

Case report

ENDODONTIC MANAGEMENT OF MAXILLARY FIRST MOLAR WITH TWO PALATAL CANALS

ABSTRACT:

Endodontic therapy of maxillary first molars can be difficult, especially when root canal morphology varies unexpectedly. The presence of two palatal canals is unusual in maxillary first molars.

The presence of two palatal canals must be correctly diagnosed for appropriate treatment. CBCT (Cone Beam Computed Tomography) and other diagnostic tools can help detect the exact position and form of the canals. To address both the conventional canals and the extra palatal canals, effective treatment planning is required.

The preparation of the access cavity is critical in identifying the palatal canals. A conservative access cavity design that preserves tooth structure and structural integrity is advantageous. To detect and traverse the canals, magnification, illumination, and careful examination with fine endodontic files are required.

Because of their complicated and difficult nature, palatal canal instrumentation need specialized procedures. To adequately prepare the canals, a combination of manual files, rotary files, and ultrasonic tips may be used. To ensure adequate disinfection and removal of bacteria and debris from the complex canal anatomy, careful shape and cleaning are required.

Canal obturation should aim for a three-dimensional seal, ensuring complete filling of the root canal system. The use of proper obturation procedures can improve the quality and longevity of root canal therapy.

This paper provides an overview of the endodontic management of a maxillary first molar with two palatal canals, discussing the diagnosis, treatment planning, access cavity preparation, and the use of appropriate instrumentation and obturation techniques.

INTRODUCTION:

When a tooth has been damaged by pathosis, the main objective of the endodontic treatment is to prevent and intercept pulpal/periradicular pathosis so that natural dentition can be retained. (1) Among the most common reasons for endodontic therapy failure is the inability to negotiate, clean, or obturate all existing root canals.(2,3) The main concept of root canal treatment is complete mechanical cleaning and comprehensive debridement, followed by three-dimensional obturation to establish a tight closure. (4) While most studies of the maxillary first molar focus on the frequency of a fourth canal (MB2) in the mesiobuccal root, this case study looks into the likelihood of a second palatal canal and the associated endodontic therapy options. A maxillary first molar with two palatal canals was described by Aggarwal et al., whereas a maxillary first molar with two palatal roots was documented by Tomazinto et al. (5)

CASE HISTORY

AIM:

The purpose of this case study is to show how a maxillary first molar with two palatal canals can be treated non-surgically.

A 40-year-old man presented to the Department of Conservative Dentistry and Endodontics at DA Pandu Memorial RV Dental College in Bangalore with a chief complaint of pain in the upper left back tooth region that was exacerbated by drinking cold drinks for more than a month.

For six months, the patient complained periodic pain in the maxillary left region.

Two months before visiting our department, he had another clinic repair his maxillary left molar, which had promptly cracked.

Recently, the patient suffered acute pain, which was exacerbated by cold stimulation.

The patient also complained of food bloating in the same area.

Restorative therapy had been provided for the patient's left maxillary first molar and maxillary first premolar.

The patient denied having any systemic disorders or allergies. There was no relevant family history.

A clinical examination indicated a disto-occlusal deterioration of class II (figure 1) with no periapical abscess or sinus tract.

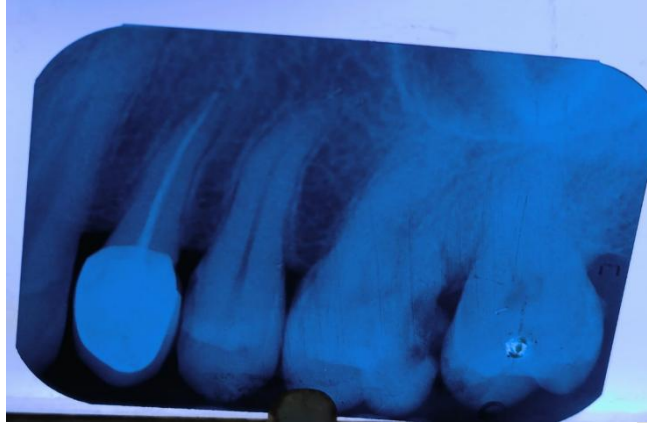


fig.1: preoperative radiograph of 26 showing radiolucency extending into pulp

A periodontal examination was also performed using a williams's graduated probe, which demonstrated a normal probing depth.

Percussion on the teeth caused it to be sore. Radiographs revealed that disto-occlusal caries had progressed to pulp chamber, without any periapical changes.

DIAGNOSIS:

The left maxillary first molar was diagnosed with irreversible pulpitis and apical periodontitis.

Following the treatment advice of root canal treatment and follow-up crown restoration, the treatment regimen was explained to the patient and agreement was acquired. There were no diagnostic difficulties.

TREATMENT:

The root canal therapy was initiated with the patient's informed consent after discussing the treatment plan and its consequences. One cartridge infiltration was used to provide local anesthetic, and a rubber barrier was used to isolate the patient. (2% lidocaine in a 1:80,000 epinephrine solution).

All soft caries were removed using a round bur; endo-access bur (Dentsply), was used to create access cavity. All canals were mesiobuccally, distobuccally, and palatally situated.

Clinically, a tiny hemorrhagic spot was observed next to the palatal orifice and mesiobuccal aspect. Using DG16 to gain access to both canals.

