



AN UNUSUAL OCCURRENCE OF TWO PALATAL CANALS IN MAXILLARY FIRST MOLAR – A CASE REPORT.

Dental Science

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ABSTRACT

The endodontist should have a detailed and thorough knowledge of root canal anatomy to effectively perform endodontic treatment, negligence to which might lead to endodontic failures. Maxillary first molars show considerable variation in root canal anatomy with respect to number of roots and number of canals. Literature states that canal variations can reach up to 33% in maxillary first molars. There is an overall low prevalence (<2%) of anatomic variations in the palatal canal of maxillary molars among different populations. This case report deals with one such palatal canal variations in maxillary first molar with 4 canals: 2 separate palatal canals, mesiobuccal and distobuccal canal and its management.. Clinician awareness on careful assessment of extra palatal canal in maxillary molar teeth using conventional radiograph has been reinforced in this case report to achieve long term success in endodontic treatment.

KEYWORDS

Palatal canal, Mesiopalatal canal, Maxillary Molar, Radiograph

INTRODUCTION:

Maxillary first molars show considerable variation in root canal anatomy with respect to number of roots and number of canals. The endodontist should have a detailed and thorough knowledge of root canal anatomy to effectively perform endodontic treatment (1, 2). Locating and negotiating additional canals in maxillary first molars is always a challenging task in clinical scenario. Negligence in locating and treating these extra canals might lead to endodontic failures (3, 4). Complex internal anatomy and missed canals are among the most common reasons for failure of endodontic treatment (5).

After mandibular molars, maxillary molars are the second most frequent endodontically treated group of teeth (6, 7). Historically, they are described as 3-rooted tooth with 1 or 2 canals in the mesiobuccal root, 1 canal in the distobuccal root, and 1 canal in the palatal root (8, 9). There are various case reports of multiple canals in the mesiobuccal or distobuccal canals (10). However, the frequency of a maxillary first molar with two roots or two palatal canals is very low, 3.9 and 1% respectively (11). Stone and Stroner reported various cases of two separate roots, each with a separate canal, and one single palatal root with one orifice, a bifurcated canal, and two foramina (12). The importance of knowing the anatomic variations in maxillary molars showing palatal canals bi- or trifurcating into several separate foramina were also reported in literature. (13-16).

Anatomy other than type 1 root canal configuration is difficult to detect using 2-dimensional periapical radiographs, because of overlapping or superimposition of multiple anatomic structures in the maxillary posterior area (10). Some of the previous case reports were based on the radiographic examinations of the teeth, though in recent times detection of canal variations is done using newer diagnostic tools such as CBCT. However, use of high technical diagnostic devices may not be possible in all clinical situations. Hence, the endodontist should know and learn to identify the changes in the radiograph thoroughly before committing to the use of advanced technologies.

This case report describes nonsurgical root canal therapy of an unusual permanent maxillary first molar with 3 canals: 2 separate palatal canals, mesiobuccal and distobuccal canal. This case report deals with one such palatal canal variations and its management conventionally.

CASE REPORT:

A 44 year old male patient reported to Department of Conservative Dentistry and Endodontics, SRM Dental College, Ramapuram, Chennai, with symptoms of pain and discomfort in his left upper back

tooth for past one week. He revealed a history of previously initiated root canal therapy in upper left back tooth (26) before two weeks. The history further revealed that there was presence of dull, intermittent and localized pain for past one week. On clinical examination, the tooth had temporary restoration involving the occlusal surface only. On percussion test the tooth was asymptomatic. Further, electric pulp testing and cold vitality tests showed no response. Conventional intra oral periapical radiograph showed radio-opaque filling like material extending till the pulp chamber leading to a diagnosis of "previously initiated root canal therapy in 26". Endodontic treatment followed by post endodontic restoration was planned for 26.

