% had one root, 76% had 2 roots, and 2% had 3 roots. In the 2-root group, most of the teeth had one or 2 canals in the mesial root that joined before the apex (Weine Type II) and 1 canal in the distal root. About 25% of the mesial roots had 2 separate canals from pulp chamber to apex (Weine Type III). Although the location of the accessory mesial

canal orifice has been reported closer to the mesiolingual (ML) canal, its pathway converges with either the ML canal or the MB canal. When explored with the aid of the operating microscope, an accessory mesial canal was detected in 17% of first molars and fewer than 5% of second molars compared with 0% when no magnification was used.^[9] The mandibular second molars often don't have 2 roots but a single fused root. The canal configurations of these teeth vary from one canal to four canals and commonly contain multiple isthmuses and anastomosis with 8% incidence of C shaped canals. The presence of a third canal in the mesial root of mandibular molars has been reported to have an incidence rate of 1 to 15%. 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 mesiolingual canal. Although the high-prevalence accessory mesiobuccal canals in maxillary molars have been well characterized the lower-prevalence accessory mesial canals in mandibular molars are not well recognized by clinicians. The accessory mesial canals invariably originate within the subpulpal groove or isthmus connecting the two main canals making their detection very challenging. Many clinicians tend to perceive a given tooth will contain a predetermined number of root canals however, a careful evaluation of the literature shows deviations from the normal is not uncommon hence, a thorough knowledge of root canal morphology and unusual anatomy of the tooth is critical for the treating dentist for a successful outcome of root canal therapy.

CONCLUSION

Detailed knowledge of the root canal system is imperative for a successful root canal treatment. Unforeseen complexities can be managed with the thorough knowledge and armamentarium. The detection of additional root canals requires a careful clinical and radiographic visualization. Diagnostic tools such as multiple radiographs, careful examination of the pulpal floor with a sharp explorer, and better visualization using an operating microscope and use of ultrasonics and use of high flexibility NITI rotary files are all important aids in the detection of aberrant root canal in mandibular molars for successful management of these cases.

REFERENCES

- Kersten DD, Mines P, Sweet M. Use of the microscope in endodontics: results of a questionnaire. *J Endod* 2008; 34:804-7.
- Lee M, Winkler J, Hartwell G, et al. Current trends in endodontic practice: emergency treatments and technological armamentarium. *J Endod* 2009; 35:35-9.
- Saunders WP, Saunders EM. Conventional endodontics and the operating microscope. *Dent Clin North Am* 1997; 41:415-28.
- Buhrley LJ, Barrows MJ, BeGole EA, et al. Effect of magnification on locating the MB2 canal in maxillary molars. *J Endod* 2002; 28:324-7.
- Pineda F, Kuttler Y. Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. *Oral Surg Oral Med Oral Pathol* 1972; 33:101-10.
- Pomeranz HH, Eidelman DL, Goldberg MG. Treatment considerations of the middle mesial canal of mandibular first and second molars. *J Endod* 1981; 7:565-8.
- Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol* 1984; 58:589-99.
- De Carvalho MC, Zuolo ML. Orifice locating with a microscope. *J Endod* 2000; 26:532-4.
- Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol* 1984; 58:589-99.
- Fabra-Campos H. Unusual root anatomy of mandibular first molars. *J Endod* 1985; 11:568-72.
- Fabra-Campos H. Three canals in the mesial root of mandibular first permanent molars: a clinical study. *Int Endod J* 1989; 22:39-43.
- Vertucci F. Root canal anatomy of the human permanent teeth. *Oral Surg* 1984; 58:589-99.
- Vertucci F, Williams R. Root canal anatomy of the mandibular first molar. *JN Dent Assoc* 1974; 48:27-8.
- Barker, BCW, Parsons, KC, Mills, PR, Williams, GL. Anatomy of root canals. III. Permanent Mandibular molars. *Aust Dent J* 1974; 19:408-13.
- Hess W, Zurcher E. The anatomy of the root canals of the teeth of the permanent and deciduous dentitions. New York: William Wood & Co; 1925.
- Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol* 1984; 58:589-99.
- Teixeira FB, Sano CL, Gomes BP, Zaia AA, Ferraz CC, Souza-Filho FJ. A preliminary in vitro study of the incidence and position of the root canal isthmus in maxillary and mandibular first molars. *Int Endod J* 2003; 36:276-80.
- Yesilsoy C, Gordon W, Porras O, Hoch B. Observation of depth and incidence of the mesial groove between the mesiobuccal and mesiolingual orifices in mandibular molars. *J Endod* 2002; 28:507-9.
- Baugh D, Wallace J. Middle mesial canal of the mandibular first molar: a case report and literature review. *J Endod* 2004; 30:185-6.
- Gulabivala K, Opanason A, Ng YL, Alavi A. Root and canal morphology of Thai mandibular molars. *Int Endod J* 2002; 35:56-62.
- Beatty RG, Krell K. Mandibular molars with five canals: report of two cases. *J Am Dent Assoc* 1987; 114:802-4.
- Fabra-Campos H. Unusual root anatomy of mandibular first molars. *J Endod* 1985; 11:568-72.
- Bond JL, Hartwell GR, Donnelly JC, Portell FR. Clinical management of middle mesial root canals in mandibular molars. *J Endod* 1988; 14:312-4.
- Manning SA. Root canal anatomy of mandibular second molars. Part 1. *Int Endod J* 1990; 23:34-39.