A smaller k-file #10 was used to check the canal's patency before negotiating the canal and increased to k file #15.

The working length was determined using the CanalPro apex locator (Coltene) and validated with a radiograph (Figure 2).



fig.2: working length radiograph of 26 with two palatal canals, mesio Buccal and disto Buccal canals

Irrigation with sodium hypochlorite (3%) and normal saline (0.9%) was extensive. The access cavity was subsequently sealed with zinc oxide eugenol (Perfection Plus LTD, UK).

The patient was asymptomatic on the second appointment. The patient was advised to undergo CBCT so that we could analyze the root canal anatomy in three dimensions.

After being told about the complex and atypical anatomy of root canal, the patient was eager to have the teeth evaluated with CBCT. The patient provided informed consent to have the CBCT checkup done on those specific teeth.

CBCT IMPRESSION:

According to the CBCT report, the maxillary first molar showed three roots with five canals (MB1, MB2, DB, MP, DP) (figure 3).

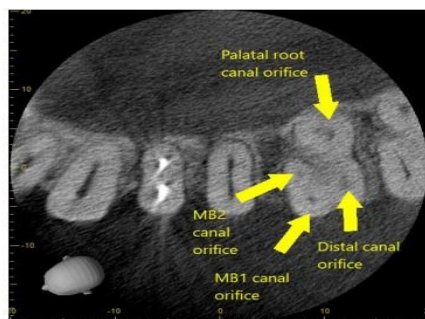


fig.3: cbct image showing 5 canal orifices at the junction of cervical and middle third

Two palatal orifices were discovered at the junction of the cervical and middle third portions of the root wrt 26

Both palatal canals are fusing in the apical area, as revealed by the CBCT data (Figure:4)

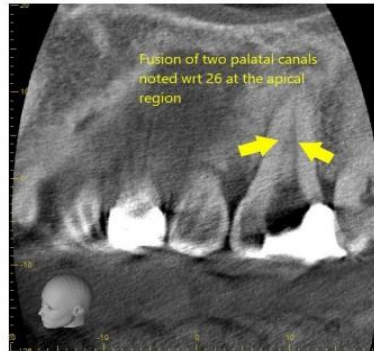


fig.4: cbct image showing fusion of two palatal canals at apical third

Initial instrumentation was completed with profuse NaOCl irrigation (3%) and normal saline (0.9%) up to #25k file to full working length. The final instrumentation was carried out with a 25/0.04 (NiTi file) with 17% EDTA (Dia Pre Pro, Dia Dent, Korea) and abundant irrigation of sodium hypochlorite (NaOCl) (3%). The last irrigation used a large amount of saline (0.9%).

The master cone radiograph was obtained. The canals were dried using paper points (METABIOMED, Cheonaju, Korea) and obturated with gutta-percha (META BIOMED, Cheonaju, Korea)

Temporary restoration done and the patient was recalled for further treatment.

OUTCOME AND FOLLOWUP:

The maxillary first molar was entirely asymptomatic after one month of follow-up. Following that, tooth preparation and the final ceramic crown repair were completed (Figure:5)



fig 5: post operative radiograph after crown cementation

The tooth was clinically asymptomatic and radiographically sound after a three-month follow-up.

DISCUSSION:

Endodontic treatment of the maxillary first molar can be challenging, particularly if it has several canals.

The presence of two palatal canals in the maxillary first molar is a rare anatomical defect that affects only a small percentage of people. A recent study found only one specimen with four roots among 1365 maxillary first molars, yielding a 0.07% incidence, while the incidence in maxillary second molars was 0.98%.⁽⁶⁾

Diagnosis of a maxillary first molar with two palatal canals might be difficult due to the complicated anatomy and the possibility of overlapping or fused canals.

Various diagnostic tools, such as periapical radiography, cone-beam computed tomography (CBCT), dental operating microscopes, and dental loupes, can aid in the detection and visualization of these additional canals.⁽⁷⁾

CBCT scans have been demonstrated to be more accurate than conventional radiography in terms of root canal anatomy.

Once the presence of two palatal canals is confirmed, proper access cavity preparation is required to locate and traverse these canals.

A modified triangular-shaped access chamber with two palatal orifices can aid in appropriately viewing and accessing the canals. ⁽⁸⁾

Magnification devices, such as dental operating microscopes, considerably improve the clinician's ability to locate and navigate these canals.

NiTi rotary files have proven to be effective in shaping complex root canal systems, including molars with two palatal canals. However, given the variability in canal anatomy, hand instrumentation is also required to achieve the desired results.⁽⁹⁾

The use of chelating agents, such as EDTA, along with effective irrigation protocols, can aid in disinfecting and removing debris from these complex canals.

It is important to verify the quality and length of obturation using periapical radiographs or CBCT scans.

CONCLUSION

Accurate diagnosis, appropriate access cavity design, effective cleaning and shaping, and meticulous obturation techniques are essential for the long-term success of endodontic therapy in complex clinical conditions.

Implementing modern diagnostic aids, advanced instrumentation techniques, and magnification can improve the clinicians' ability to manage these complex anatomical variations successfully.

CONSENT

All authors declare that 'written informed consent was obtained from the patient for publication of this case report and scanned copy of the same is attached in the email.

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