

Five Root Canals for a Maxillary First Molar Tooth – A Case Report

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Abstract:

This case report represents assessment and management of a maxillary left first molar tooth containing five root canals by endodontic treatment. In this case Mesio Buccal 2 (MB2), Mesio palatal (MP) and Distobuccal (DB) canals were missed as well as very poor obturation at palatal and mesio buccal 1 (MB1) canal during previous treatment history. Three mesio buccal (MB1, MB2, and MP), DB and palatal canals were identified and endodontic retreatment was done followed by final restoration. This case provides an evidence of variations in the root canals of the mesio buccal root of maxillary first molar tooth. Complete clinical and radiographic examination and adequate knowledge of the morphology of this kind of teeth is necessary for successful clinical outcome.

Key Words: Maxillary first molar, Five root canals, Endodontic Treatment.

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Introduction:

Both external & internal anatomy of a tooth is an important aspect of root canal treatment. Failure to detect and treat the second MB2 canal system will result in a decreased long-term prognosis.¹ The main reasons for endodontic failure are apical percolation and presence of micro organisms caused by incomplete instrumentation, inadequate cleaning, insufficient canal obturation and presence of untreated canals². Unusual root and root canal morphology associated with molar teeth have been recorded in several studies in the literature.^{3,4} The maxillary first molar is the largest tooth in volume and one of the most complexes in root and canal anatomy⁵. In a literature review, the morphology of the MB root of 8399 maxillary first molar teeth was assessed in 34 studies where two or more canals were present in 56.8% in average of all studies and one canal in 43.1%. And single apical foramen was 61.6% while two apical foramina were 38.3 %.³ The distobuccal and palatal root was reported in 14 studies included 2576 teeth where the common root canal system configuration of the DB root canal was single 98.3% and two canals 1.7%, and the single apical foramina was present 98% of the time as well as the palatal root with single canal 99% and single apical foramina 98.8% respectively.³ Also some case reports have shown few anomalies like four rooted maxillary first molar presenting mesio buccal, distobuccal and two palatal root and each root containing single canal also five rooted with two MB, one DB and two palatal and each root containing single canal.⁶ Three

splitted palatal canals in a single palatal root as well as single MB and DB canal in corresponding root.⁷ Three roots with 6 canals contain two MB, single DB and three palatal canals.⁸ Two MB canal and a single C shaped canal form due to fusion of DB and palatal canal⁹. And also very rarely single-rooted maxillary first molar with a single canal.¹⁰⁻¹¹ In one study⁹ shows 0.09% and another study¹² shows 0.3% C shaped canal in maxillary first molar tooth only.

The mesio buccal root of the maxillary first molar contains a double root canal system more often a single canal, in most studies.³ Two or more canal system in MB root shows higher incidence like Sert S¹³ 93.5%, Thomas¹⁴ 73.6%, Acosta¹⁵ 71.6%, Stropko¹⁶ 73.2%, Neaverth¹⁷ 80.3%, Nasonowitz¹⁸ 64.6%. Some case published regarding to three or more canals in MB root canal system of maxillary first molar tooth. Richard¹⁹ and Favieri²⁰ found 3 MB, 1 DB and 1 Palatal canal in maxillary first molar tooth. N Adanir²¹ cited about a four rooted maxillary first molar where MP root contain 2 canals and rest of MB, DB and palatal roots have single canal.

Case report:

A 31 years old female patient was referred to the department of Conservative Dentistry & Endodontics at Bangabandhu Sheikh Mujib Medical University (Dhaka, Bangladesh) for better management of upper left second premolar and first molar tooth. At that time, the patient's complaints about inability to enjoy taking food at left side of the jaw. She also reported about mild to moderate pain at several times as well as pain during bite. She gave a previous history of dental treatment at her residence area on tooth

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25 (upper left second premolar) & 26 (upper left first molar) at two years back. On clinical examination, neither fistula nor oedema was observed. The tooth 25 had a gross proximal caries with occlusal filling and shows exaggerated response of thermal test. The tooth 26 was tender during percussion with no thermal response & the coronal restoration was not perfectly done. And the periapical radiograph showed thickened periodontal ligament and radiolucent area around the root apex. Also the tooth 26 showed damaged pulpal floor due to previous faulty access opening as well as very poor obturation of the MB and Palatal root canals while DB was untreated. The tooth 25 suggests late stage of chronic pulpitis and the tooth 26 suggest chronic periapical periodontitis. As a result, there was no alternative better option to treat without endodontic treatment of both 25 and 26.

