CASE REPORT

A Maxillary Molar with Seven Canal Orifices; An Endodontic Rarity

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ABSTRACT:

SUMMARY: Lack of knowledge regarding basic root canal anatomy and its variations are the main factors responsible for unpredictable treatment outcome. Numerous studies have reported diversity in the root canal morphology of all teeth, and the maxillary 1st molar is no exception. The purpose of this paper is to report a successful nonsurgical endodontic treatment of a maxillary 1st molar with seven canal orifices. The description of the procedure performed aims to emphasize the need for clinicians to be attentive of variations in root canal anatomy of any teeth that undergoes root canal treatment.

KEYWORDS: Maxillary molar, endodontic treatment, Canal orifice, Unusual Anatomy.

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BACKGROUND

Endodontic treatment aims to thoroughly clean and shape the entire root canal space, followed by placement of an inert material[1]. The successful outcome of this procedure is essentially dependent on the clinician's sound knowledge of basic root canal morphology and its variations. The rationale behind this is that any time during routine practice, a clinician may encounter atypical morphology in a tooth. Clinicians, during routine practice may come across teeth having atypical morphology. Sometimes complete or part of a canal space may be left untreated which results in unpredictable results[2,3].

Literature reports various data on variations in the number of canals for maxillary first molar[4,5]. The typical anatomy is the presence of three to four canals with each canal having a single orifice. The prevalence of a second distobuccal canal is as low as 1.7%[6] and that of second palatal canal is less than 2%[7]. Only one case describes a maxillary molar with seven canal orifices; three MB, two distal and two palatal[8].

The current case report aims at increasing the clinician's awareness of the rare configuration of maxillary first molar root canal system. It presents endodontic treatment of a tooth with seven canal orifices; three palatal, two mesial and two distal canal orifices.

CASE PRESENTATION

A 35-year-old man presented with the complaint of increase sensitivity to hot and cold for two weeks associated with food impaction in right upper jaw. Pain persisted even after removal of stimulus, along with mild discomfort on chewing. The patient did not give any history of nocturnal or spontaneous pain with swelling. His medical history was unremarkable.

Intra oral examination revealed a deep occlusal carious lesion in permanent right maxillary 1st molar. The tooth was not tender to palpation and percussion. There was no mobility and periodontal probing was within normal limits. However, persisted response was recorded on pulp vitality tests, indicating irreversible pulpitis. The initial periapical radiograph revealed a deep Class I carious lesion in tooth #16 with pulp involvement. Pulp chamber calcification was appreciated on the radiograph along with the widening of

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apical lamina dura (Fig. **1**). Therefore, a diagnosis of IRREVERSIBLE PULPITIS was made.

Fig. (1). The periapical radiograph showing a deep Class I carious lesion in tooth #16 with pulp involvement.

INVESTIGATIONS

- ‣ Periapical radiograph
- ‣ Vitality testing

TREATMENT

After discussing complete treatment plan with the patient along with the predicted outcomes, an informed consent was obtained. The tooth #16 was anesthetized locally with one cartridge with 2% lidocaine with 1:80 000 epinephrine (Xylestesin-A) and isolated with rubber dam.

After removing the caries with a round carbide bur in slow speed handpiece, an access opening was prepared. Calcified material was found in the pulp chamber which was of soft consistency and easily removed with spoon excavator. The remnants were removed using an ultrasonic scaler (sonic scaler tip #1 universal, American Distance Education Consortium (ADEC), USA). After cleaning the pulp chamber, visual and clinical examination was performed with a DG-16 endodontic explorer which revealed two distinct canal orifices in the palatal root, one canal orifices in the distobuccal root and two in the mesiobuccal root (i-e, MB1 and MB2).So the conventional access opening was modified to a trapezoidal shape to improve the visibility. Surprisingly, additional two orifices were found in the palatal and distobuccal root each, which made makes a total of 7 separate canal orifices (3 in palatal, 2 in distobuccal and 2 (MB1 and MB2) in the mesiobuccal root) in the maxillary molar (Figs. **2**, **3**). Radiograph confirmed the presence of all seven canals orifices. All canals were thoroughly instrumented.

