



MONORADICULAR C SHAPED MAXILLARY FIRST MOLAR: A RARE CASE REPORT

Dental Science

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ABSTRACT

Aim: This case report presents an unusual single rooted C-shaped root canal system in a maxillary left first molar tooth.

Summary: C shaped single rooted maxillary 1st molar are very rare occurrence. Anatomic variations are one of the major causes for endodontic treatment failure owing to inadequate cleaning, shaping and sealing of root canal system. Diagnosis of such alterations using CBCT is firmly advised. This case report highlights the diagnosis and treatment of a rare case of C shaped maxillary 1st molar.

KEYWORDS

C-shape, CBCT, Endoactivator, Maxillary First Molar.

INTRODUCTION

A thorough knowledge of internal and external anatomic relationships of teeth, careful interpretation of angulated radiographs, proper access preparation and a thorough clinical exploration of the interior and exterior of the tooth are prerequisites for successful endodontic treatment. Maxillary molars may have one of the most complex root canal systems that are very difficult to manage.

In maxillary first molars, several cases of variations in roots and root canals morphology have been reported previously.¹ However, the presence of C-shaped canal configuration in maxillary first molar has been rarely recorded. Newton CW and Mc Donald S(1984)² reported the first case of C shaped canal in maxillary first molar. De Moor (2002)³ reported the incidence of C shaped canal in maxillary first molar as low as 0.092%. This variation appears to be determined genetically, and can be used in tracing the ethnic origin of affected patients.⁴ Treatment of the teeth with C shaped anatomy is challenging for the clinician; however such cases can be treated successfully using sonic and ultrasonic instruments, special irrigation system and plasticized obturation techniques. This rare case report presents the successful root canal treatment of a single rooted maxillary first molar with a C-shaped canal system using endoactivator irrigation system and thermoplasticized obturation technique.

Case Report

A 35-year-old female patient reported to the Department of Conservative Dentistry and Endodontics, Subharti Dental College, Meerut with the chief complaint of pain in the left upper back tooth region since 4 days. Pain was continuous in nature and aggravated by hot and cold beverages. On clinical examination, carious lesion was present with respect to tooth 26 (Figure 1 a).



Figure 1. (a) Pre-operative clinical photograph (b) Pre-endodontic buildup followed by access cavity preparation (c) Irrigant activation using endoactivator (d) Post obturation clinical photograph

The tooth was found to be tender on percussion and palpation. On Electric pulp testing tooth illicit no response. Intraoral periapical radiograph of tooth 26 revealed the presence of deep proximal caries approximating the pulp with periapical radiolucency and also presence of atypical root canal anatomy was suspected (Figure 3 a). Patient was referred for Cone Beam Computed Tomography (CBCT)

imaging to evaluate the canal configuration. The result of the CBCT (Figure 2) showed the presence of a single root with one palatal and one buccal canal. In buccal canal, C shaped canal configuration was observed.

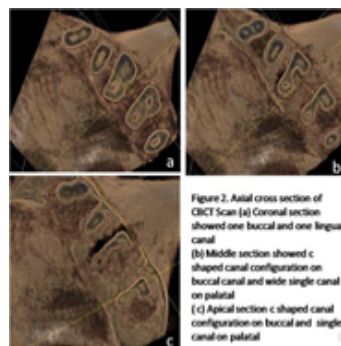


Figure 2. Axial cross section of CBCT Scan (a) General section showed one buccal and one lingual canal (b) Middle section showed C shaped canal configuration on buccal canal and wide single canal on palatal (c) Apical section C shaped canal configuration on buccal and single canal on palatal

From the clinical and radiographic signs, a diagnosis of pulpal necrosis with acute apical periodontitis was made. Treatment plan involved root canal treatment followed by placement of prosthesis. No other relevant medical or dental history was found. An informed consent was obtained from the patient and endodontic treatment on tooth 26 was initiated. After attaining profound local anaesthesia (2% lidocaine) and rubber dam isolation, caries were removed followed by pre endodontic composite (Filtek Z350 XT universal nano-fill composite, 3M) buildup. Access cavity were prepared using Endo access (Dentsply Maillefer, USA) and Endo Z bur (Dentsply Maillefer, USA) (Figure 1 b). Under a dental operating microscope at 6X magnification two orifices were identified one wide palatal canal and one small buccal canal. Scouting of the canals for patency revealed that palatal canal has Vertucci type I(1-1) root canal configuration whereas the buccal canal has Vertucci type III(1-2-1) root canal configuration. Working length was determined using an electronic apex locator (Root ZXII™, Morrito, Tokyo, Japan). The canal was instrumented using step back technique with final apical gauging, in palatal canal upto size 50K file (M access K file, Dentsply Maillefer, USA) and in buccal canal 25K file (M access K file, Dentsply Maillefer, USA). Cleaning was performed by copious irrigation with 3% sodium hypochlorite (Septodont, India), followed by normal saline and 17% EDTA solution (Smear Clear, Sybronendo, Kerr, Italy) using EndoActivator System (Dentsply Tulsa Dental Specialties, Tulsa, UK) (Figure 1 c). After the preparation canals were dried with absorbent paper points (Dentsply, New Delhi, India), packed with Ca(OH)₂ (Dental therapeutics AB, Nacka, Sweden) mixed with 2% chlorhexidine (FMG Prod. Odontol. Ltda, Joinville, SC-Brazil). The access cavities was temporised with Cavit (3M ESPE, St. Paul, MN, USA). On the next appointment after 1 week patient was completely asymptomatic. Canals were gain irrigated and intracanal medicament was removed following the the same