The patient received posterior superior alveolar nerve block and greater palatine nerve block anesthesia of 2% lidocaine with 1:100,000 epinephrine (Lignox A 2% 30ml Injection, Indoco Remedies Ltd) using 2ml syringe (Dispovan 2ml; needle size 0.55x25mm; Lot no.421021SF2). Rubber dam isolation could not be applied as there was a presence of restricted mouth opening and gag reflex. A conventional endodontic access was gained in 26 (Figure-1). Mesiobuccal, distobuccal and palatal canals were located using DG-16 (GDC Fine Crafted Dental Pvt Ltd). Patency was checked using 10k size file and working length was determined by 15k size file (Mani, Inc, Tochigi, Japan). After coronal flaring was done using SX file of Protaper Universal Rotary file system (DenTsply Malliefer, Ballaigues, Switzerland), Working length radiograph was taken by bisecting angle technique (Figure-2). On careful assessment of the working length radiograph, palatal canal showed variations in the palatal canal anatomy suspecting the presence of extra canal. (Figure-2, 3, 4). So the access cavity was modified and the careful exploration of the chamber floor was done with the endodontic explorer between mesiobuccal and palatal canal. This procedure resulted in identification of bleeding point on catch of explorer tip at the chamber floor which confirmed the presence of second palatal canal. This was followed by coronal flaring of the new orifice using gates glidden drills of sizes 1,2,3. The additional canal exit converged with the main palatal canal.

Biomechanical preparation was done upto F2 for all the four canals with intermittent flushing of 2.5% sodium hypochlorite (Nithyasri Chemicals Kulgaon, Thane, Maharashtra) and 17% EDTA (Anabond Desmar, Deccan Dental Depot Pvt. Ltd, Hyderabad, India). Canals were dried and calcium hydroxide intracanal medicament was placed and closed dressing was given using Cavit-G (3M ESPE, Germany). Patient was asked to report after 1 week for obturation. On the day of obturation the temporary dressing and the intracanal medicament was

removed, canals were dried using paper points (Dia Pro T paper points, Diadent group International, Korea). F2 Gutta percha points (Dentsply Dental Protaper Universal Gutta Percha Points, DenTsply Malliefer, Ballaigues, Switzerland) were used as core material and coated with zinc oxide eugenol as the sealer and obturation was done using cold lateral condensation method. (Figure-5) Temporary coronal seal was given using Cavit-G and patient was asked to report after one week for review. After 1 week, the tooth was totally asymptomatic and permanent coronal seal was given using miracle mix (GC corporation, Tokyo, Japan) (Figure-6). Tooth preparation for full coverage crown was prepared and a metal ceramic crown was fabricated and luted. Patient was asked to report after 1 month for follow up and reported of no symptoms.

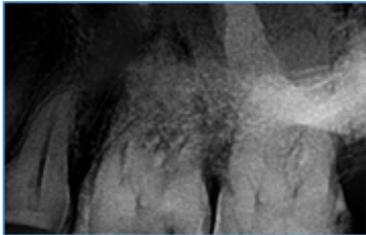


Figure-1 - Access opening done



Figure-2 - Working length determination

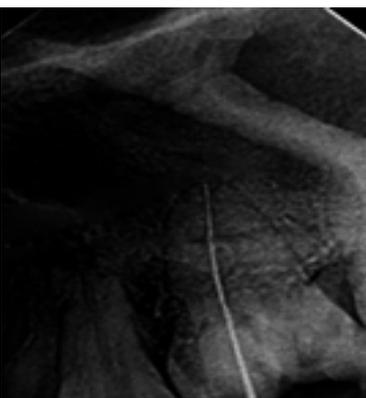


Figure-3 - Locating second palatal canal



Figure-4 - Final working length determination

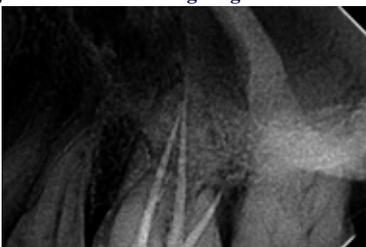


Figure-5 - Master cone radiograph

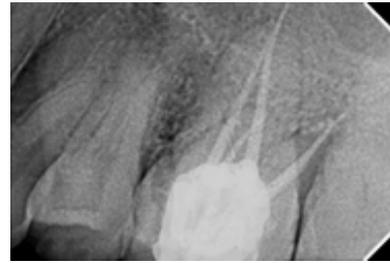


Figure-6 - Obturation with permanent coronal seal

Discussion:

