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Management of Mandibular First Molar with Six Root Canals: A Case report

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Abstract

Internal anatomy of pulp is a complex structure which provides a challenge in successful diagnosis and endodontic treatment, especially in multirooted teeth. Mandibular first molar is the most common teeth to be treated as it is the first permanent teeth to erupt in oral cavity. An inability to identify abnormal morphology can lead to failure of endodontic treatment.

The mandibular first molars have typically two roots, one mesial with two root canals and another distal root, which contains one or two canals. This case report shows the presence of 6 canals which were identified during endodontic therapy using endodontic explorer and SLOB technique. Follow-up showed patient was completely asymptomatic and without any periapical radiolucency.

Keyword: Extra canals; mandibular first molar; Missed Canals; Radiography

The ultimate goal of root canal treatment is to clean the root canal system completely and to fill it in three dimensions to eliminate or at least reduce the microbial load in the canals (1–3).Therefore, the details about the unusual root canal anatomy should be known to ensure successful outcome of root canal treatment (4-6). It is very common in practice to miss a canal while carrying out endodontic treatment especially in molars. The leading cause of failure of endodontic treatment is inability to treat all canals. Bacteria present in these missed canals can cause reinfection. In the study carried out by Hoen and Pink, they found the incidence of missed canals were reported to be 42% of all the 1100 endodontically failing teeth.(7)

The mandibular first molar is the most common tooth to involve in the caries because it is the earliest permanent tooth to erupt in oral cavity (8). The clinician may be confronted in many cases of mandibular first molars with variation in root (single root,(9) four roots,(10) taurodontism,(11) radix entomolaris,(12) Radix paramolaris(13)) and internal anatomy (middle mesial,(14) middle distal,(15) and C-shape(16).

The mandibular first molar mostly has three to four canals. The mesial root has two canals with generally an isthmus in between(17,18,19). This may have an accessory mesial canal ranges from 0% to 17%(20,21). Kottor et al. [6] and Ahmed et al.(22) found a prevalence rate of 4% and 3% for 3 canals in mesial and distal roots.

Therefore, this occurrence of 3 canals in mesial root and 3 canals in distal root in the same tooth is rare.(23,24)

This clinical report describes the unusual canals morphology of a mandibular first molar with two roots and six root canals detected during routine root canal treatment.

Case Report

A 45-year-old man was referred for root canal treatment of his left mandibular first molar. History revealed pain with the same region six month back. Severe attrition was seen with the tooth. Neither fistulae nor edema was observed in the soft tissue. There was no pain or tenderness to palpation, tooth mobility was within physiological limits, and gingival attachment was normal. The tooth was tender to vertical percussion. Thermal pulp testing (Endo-Frost,Colt`ene-Whaledent, Langenau, Germany) elicited a negative response.

The tooth was anesthetized using the standard inferior alveolar nerve blocks with 1.8mL of 4% articaine and 1 : 100.000 epinephrine (Articaine, DFL Ind e Com Ltda., Rio de Janeiro, Brazil). Pretreatment radiographs of the tooth showed a normal root canal anatomy.(Figure.1)