Local anaesthesia was given and the operative field was isolated for the tooth 26 (left maxillary first molar). After removal of the remaining coronal restoration and preparation of the access cavity, exploration of the root canal entrances revealed 3 canals in the MB root, 1 canal in the DB root and 1 canal in the palatal root. Where the canal orifices of the MB1 & MB2 were closer with same apical foramen and the orifice of the MP was far and in between mesiobuccals & Palatal canal with isolated apical foramen. The MB2, MP and DB was untreated previously. After exploring the five canals, MB2, MP and DB was negotiated with #10, #8 and #10K files and the under obturated gutta percha was removed from the MB1, Palatal canal with the aid of H file.

Then the working length of the tooth was determined radiographically based upon the initial radiograph (Fig-1). Here, The # 15 H file was used on MB1, #15 K file on MB2, #15 H file on MP canals as well as the #20 K file was used on DB and #25 K file was on palatal canal respectively (Fig-2). Apical preparation of the MB1 & MB2 with #35 H file at 18 mm working length, and MP with #30 H file at 16.5mm working length. The DB and palatal canal was prepared with #35 H file & # 45 H file respectively at the working length of 19.5mm & 21.5mm. After chemo mechanical preparation, the canals were flushed with 2.5% sodium hypochlorite, then dried and filled with calcium hydroxide as an intracanal medication. Root canal access was sealed with zinc oxide eugenol cement. After 7 days, the canals were emptied and the patency of the canals is rechecked with master apical file. Then the canals are copiously flushed with 2.5% sodium hypochlorite and dried with paper point. Then master gutta percha cone were selected for each canal and all the canals were filled with Sealer 26 (Dentsply, Brazil) using lateral condensation

technique. After a temporary coronal restoration, a final radiograph was taken to confirm the competences and extension of root canal filling (Fig-3). The permanent coronal seal was done by crown prosthesis. Then up to six months follow up visit, the patient was evaluated clinically where there was no tenderness to percussion with no sinus tract or any sign of periodontal disease or infection and the tooth was functional.



Fig-1: Intraoral periapical radiograph (Pre operative)



Fig-2: Intraoral periapical radiograph (Per operative)



Fig-3(a): Intraoral periapical radiograph (Post operative)



Fig-3(b): Intraoral periapical radiograph (Post operative)

Discussion:

Despite the current high success rate achieved in endodontic treatments, the MB root is associated to considerable number of failures due to difficulty in locating and filling the second or third MB canals^{22, 23}. Clinical experience and histological studies revealed that the MB2 or the MP is commonly located within the developmental groove between the MB1 and palatal canal. To locate the MB2 or MP root canal systems, the clinician should prepare the access cavity mesially at expense of the mesial marginal ridge. As well as to prepare straight line access and to eliminate the pulpal roof.

Anatomically the MB canals and related isthmus aspects of the root canal system lie closer to the external furcal side concavity. A single MB canal is oval and wider buccolingually, two or three canals are more circular. Generally a concavity exists on the distal aspect of the MB root, which makes the wall very thin.⁵ So, all the MB canals specially MB2 and MP must be prepared more conservatively and carefully to avoid future fracture or strip perforation.

Less variation was found in the distobuccal and palatal root representing single canal. The palatal root is often curves buccally at the apical one third which may not be obvious on a standard radiograph. from its orifice, the palatal canal is flat, ribbon like and wider in mesiodistal direction. The distobuccal root is conical and from its orifice, the canal first is oval and then becomes round as it approaches the apical third. The incidence two canals in the MB root canal system of maxillary first molar tooth is higher (60.5%) in laboratory studies in compare with clinical studies (54.7%) on an average.³ But interestingly the incidence of location of a two canal system in clinical studies appears to be increasing with routine use of the

SOM and other aids during the modified endodontic access opening procedure.^{16, 24, 25} So dental practitioner should utilize maximum use of diagnostic aids to find missing canals though in these case the five canals were identified with naked eye using a canal explorer with anatomical guidance after creating straight line access. Now a days, the commonly used canal finding aids are canal explorers, magnification, dye, multiple obliquely angled radiographs, dental operative microscope, wear loupes, fibre optic hand piece, piezoelectric ultrasonic unit, computed tomography etc. but the most important factor to find missing canal is to create a complete access opening and assembling proper internal and external anatomy of that tooth.

Conclusion:

Inability to find and treat the extra canal which is usually very common in mesiobuccal root of maxillary first molar may cause treatment failure. But a proper clinical guide line and every effort from the clinician may be helpful to find and treat extra canal successfully.

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