irrigation protocol as mentioned above. Master cone were placed in each of the canals and radiograph was taken (Figure 3 b). Canals were dried with absorbent paper point and obturated using thermoplasticized obturation technique. In this technique, apical plug was created with "Downpack" mode using AH Plus sealer (Dentsply, Maillefer, USA) with match gutta percha cones whereas the middle and coronal thirds of the canals were "Backfilled" using Calamus (Dentsply, Maillefer, Switzerland) (Figure 1 d, Figure 3 c) followed by post endodontic restoration. Post operative instructions were given to the patient. The metal ceramic crown cementation was done after 2 weeks. During follow up appointments the tooth was functioning normally and had no pain. No radiographic abnormalities were found. (Figure 3 d)

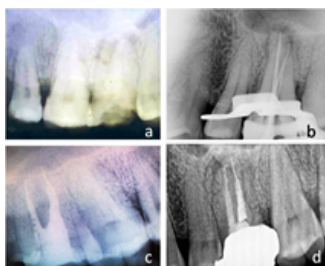


Figure 3 (a) Pre operative Intraoral Periapical radiograph
(b) The radiograph displaying the master cones
(c) Postoperative radiograph of completed root filling
(d) 1 year follow up radiograph

DISCUSSION

The C-shaped canals are characterised by the presence of fin or web connecting the individual root canals. C-shaped canal is predominantly found in mandibular second molar. Such a canal anatomy has also been reported in maxillary first molars (Newton CW & McDonald S 1984², Dankner E et al. 1990⁵), mandibular first molar (Bolger WL & Schindler WG 1988)⁶, mandibular third molars (Baisden MK & Kulild JC 1992)⁷. Such anatomic variation poses a challenge during the diagnosis as well as during adequate cleaning and shaping.

On evaluation of CBCT scans, axial cross section of 26 revealed the presence of single root with a distinct palatal canal and a faint buccal canal in the cervical third (Figure. 2 a). In the middle third, buccal canal developed a C-shaped anatomy which continued to the apical third (Figure 2 b, c). Throughout the length of the root a single distinct palatal canal was evident. The axial cross section revealed the presence of single root. This is a very rare finding and no case of single rooted maxillary molar has been reported in the literature.

Manual instrumentation of the complicated root canal system leaves areas like fins or isthmus un-instrumented. These anatomical complexities prevent the instruments and irrigant solutions from reaching the entire canal surface which might influence the success of root canal treatment. Therefore, in present case endoactivator irrigation system was used (Mancini M et al. 2013)⁸ to increase the efficacy of irrigant and to clean the un-instrumented areas.

Obturation of C-shaped canal system is highly technique sensitive. Contemporary techniques like cold lateral condensation technique may leave voids due to the canal irregularities.⁹ Gutmann & Rakusin (1987)¹⁰ suggested the use of thermoplastized gutta percha for obturation of C-shaped canals. In order to achieve adequate seal, the entire root canal system was obturated thermoplasticized obturation technique (Calamus Dual System Dentsply Sirona). On 1 year follow up, patient was asymptomatic, and radiographically satisfactory healing was observed.

CONCLUSION

Presence of C-shaped root canal system poses a challenge while diagnosis and treatment. Management of such anatomical exceptions requires the use of CBCT to accurately determine the internal root canal anatomy. Furthermore, such cases would necessitate the use of devices that promote the 3-dimensional cleaning and sealing of the root canal system. This case was carried out with utmost consideration of all the above challenges. The most important finding in this case was the presence of c-shaped root anatomy in the buccal canal and the presence of a single root in the maxillary first molar, which is a very rare occurrence.

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