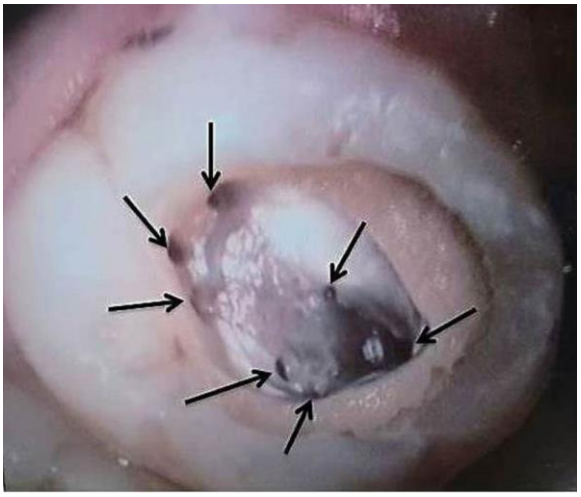

Fig. (2). Access opening showing seven root canal orifices.

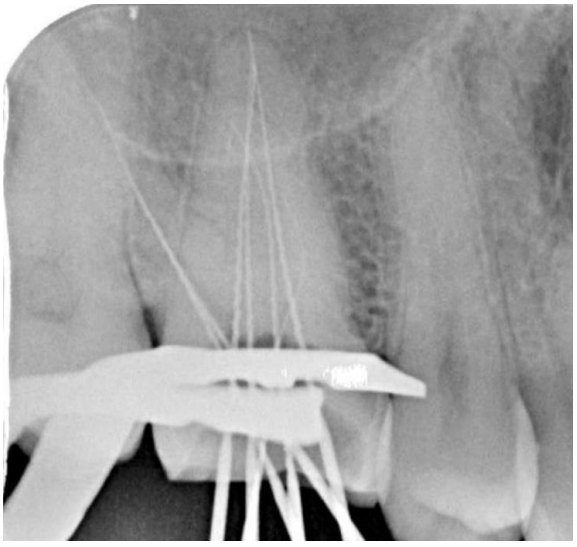

Fig. (3). The periapical radiograph after intacanal file placement showing seven separate orifices.

Working lengths were measured by means of an apex locator (Root ZX, J. Morita Corp, Tustin, California, USA) and periapical radiographs taken. The mesial canals were 19mm in length, distal canals working length of 20 mm, whereas the length of palatal canals were 22mm. Cleaning and shaping was performed using the crown-down technique with ProTaper Universal Rotary NiTi files (Dentsply) and RC-Prep (HaweNeos Dental, Bioggio, Switzerland). 5% sodium hypochlorite was used as an irrigant during cleaning

and shaping. After cleaning and shaping it was found that two palatal orifices united in the coronal third to form one main palatal canal and the other palatal canal joined with the main canal in the apical third just before exiting at the main foramen. The two distal orifices joined in the coronal third to form one main distobuccal canal.MB1 and MB2 were two separate canals (Figs. **4**, **5**). The access cavity was sealed with temporary restoration. Patient was asked to follow after a week.

Fig. (4). Access opening after cleaning and shaping showing merging of two distobuccal orifices and two palatal orifices.

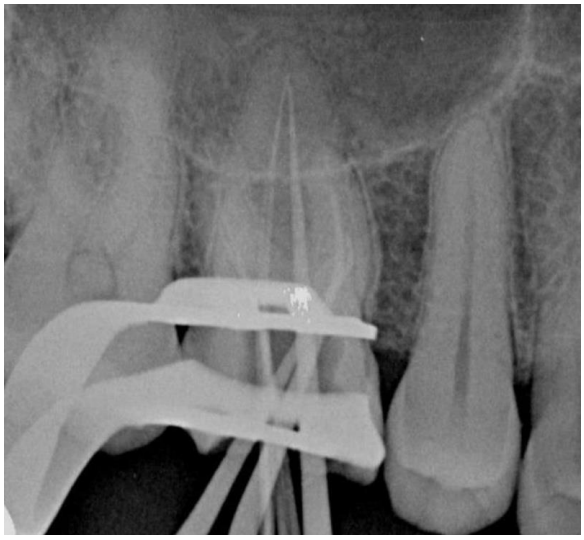

Fig. (5). The periapical radiograph with intracanalGuttapercha cones revealing merging of two distobuccal orifices and two palatal orifices.

