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Research Paper

Management of A Case of Unusual Anatomy in First Mandibular Molar with Three Canals in Distal Root

Medical Science

KEYWORDS : canal complexity , middle distal canal , mandibular first molar , five root canals

Dr R.K. Tiwari	Professor, Department of conservative dentistry and endodontics, Dr Z. A. Dental college, A.M.U. Aligarh
Dr sameer savaliya	Sr Lecturer , Department of conservative dentistry and endodontics, karnavati school of dentistry
*** Dr parul kansal**	Resident Doctor, Department of conservative dentistry and endodontics, Dr Z. A. Dental college, A.M.U. Aligarh * Corresponding Author
Dr E. Deenadayalan	Resident Doctor, Department of conservative dentistry and endodontics, Dr Z. A. Dental college, A.M.U. Aligarh

ABSTRACT

The endodontic treatment of a mandibular molar with aberrant canal configuration can be diagnostically and clinically challenging. With the increasing number of reports of aberrant root canal morphology, the clinician needs to be aware of the variable anatomy. This case report presents the treatment of a mandibular first molar with five root canals, of which two canals were located in the mesial root and three in distal root. This case presents a rare anatomic configuration and points to the importance of expecting and searching for additional canals.

INTRODUCTION

The successful root canal treatment depends on adequate cleaning, shaping, and filling of the root canal system. Microorganisms present in untouched areas such as missed canals, isthmuses, and irregularities may remain unaffected by endodontic disinfection procedures. These microorganisms continue to multiply to significant number and gain access to the periradicular region, causing inflammation in the periradicular tissues [1]. Therefore, it is imperative that aberrant anatomy is identified prior to, and during the root canal treatment of such teeth.According to Vertucci [2] the mandibular first molar having following configuration. The mesial roots present two canals on a regular basis, adopting 2-2 and 2-1 as the most common configurations. A third canal is present in 2.6% of the population. The most common configuration in the distal root is type I (62.7%), followed by type II (14.5%) and type IV (12.4%). The mandibular second molar is similar to the first, except that the roots are shorter, the canals more curved, and the range of the variations broader. Very often (64%) the mesial root has two canals, approximately 38% incidence for type II and 26% incidence for type IV. In the distal root, there is almost always only one independent canal (92%)(type I), rarely type II (3%) or type IV (4%). When type I is a single canal extends from the pulp chamber to the apex; type II are two separate canals leave the pulp chamber and join short of the apex to form one canal and the type IV are two separate and distinct canals extend from the pulp chamber to the apex. It has been postulated that secondary dentin apposition during tooth maturation would form dentinal vertical partitions inside the root canal cavity, thus creating root canals. A third root canal may also be created inside the root canal cavity of mandibular molars by this process. Such third canals are usually situated centrally between the two main root canals, the buccal and lingual of the mesial and distal roots. The diameter of these third middle canals is usually smaller than that of the other two [3].The aim of this case report is to present and describe the management of a mandibular first molar with three canals in the distal root and two in mesial root.

CASE REPORT

A 20-year old female patient was referred to our department of Conservative Dentistry and Endodontics with the chief complaint of pain in the lower right back tooth since the past 7 days. Her medical history was non-contributory. Clinical examination revealed a deep occlusal carious lesion in relation to right mandibular first molar (tooth # 46). The tooth was tender to vertical percussion. There was no tenderness on palpation in buccal and lingual vestibule. Tooth mobility and periodontal probing around the tooth was within physiologic limits. Thermal and electrical pulp testing elicited a negative response. The preoperative radiograph demonstrated an occlusal radiolucency approaching the pulp space and widening of periodontal ligament space in relation to the mesial root apices and the furcation region. A diagnosis of necrotic pulp with symptomatic apical periodontitis was established and endodontic therapy was scheduled.

Following local anaesthesia, an endodontic access cavity was prepared under rubber dam isolation on tooth # 46. Examination of pulp chamber floor revealed five distinct root canal orifices: two were detected mesially (mesiobuccal and mesiolingual); and, three distally (distobuccal, middle distal and distolingual). Three canals in the distal root were confirmed on radiograph (Fig 1). The orifices were enlarged using #2 Gates-Glidden Drill (Mani, Japan). After confirming the working length with a radiograph the mesial canals were enlarged up to size F2 Protaper hand file (Dentsply, Switzerland) and the distal canal was instrumented with hand K-files (DentsplyMaillefer) and enlarged up to size F2 Protaper hand file (Dentsply, Switzerland. Intracanal medicament of 2% chlorhexidine was placed and closed dressing was given to enhance access and visualization. Cleaning and shaping of canals was done, and the canals were dried with absorbent points. The obturation was done by cold lateral compaction of gutta-percha. The patient was asymptomatic during the follow-up period. Post obturation radiograph after 6 months. (fig – 2)

