

Maxillary First Molar With Two Palatal Canals- A Case Report

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Abstract: Maxillary first molar with two palatal canals is a rare finding as mostly extra canals are found in the mesial canal as MB2. Clinicians should have a good knowledge on the anatomy of root canal system and be alert about the possible existence of any variation in the canal morphology. Careful examination of the radiograph along with careful detection of the pulp chamber will go a long way in the success of endodontic treatment.

Keywords - Maxillary first molar, canal, root canal, radiograph, pulp chamber

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I. Introduction

A thorough knowledge of root canal morphology is a very important aspect of root canal treatment. Failures to detect aberrant root canals and to identify additional roots are one of the main causes for failure in the endodontic therapy. Human molars demonstrate comparatively high anatomic variations and abnormalities with respect to number of roots and root canals^[1]. The literature delineates wide variations in root canal morphology of maxillary first molars. Cleghorn et al conducted a comprehensive review of the root and root canal morphology of the human permanent maxillary first molar and he found that the incidence of a maxillary first molar with two separate canals in the palatal root is less than 1%^[2]. According to Ingle the external root morphology areas follows-

- Overall average length of this tooth is 20.5mm
- Average crown length is 7.5mm
- Average root length is 13mm
- Average age of eruption is 6-7 years
- Average age of calcification is 9-10 years^[3].

CANAL SYSTEM

Cleghorn et al reported the incidence of two canals in the mesiobuccal root as 56.8% and of one canal was 43.1% in a weighted average of all reported studies^[2]. Less variation was found in distobuccal and palatal roots and the results were reported from 15 studies consisting of 2606 teeth. Distobuccal root had only one canal in 98.3% of teeth studied while the palatal root had only one canal in over 99% of the teeth studied^[3]. The root canal configurations that are present within the roots of the permanent teeth of human can be categorized into eight forms: I. One canal extends from the pulp chamber till the apex. II. Two distinct canals leave the pulp chamber and they join short of the apex to form a single canal. III. A single canal leaves the pulp chamber, splits into two within the root, and then combines to exit as one canal. IV. Two separate and distinct canals extend from the pulp chamber till the apex. V. A single canal leaves the pulp chamber and splits short of the apex to form two separate and distinct canals with separate apical foramina. VI. Two separate canals leave the pulp chamber, unite in the body of the root, and then they redivide short of the apex to depart as two distinct canals. VII. A single canal leaves the pulp chamber, divides and then unites within the body of the root, and then

redivides into two distinct canals that are short of the apex. VIII. Three separate and distinct canals extend from the pulp chamber till the apex^[4].

II. Case Report

A 31 year old male patient reported to the department of Conservative dentistry and Endodontics with a chief complaint of pain in upper left back tooth region for the past 10 days. History reveals that the pain is gradual in onset, throbbing type, moderate in intensity, intermittent in nature, aggravates on mastication. There was no relevant history. On clinical examination there was no palpable lymph nodes extra-orally and intra-orally there was dental caries in 26 with tender on percussion. A preoperative radiograph was taken (Fig 1). Pulp sensibility test was done in 26 and delayed response was observed. A diagnosis of acute irreversible pulpitis with symptomatic apical periodontitis in 26 was made and the treatment plan was root canal treatment in 26. Administration of local anesthesia was done and the tooth was isolated using rubber dam. Access cavity was made using endo-access bur. The main canals were located. A small hemorrhagic point was noted adjacent to the palatal orifice. The usual triangular access preparation which is of triangular shape was modified to a trapezoidal shape to improve access to additional canal. The negotiation of second palatal canal was done using DG16 to assess the second canal. Smaller k file #10 (21mm) was used to check for canal patency and the canal was negotiated and enlarged till k file #15. K File #15 was passed in all the canals for WL determination. Working length determination was done with MB-18+0.5mm= 18.5 mm; DB-16.5+2mm= 18.5 mm, P1-21mm and P2-19.5mm (Fig 2). Orifice were enlarged using GG drills and sodium hypochlorite was used to clear off debris and necrosed tissue. Biomechanical preparation was done using Protaper sequences as SX, S1, S2, F1, F2 to the WL. In between change of file copious amount of irrigation (saline) was used. Final irrigation was done using EDTA. Mastercone radiograph was taken (Fig 3) and the tooth was obturated using AH plus sealer (Fig 4).

III. Discussion

Usually the fourth canal in maxillary molars is reported to be of additional mesiobuccal canal according to majority of the clinical literature (Vertucci FJ et al in 1974; Seidberg BH et al in 1973). But cases such as two palatal roots and canals, in the teeth is infrequently reported.⁵ In this case, the root system was characterized by a two separate canals that joins into one canal in the apical (Vertucci type II). The detection of extra canals can be as follows:

DETECTION OF EXTRA CANAL BEFORE ACCESS CAVITY PREPARATION

Radiographic detection:

- Presence of an extra root can be suspected when double periodontal ligament space are seen on the root side or if the PDL overlap over the adjacent roots^[6].
- Radiograph can be taken from different angulation.
- Mesial angulation of 40-degree of the x-ray beam can be used to identify additional canals^[7].
- On a parallel radiograph if there is a sudden narrowing of the canal pattern then one can suspect for an extra canal^[8].