In the subsequent appointment, Master guttapercha cone was placed in the canals and a radiograph was taken to confirm the length. Canals were dried with paper points and guttapercha were coated with Sealapex (Kerr Manufacturing Co) andobturated till length. The cold lateral condensation technique was used. Post-obturation radiograph confirmed root canal filling up to the prepared length (Fig. **6**). Since two distal canals and two out of three palatal canals merged during cleaning and shaping to formsingle main canal so the final radiograph yielded five obturated canals (Fig. **7**).

Fig. (6). Access opening after obturation.

Fig. (7). The periapical radiograph after obturation.

OUTCOME AND FOLLOW-UP

Patient was asymptomatic and all the root canals were thoroughly debrided and filled upto length, hence endodontic treatment was deemed successful. Patient was recalled after two weeks for a full coverage restoration.

DISCUSSION

Although variations in root canal morphology may not present routinely, it is when they are encountered and the clinician is unable to find and thoroughly clean the atypical root canal space, that the endodontic treatment may have unfavorable outcome. Finding an extra canal is always challenging for the clinician but it is important the every effort should be made to deal with such a variant

A myriad of literature has been published on the unusual anatomy of maxillary 1st molar, with the greater incidence in the variable number of roots including one[9], four[10] and five[11] roots. There are also case reports on the incidence of 5 five[4,12] or 6 six canals[13]. One study showed a C-shaped canal configuration[14] in the maxillary molar. These studies also reported variations in the number of canals per root[15-17].

The incidence of second mesiobuccal canal ranges from 56.8% to as high as 90% as reported in various studies[18]. However, the incidence of two canals In the distobuccal root ranges between in between 1.9 - 4.3 % and 2 - 5.1% in the palatal root[19]. Maggiore *et al.* [18] reported two canals in the mesial root, three canals in the palatal root and a single canal in the distal root, howeverin our case we reported seven root canals distributed as two mesiobuccal, two distobuccal and three palatal canals orifices.

A wide variety of techniques and aids are available to identify aberrant root anatomy and extra root canals. These include angled radiographs, illumination, loupes, dental operating microscope, meticulous use of DG 16 explorer, removing dentine overhangs with ultrasonic tips and CBCT[20]. CBCT is now considered the most accurate diagnostic tool for assessing root canal morphology. It helps in locating more number of root canal systems as compare to digital radiography[21]. CBCT scan is the best tool for evaluating anatomic variations like accessory canals etc, therefore increasing the chances of successful endodontic results[22]. CBCT scans should have been done in the mentioned case so that the precise location of the root canals can be determined preoperatively and limited dentine would be removed during access preparation, but since it is an expensive diagnostic modality, it was not an affordable option for the patient.

In our case initially seven separate canal orifices were negotiated and after instrumentation we were left with five canals orifices i-e two distal and two palatal canal orifices were merged. A similar case was reported Kottoor*et al* in which seven separate canals orifices were present but two mesial, distal and palatal canals were joining apically along with one of the mesial canal remained patent till the apex resulting in four obturated canals[20]. In our case five separated obturated root canals can be appreciated.

Although detecting and negotiating extra root canals is challenging, once the discovery of an atypical anatomy is made, the clinician should be vigilant and every effort must be undertaken to search for and identify each root canal present. This is essential for the successful outcome of the endodontic treatment. The purpose served by reporting atypical anatomy in the root canal space is to raise awareness of the variations that can be encountered during treatment of the maxillary first molars.

CONCLUSION

If a clinician is unable to find and thoroughly clean the atypical root canal space, then the endodontic treatment may have unfavorable outcome. The clinician should be vigilant and every effort must be undertaken to search for and identify any additional root canal. Additional aids should be used for canal negotiation whenever an aberrant root canal anatomy is suspected. The purpose of this case report is to raise the awareness of atypical anatomy of maxillary first molar.

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