



ORIGINAL RESEARCH PAPER

Medical Science

MANAGEMENT OF C SHAPED CANAL ANATOMY IN MANDIBULAR SECOND MOLARS: TWO CASE REPORTS.

KEY WORDS: C shape, anatomy, mandibular second molar.

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ABSTRACT

Thorough knowledge of root canal anatomy and its variations is essential for successful root canal therapy. One such variation in root canal anatomy is C shaped canal. Successful management of C shaped root canal requires proper clinical and radiographic diagnosis, cleaning and three dimensional obturation of the root canal. This case report presents two cases of successful management of C shaped root canal with permanent mandibular second molar.

INTRODUCTION:

Thorough chemo mechanical debridement followed by complete obturation of the root canal system is the main objective of root canal therapy. To achieve this objective, complete knowledge of the root canal anatomy and its variations is essential. Cooke and Cox were the first to document C-shaped canal in endodontic literature in 1979. The name was given because of the cross-sectional morphology of the root and root canal. (1) The prevalence of C shaped root canal in mandibular second molar ranges from 2.7 to 44.5 %. (2) It occurs mainly in mandibular second molars, but may also be observed in maxillary first molars, first and third mandibular molars, and in mandibular pre-molars. (3,4) It occurs due to failure of hertwig's epithelial root sheath to fuse into buccal or lingual root surface. (2)

Instead of having several discrete orifices, the pulp chamber of the C-shaped canal is a single ribbon-shaped orifice with a 180° arc or more. Below the orifice level, the root structure can harbor a wide range of anatomic variations. These can be classified into two basic groups: (1) those with a single, ribbon-like, C-shaped canal from orifice to apex and (2) those with three or more distinct canals below the C-shaped orifice. (1) The main anatomic feature of C-shaped canals is the presence of a fin or web connecting the individual root canals. (1) Tooth with C-shaped canal often has a conical or square configuration. Once diagnosed C shaped canals present great difficulty in management. (1)

The present article describes two cases of successful management of C shaped canals in mandibular second molars.

CASE REPORTS:

Case 1

A 39 year old female patient reported to the department with a chief complaint of pain in lower left back tooth region. On clinical examination, grossly carious 38 and deep occlusal caries with 37 was seen. Radiographic examination revealed periapical radiolucency with 38 and deep caries with 37 (Figure 1.A). Also the roots of 37 appear to be fused and square in the apical area with a thin radiolucent line separating the mesial and distal roots. The pulp chamber appears large in apico occlusal dimension with a low bifurcation. All these radiographic features points towards the possibility of C shaped canal anatomy with 37. The treatment plan decided was extraction with 38 and endodontic therapy with 37. Following local anesthesia administration, the tooth was isolated under rubber dam and access cavity preparation was done with round bur and Endo Access bur. Complete root canal treatment was carried out under Dental operating microscope (Opto dental microscope, Opto DM PRO model). C shaped canal orifice was visible (Figure 2) which was dividing into two different canals in

middle third. Working length was determined with apex locator (Root ZX, J. Morita CO, Tustin, CA) and radiographic method. Working length radiograph (Figure 1.B) confirmed the presence of C shaped canal. Coronal flaring was done with protaper rotary files (Dentsply Maillefer, Ballaigues, Switzerland) followed by hand K & H files (Mani Inc.). Anticurvature filing was done to avoid strip perforation. 5% sodium hypochlorite was used initially followed by liquid EDTA (Canalarge, Ammdent; Amrit Chemicals and Minerals Agency, Mohali, Punjab, India). Endoactivator was used for activation of the irrigants. Obturation was done by warm vertical compaction with the help of Touch N Heat (EIE/Analytic, Redmond, WA, USA) and Obtura III Max device (Obtura Spartan, Fenton, MO, USA). AH plus was the sealer used (Dentsply Maillefer Company, USA) (Figure 1.C).

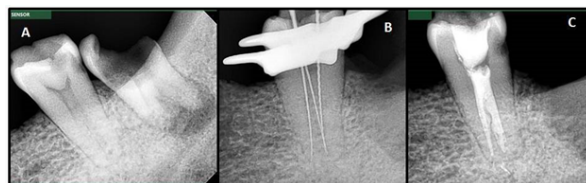


Figure 1. Intraoral radiographs: (A) preoperative; (B) working length determination; © postoperative.



Figure 2. Clinical picture: Access opening under dental operating microscope.

Case II

A 44 year old female patient reported with severe pain with 37. There was history of incomplete root canal treatment with 37. Tenderness on percussion was present. Intra oral periapical radiograph showed single fused conical root with a wide canal suggestive of C shaped anatomy (Figure 3.A). Access opening was modified with the help of round bur and endo access bur under local anesthesia and rubber dam isolation. Working length determination was done with the help of apex locator. Biomechanical preparation was done by hybrid instrumentation technique with the help of protaper rotary files and hand K & H

files. Irrigation was done with 5 % sodium hypochlorite and 17 % liquid EDTA along with activation by endoactivator. Obturation was done by Touch N Heat device and Obtura III Max device. Sealing of apical delta is visible in the radiograph (Figure 3.B).

