



UNUSUAL ROOT CANAL MORPHOLOGY OF MANDIBULAR FIRST MOLAR WITH SEVEN CANALS -A CASE REPORT

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ABSTRACT It can be difficult to diagnose and treat an aberrantly configured canal in a mandibular molar using endodontics. In this case study, the treatment of a mandibular first molar with seven root canals in 2 rooted tooth—four of which were in the mesial root and three of which were in the distal root—is observed in Indian population. This case illustrates a unique anatomic structure and emphasises the significance of anticipating and looking for additional canals. This case report describes a successful management of an aberrant morphology in a mandibular 1st molar.

KEYWORDS : Cone beam computed tomography, mandibular first molar and seven root canals.

INTRODUCTION:-

A precise diagnosis, a full understanding of biological principles, such as cleansing, shape, and disinfection, that would enable three-dimensional obturation of the root canal system, and efficient treatment execution are necessary for an endodontic operation to be successful. Understanding the anatomy of the root canals thoroughly is essential for effective root canal therapy. Clinical practitioners have long been fascinated by the variances in teeth because no two teeth are alike. The root canal anatomy must be thoroughly understood in order to find and treat this structure because variances in teeth are natural. A large number of failures caused by abnormal anatomy, such as missing canals, were recorded by Vertucci.¹

Hence, in cases when additional canals or anatomical changes are disregarded, posttreatment consequences may develop. Magnification is useful and should be used in regular endodontic cases because, as the saying goes, "you can only treat what you can see." This leads to better results.

The first permanent teeth to erupt are the mandibular first molars, which usually need endodontic treatment. The first molars typically have two roots on either side of the mandible: a distal root with one or two canals and a mesial root with two canals. The first mandibular molars are connected with a variety of anatomical changes and anomalies, many of which have been reported in the literature. C-shaped canals, five canals, six canals, and seven canals are only a few of the numerous varieties of canals. The presence of a middle mesial canal, which occurs in 1–15% of instances, is the main variation of the root canal system of the mandibular first molar.² At the distal root, however, three canals have also been noted, with an incidence of 0.2% to 3.0%.³

CBCT has gained recognition as an essential tool for diagnosis and treatment planning in a growing number of dental specialties since its introduction. ⁴ The disadvantages of conventional radiography, such as the inability to evaluate complex canal anatomy in three dimensions during endodontic treatment, can be overcome using CBCT⁵.

The mandibular first molar described in this case report is the first of its kind to have two roots and seven root canals in an Indian population (4 canals in mesial root and 3 canals in distal root). This type of

morphology has not before been discussed in clinical, laboratory, or clinical case studies. This odd shape was confirmed by cone-beam computed tomography (CBCT) scanning. A seven-canal mandibular first molar received an efficient non-surgical treatment.

CASE DESCRIPTION AND RESULTS:

A 21-year-old male patient arrived at the Dr. Hegdewar Smruti Rugna Seva Mandals Dental College in Hingoli's Department of Conservative Dentistry and Endodontics. The patient's main complaint was right-side pain when chewing. The patient's medical history did not contribute. The widespread caries caused substantial damage to tooth 46, which responded favourably to the cold test and was just slightly sensitive to percussion. There were no sinus tracts and no apices that were sensitive to palpation. On #46, pre-operative periapical radiograph revealed severe carious lesions.



Figure 1: PRE-OPERATIVE RADIOGRAPH

There was slight PDL widening and periapical radiolucencies seen on the radiograph. This case was diagnosed as Chronic irreversible pulpitis with asymptomatic apical periodontitis. A combination of 2% lignocaine and 1:80,000 epinephrine was used to anaesthetize the patient. A cavity was created for endodontic access after rubber dam isolation. There are three canal orifices in the pulp chamber: mesiobuccal, mesiolingual, and distolingual. The distobuccal canal was located in the first phase using Krasner and Rankow's first law of symmetry.

When the mesiobuccal and mesiolingual canals were far apart in the

second phase, two extra canals were present between them and the floor-wall junction was explored using a DG 16 explorer, in accordance with the first law of orifice location.⁶

Figure 2 - Location of Mesial and Distal canals:

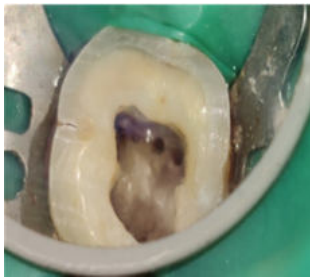


Figure2: a



Figure2: b



Figure 2: c

The next step involved exploring the area between and outside the distolingual and distobuccal canals, or isthmus. One buccal to the previously believed distobuccal canal, another canal was discovered. As a result, 7 canal orifices in total were found, 4 in the mesial root and 3 in the distal root. According to proposed anatomically based nomenclature, they were referred to as mesiobuccal, linguo-mesiobuccal, bucco-mesiolingual, and mesio-lingual in mesial root, and distobuccal, linguodistobuccal, and distolingual in distal root.⁷

When performing the process, magnifying loupes were used. Each canal was traversed independently, and independent working length radiographs were acquired. Radiographs strongly suggested the presence of two distinct foramina in each root. Working lengths of 20 mm and 19.5 mm, respectively, were established for all mesial and distal canals. Cone beam computed tomography scan done before the biomechanical treatment to confirm the prevailing case, correlating the clinical and radiographic data. Following working length determination, the canal was prepared up to an apical size of 25/0.04. in a step-Down approach using Protaper Gold Ni-Ti rotary files.



Figure 3: WORKING LENGTH RADIOGRAPH.