Clinical detection:

Radicular grooves or bifurcation of the roots may be seen while careful periodontal probing on the cervical area, thus confirming the present of an accessory root^[9].

DETECTION OF EXTRA CANALS DURING ACCESS CAVITY PREPARATION:

- Champagne bubble test can be carried out by pouring the pulp chamber with 5% of warm sodium hypochlorite, one can visualize bubbles emanating from organic tissue indicating presence of canals.
- If hemorrhagic spots are present on the pulpal floor, it indicates the site of canal orifices.
- Tactile examination of all the walls of the major canal with a small, pre-curved K-file tip is recommended, so as to find a catch which may indicate the orifice of an extra canal.
- Using endodontic explorer.
- Using DOM & loupes.
- During the drilling process of access preparation the powdered dentin often collects along the groove that joins the orifices. A white line is formed due to this and it helps in guiding way to the orifice.
- Pulp chamber can be transilluminated with an external fiber optic light source to allow visualization of orifices.
- Proper analysis of dentinal map & colour changes on the floor of the pulp chamber^[10].

DETECTION OF EXTRA CANAL AFTER ACCESS CAVITY PREPARATION:

- Uses of dye such as methylene blue can also help in locating orifices in the pulp chamber.
- If the working length file appears off center in the radiograph (Vertucci et al).
- CT-scan, or CBCT.

IV. Figures

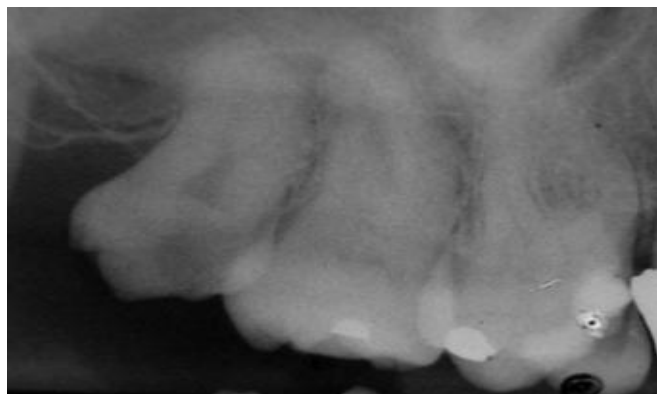


Fig 1- Preoperative radiograph

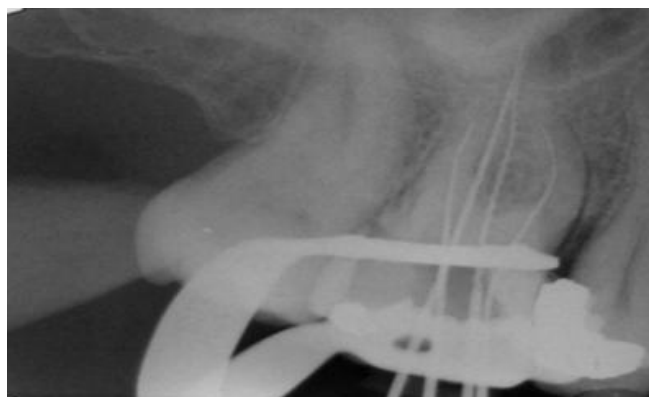


Fig 2- Working length radiograph



Fig 3- Mastercone radiograph

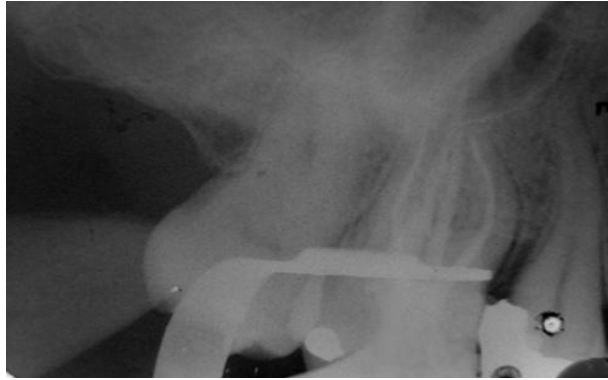


Fig 4- Obturation radiograph

V. Conclusion

Anatomic variations can occur in many teeth and the palatal roots of maxillary first molar are no exception. Thus, careful examination of radiographs as well as understanding the internal anatomy of teeth is vital for successful endodontic treatment. Although such cases occur infrequently, the clinician should focus not only on variations of the buccal roots when considering root canal treatment of maxillary first molars.

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