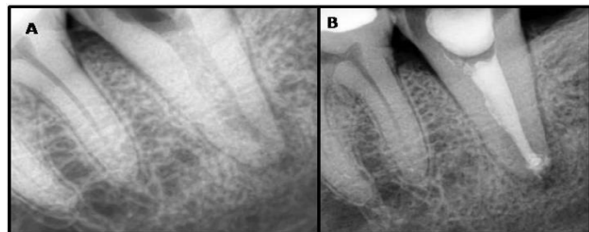


Figure 3. Intraoral radiographs: (A) preoperative; (B) postoperative.

DISCUSSION:

The main difficulty in the management of C shaped canal is due to the presence of fins, webs and other canal connections. This may lead to failure due to inadequate cleaning and disinfection and leaving behind the infected pulp tissue. Hence proper instrumentation, irrigation and obtaining hermetic seal is crucial.

Many times C shaped canal anatomy can be suspected from preoperative IOPA. Teeth with C shaped canals often present single fused root or roots that appear to be continuous or square at the apex as seen in our cases. The pulp chamber may be large in the occlusoapical dimension with a low bifurcation as in our first case. In working length radiographs, endodontic instruments can appear to be misplaced in the furcation. This can lead the operator to mistakenly suspect a perforation.⁽¹⁾

As we all know, we can treat only what we can see. Often the C shaped canals have single canal orifice which divides into one or more canals at a lower level. Dental operating microscope is very useful in proper visualization of such anatomy.⁽³⁾

C shaped canals have large volumetric capacity and house transverse anastomosis and irregularities. Hence, continuous circumferential filing with H file along the circumference of the C shaped canal and copious irrigation with sodium hypochlorite are essential to ensure maximum tissue removal.⁽⁴⁾ At the same time precaution should be taken to avoid excessive filing in the lingual wall to prevent strip perforation. Anticurvature filing in the coronal third is recommended for this purpose.

Also conventional needle irrigation may not be sufficient in proper cleaning of C shaped canals. The use of ultrasonics or sonic instruments like endoactivator may be useful in deeper penetration of the irrigants leading to more cleansability in the fan shaped areas.⁽⁵⁾ However improper and aggressive use of ultrasonics can lead to perforation.^(4,6,7) Hence we preferred endoactivator in this case.

Thermoplastic gutta percha obturation technique is the preferred technique due to more possibilities of sealing of the isthmus and other inaccessible areas.⁽⁴⁾ Hence, in both the cases, warm vertical compaction technique was used with the help of Touch N Heat and obtura III Max. Obturation of apical delta, anastomosis and other irregularities can be seen in the post obturation IOPA in both the cases.

CONCLUSION:

The successful endodontic management requires thorough knowledge about aberrant root canal systems. Implementation of sound principles of biomechanical preparation, obturation and restoration leads to successful management of C-shaped anatomy. This case report shows successful management of two cases of C-shaped canal anatomies using advance armamentarium like Dental operating microscope, irrigant activation system and thermoplasticised gutta percha technique.

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The author deny any conflict of interest related to the article.

REFERENCES

1. Jafarzadeh H, Wu YN. The C-shaped root canal configuration: a review. *J Endod.* 2007 May;33(5):517-23.
2. Elumalai D, Kumar A, Tewari R, Mishra S, Andrabi S, Iftikhar H, Alam S. Management of C-shaped root canal configuration with three different obturation systems. *Journal of General Dentistry* Jan 2015 ; 4 (1) : 25-28.
3. Wang Y1, Guo J, Yang HB, Han X, Yu Y. Incidence of C shaped root canal systems in mandibular second molars in the native Chinese population by analysis of clinical methods. *Int J Oral Sci.* 2012 Sep;4(3): 161-5.
4. Raisingani D1, Gupta S2, Mital P3, Khullar P4. Anatomic and diagnostic challenges of C-shaped root canal system. *Int J Clin Pediatr Dent.* 2014 Jan;7(1):35-9.
5. Patel P, Shah S, Parmar N. C-Shaped Root Canal System In Mandibular Second Molar: A Case Report And Discussion. *Journal Of Dental Sciences* 2 (2) : 34-37
6. Nilesh Suryakant Kadam, Ida de Noronha de Ataide. Management of C shaped canals: Two case Reports. *Journal of Orofacial Sciences* 2013 Jan;5 (1): 37-41.
7. Helvacioğlu-Yigit D. Endodontic management of C shaped root canal system of mandibular first molar by using a modified technique of self-adjusting file system. *J Contemp Dent Pract.* 2015 Jan ;16(1):77-80.