5.25% sodium hypochlorite (NaOCl) and 17% ethylenediaminetetraacetic acid (EDTA) were utilised as the irrigant during root canal preparation. Canal was temporarily restored with Cavit for 14 days after being filled with calcium hydroxide medication (3M, ESPE).

During the second appointment, the temporary restoration was taken off and regular saline was used for irrigation. Following the drying of all channels with absorbent paper points, obturation using the single-cone technique and Ceraseal Bioceramic sealer was carried out.



Figure 4:- MASTERCONE RADIOGRAPH

To assess the quality of the obturation, a final radiograph and cbct were collected. A posterior composite filling was used to reconstruct the tooth after root canal therapy was finished.

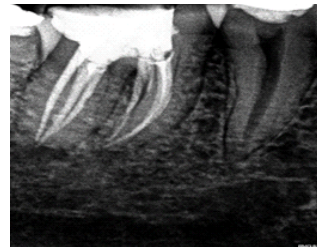


Figure 5:- POST OBTURATION RADIOGRAPH

CBCT IMAGES:-

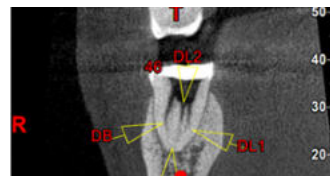


Figure 6: a) CBCT IMAGE

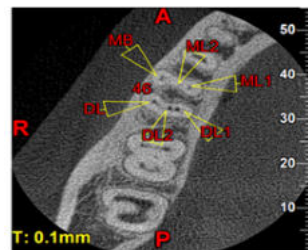


Figure 6 b) CBCT IMAGE WITH NOMENCLATURE



Figure 6 c) FINAL CBCT IMAGE



Figure 6d) FOLLOW UP IMAGE AFTER 14 MONTHS.

DISCUSSION:

One of the endodontic issues is finding additional roots or canals in the mandibular first molars and treating them. It is essential to have a good understanding of the most common root canal configuration and its variations in order to guarantee the long-term effectiveness of the endodontic therapy. In the teeth that required retreatment, Hoen and Pink 8 reported a 42% prevalence of missing root or canals. Hence, complete debridement and obturation of the root canal system constitute an essential endodontic treatment.

The below masterchart depicts the previous cases of multiple canals in mandibular first molar in various populations.

Sr. No.	AUTHOR	PATIENT AGE AND GENDER	TOOTH NO. IN MANDIBULAR ARCH	POPULATION	NO. OF CANALS	CANAL PREVALENCE
1	Mohammad Ahmad Alenezi et al (2017) ⁹	28-year/M	46	Asian (Saudi Arabia)	4	3-2 type in the mesial root.
2	Mohammad Ahmad Alenezi et al (2017) ⁹	22-year/F	36	Asian (Saudi Arabia)	5	(2-3) type in distal root.
3	Mohanavelu Deepalakshmi et al (2013) ¹⁰	33-year/F	46	Indian	4	Three canals in mesial root.
4	Arturo Martinez-Berna et al (1985) ¹¹	22 year/F	36, 46	Caucasian	6	Three canals in the mesial root and three in the distal root.
5	Hani Baziar, et al (2014) ¹²	42-year/M	36	Iranian/Persian	6	The distal root had four distinct root canal and 2 canals in mesial root.
6	Jamileh Ghoddusi et al(2007) ¹³	30-year/F	NOT SPECIFIED	Iranian/Persian	6	Two mesial in two mesial roots and four distal canals in two distal roots.

7	Mohammad Frough Reyhani et al (2007) ¹⁴	43-year/M	46	Iranian/Persian	5	Three mesial canals and two distal canals.
8	Ankur Mahesh Banode et al (2016) ¹⁵	25 years	46	Indian	7	Four canals in distal and three in mesial root in multirrooted mandibular third molar.

The development of secondary dentin during the formation of the root, which creates vertical walls, may have compressed the connective pulp tissue, which is the cause of the presence of an additional or additional canal(s) in teeth. In addition, this phenomenon was reported to be high in younger patients. The morphology of the distal root of mandibular molars can vary depending on how many angled pretreatment radiographs are carefully examined. The only result of periapical radiography is a two-dimensional image. As a result, its usefulness is reduced in situations involving aberrant anatomy.

The fact that traditional periapical radiography produces a two-dimensional depiction of a three-dimensional object, however, should be emphasised as a significant disadvantage. So, in situations where there is complex anatomy, periapical radiographs are only partially informative... For the examination of the anatomy of the root canals, CBCT has recently been employed in endodontics. When compared to conventional radiography, computed tomography (CT) scanning has the advantage of allowing the user to see different root sections and their canals. According to Nance et al. 16, a CT scan considerably improved the ability to detect canals when compared to traditional radiography. The intricate root canal anatomy was better understood in this case study because of the use of CBCT imaging and healing was observed to be better after 14 months interval. The presence of 2 roots and 7 canals was verified by studying the axial and coronal slices of the CBCT images. This is the first instance where a mandibular first molar's distal root and mesial root both had 3 canals and a total of 4 canals, for a total of 7 canals.

Each endodontist or general practitioner may find treating extra canals difficult; yet, failing to locate and treat the extra canals effectively may result in failure. These obstacles might be overcome using modern diagnostic tools like CBCT.

CONCLUSION:

First molars of the mandible may have intricate root canal architecture. Utilizing magnification devices combined with CBCT instruments and having improved knowledge of the root canal system to locate the additional canal (s) all contribute to improving the success of root canal therapy. When identifying and treating their clinical problems, dentists should be aware of the anatomical variances among the various human dentitions. This case report demonstrates how endodontic therapy for 46 patients with 7 canals was successful.

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