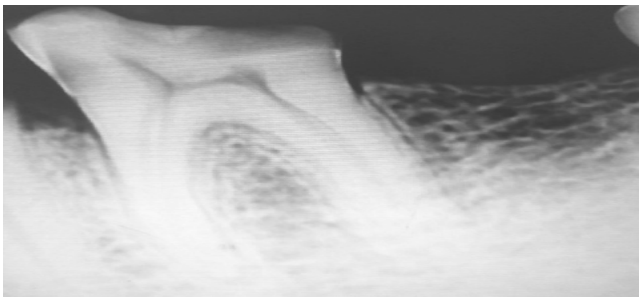

Figure.1

Figure.2

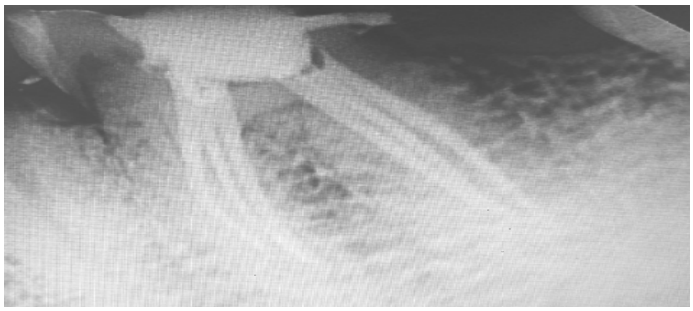

Figure.3

Rubber dam was applied and access opening has been done; initial examination with an endodontic explorer revealed that the pulp chamber had four orifices, two mesial and two distal (MB, ML, DB, and DL). Accurate examination, after exploring and cleaning the grooves of pulp chamber, showed that there were middle mesial and middle distal canals located between the root canals. The canals were negotiated to the working length (WL), as indicated by an apex locator (Root ZX locator, J.Morita MFG Corp, Kyoto, Japan), with a size 10K-type file(Dentsply-Maillefer, Ballaigues, Switzerland), confirmed radiographically using SLOB(Same Buccal, Opposite Lingual) technique.(Figure.2) Canal configuration in mesial root was Vertucci type 8(3-3) and in distal root was Gulabiwala type 9(3-1). Irrigation was performed using 2.5% sodium hypochlorite solution (NaOCl) and 17% EDTA. Cleaning and shaping were performed using a continuous rotary motion with Hero Shaper instrument (Micromega, France) till 25-4%.

After preparation was complete, the canals were rinsed with 5mL of 17%EDTA, followed by 10mL of 2.5%NaOCl and solution activated with Endoactivator in each canal, final irrigation done with 2% chlorhexidine.(25) The obturation done by continuous wave of condensation technique and AH plus (AH Plus, Dentsply, Germany) was used as sealer.(Figure.3) The tooth received a permanent restoration, and patient was asymptomatic in next appointment.

Discussion

The mandibular first molar is the first permanent tooth in the oral cavity to develop at the age of 6 years. It is common to undergo root canal treatment in adult dentition of mandibular first molar. Normally, mandibular first and second molars have two roots, that is, mesial and distal root. The prevalence of mandibular molars, with two canals in the mesial and one in the distal root is 65% and the presence of two canals in the distal root is 30%. In the mesial root of mandibular molars middle mesial or multiple canals have been reported in the literature as having an incidence of 2.07- 13.3% of the examined cases.[28,29] The incidence of middle mesial canal (MMC) and middle distal canal in mandibular first one molar are 1-15% and 0.2-3%, respectively.(22,28)

Nosrat et al. studied MMCs in mandibular molars about the frequency and found out that there were no significant differences in the MM canals incidence based on sex, ethnicity, or molar type. Among 15 MM canals, 7 showed confluent anatomy, 3 independent anatomy, and 5 showed fin anatomy. Overall, 4% (2/50) of mandibular first molars had a second distal (DL) root and 8% (2/25) of mandibular second molars had C-shaped anatomy.(29)

Susin et al. (31) demonstrated that it is most difficult to clean and disinfecting the connections between canals and isthmuses. Inappropriate access, debridement, and disinfection of this complex anatomy of root canal might have a direct effect on treatment outcomes.(5) Canal shaping is critical, not only for effective cleaning, but also for three dimensional obturation(31). The canals in our case were obturated using continuous wave of condensation technique. AH plus sealer was used because it penetrates into dentinal tubules well and serves as filler for root canal irregularities and for minor discrepancies between the root canal wall and core filling material(33).The single sitting RCT was done due to absence of clinical signs and symptoms of acute apical inflammation (pain, swelling, and apical exudate).

It is very common to miss canal while carrying out root canal treatment. The leading cause of failure of endodontic treatment is inability to treat all canals. In our case, after debridement of chamber we found extra canals i.e middle mesial and middle distal canals. Some other techniques are also useful in finding of missing or extra canal are follows CBCT, Ultrasonic, microscope, transillumination, dye, sodium Hypochlorite etc.(33)

Regarding the techniques used to approach these types of cases, some points are important to consider. In cases with multiple canal configurations to minimize the chance of root weakness the over-instrumentation should be avoided (34). Due to the complex root canal nature of these cases, both thermo-plastic root canal obturation techniques and passive ultrasonic irrigation, which has been documented as capable to improve irrigation effects(36), may be useful to overcome the isthmus and depressions, many times present, in the roots.

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