DISCUSSION

The majority of mandibular first molars have two roots, one mesial and one distal, and their usual root canal distribution is two canals in the mesial root and one or two canals in the distal root [4]. The major variant of root canal system of mandibular first molar is the presence of a middle mesial canal with 1-15 % incidence [5]. Incidence of three canals in distal root of mandibular first molar in an Indian population is 1.7%; 0.2% in Senegalese population; 1.7% in Turkish population; 0.7% in Burmese population; 1.6% in Thai population; and, in Sudanese population 3% incidence has been reported [6]. Review of case reports with finding of 3 or more canals in distal root/roots of mandibular first molar is given in table 1.

This case demonstrates a rare anatomical configuration and supports previous reports of the existence of such configuration in mandibular first molars. In this case report, distal root has three distinct root canal orifices with two apical terminations that could be described as Type II canal configuration according to Gulabiwala et al supplemental canal configurations of root canal morphology [7]. It has been postulated that secondary dentin apposition during tooth maturation would form dentinal

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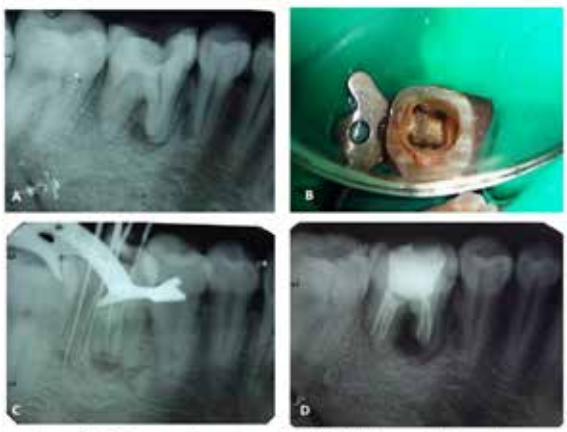

Figure 1: (A) Preoperative radiograph of 46, (B) intraoral photograph showing three distal canal orifices in access cavity preparation, (C) Working length radiograph, (D) Postobturation radiograph

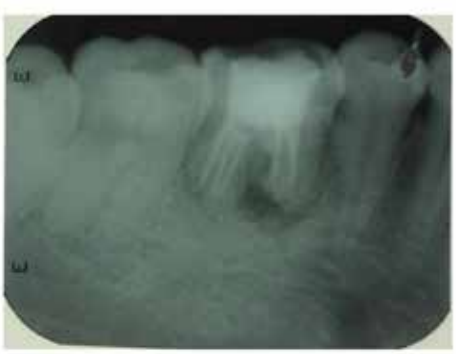

Fig 2- follow up radiograph after 6 months

Review of case reports with finding of 3 or more canals in distal root/roots of mandibular first molar

Investigator	Year	No. Of Distal roots	No. Of Distal canals	Distribution of canals in distal roots
Mustaq et al	2011	1	3	distobuccal, mid - distal,distolingual
Kuttor et al	2010	1	3	distobuccal, mid distal,distolingual
Chandra et al	2009	1	3	distobuccal, mid distal,distolingual
Ghodussi et al	2007	2	4	distobuccal 1 & 2, mid distal,distolingual
Lee et al	2006	3	3	distobuccal, distal-centre, distolingual
Kimura	2000	2	3	distobuccal, distolingual 1 & 2
Reeh	1998	1	3	distobuccal,mid-distal, distolingual
Friedman et al	1986	3	3	distobuccal, distal centre,distolingual
Stroner et al	1984	2	3	distobuccal 1 & 2, and distolingual

CONCLUSIONS

When root canal treatment is to be performed the clinician should be aware that both external and internal anatomy may be abnormal. Knowledge of possible variations in internal anatomy of human teeth is important for successful endodontic treatment. Root canal treatment was carried out successfully and the prognosis should be good. Usually, a prudent inspection of the pulp chamber floor by proper visualization allows the clinician to search for additional canals. Proper and thorough instrumentation is one of the key factors in the success of endodontic therapy; therefore, the clinician should be aware of the incidence of these extra canals in the mandibular first molar.

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