This case report highlights the importance of diagnosing the unusual extra canals in the palatal root of maxillary molars and its conventional endodontic management. The variation of root canal morphology especially in multi-rooted teeth is a constant challenge for successful endodontic therapy. Maxillary molars predominately have a single palatal canal with 1 orifice and 1 apical foramen therefore presence of a second palatal canal or more complex anatomy is always overruled. However, there are reports of two palatal canals within three rooted teeth(17,18), three palatal canals in a reticular palatal root(19), two palatal roots or four roots total(20,21), five roots (2 palatal, two mesiobuccal and one distobuccal)(21), C-shaped canals(22). With regard to the variation in the canal configuration according to Vertucci, this canal can be classified under type II canal configuration which describes two separate foramina in the pulp chamber and terminates as single canal at the apex. Thus, this case showed the presence four root canals with three roots as palatal canals fuse at the apex.

Various nomenclatures has been put forth for the presence of an extra palatal canal such as mesiopalatal (MP) or distopalatal (DP), depending on the location (mesial or distal) of the canal in relation to the main palatal(22). It is also based on their mesio-distal location as mesiopalatal (MP) or distopalatal (DP) and in case of multiple additional palatal canals, the central canal is named with the prefix "middle" as middle-palatal (m-P) (23). Extra palatal canal in this case can be named as mesiopalatal (MP) as it is located between the mesiobuccal canal and the main palatal canal towards the mesiopalatal direction.

Endodontic access can be modified to provide direct straight line access to the apical third of the root canal system (24). The conventional maxillary triangular access cavity can be modified into many shapes such as clover leaf-like (shamrock) (25), heart (26), trapezoidal (27), rectangular (28), rhomboidal (29), and ovoid shapes (30), depending on the particular clinical situation in case of presence of multiple canals. In this present case, the access cavity was slightly extended in mesiopalatal direction in order to gain straight line access. Followed by this, the exploration with an endodontic explorer led to the identification of bleeding point adjacent to main palatal canal which led to the negotiation of additional canals. Thus, the experience of the clinician along with meticulous examination of the pulpal floor and accurate reading of the various angled radiographs led to the detection of this variation.

Though there are various advances in the field of radiographs like CBCT, spiral CT to help in identification and location of extra canals, 2-D radiographic reading is one that comes forward with less cost and lesser dose exposure. Thus careful interpretation of radiographs also helps to complete the treatment time in the chair side itself.

Radiographically, if there is fast-break appearance or transition zone from a well-defined canal anatomy to an ill-defined anatomy it can be predicted that there can be an anatomic complexity such as the presence of more than one canal. Similarly, an ill-defined canal in an initial radiograph could be an indication of a complex internal anatomy (10).

Instrumentation of a 1-2 or 2-1-2 palatal canal configuration can be challenging wherein stiff stainless steel hand files can be precurved and used to locate and negotiate bifurcated canals. Creating a glide path followed by subsequent sequential use of rotary files may efficiently enlarge the canals to obturate (10). In this case, Protaper rotary system was used as the convex triangular cross section of instruments reduces the contact areas between the file and the dentin, safely improving the cutting efficacy.

A thorough review of literature showed that there is an overall low prevalence (<2%) of anatomic variations in the palatal canal of maxillary molars among different populations. In addition, it can reach up to 33% in maxillary first molars and up to 14% in maxillary second molars in certain ethnic groups. Thus careful assessment of extra palatal canal in maxillary molar teeth should be carried out to prevent endodontic mishaps and to achieve long term success in endodontic treatment.

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