Case Report

Journal of College of Medical Sciences-Nepal, Vol-13, No 4, Oct-Dec 017

ISSN: 2091-0657 (Print); 2091-0673 (Online)
Open Access

C shaped canal: Variation and Recommendations

Sushmita Shrestha, Navin Agrawal, Mannu Vikram, Vimmi Singh, Ashok Ayer, Arbind Rai

Department of Conservative Dentistry and Endodontics , BP Koirala Institute of Health Sciences, Dharan, Nepal..

Correspondence
Dr. Sushmita Shrestha, Department of Conservative Dentistry and Endodontics , BP Koirala Institute of Health Sciences, Dharan, Nepal.

Email:
drsushmitashrestha@gmail.com

DOI: http://dx.doi.org/10.3126/jcmsn.v14i1.19125

Orcid ID: orcid.org/0000-0001-8724-7257

Article received: Feb 2nd 2018
Article accepted: Mar 26th 2018

ABSTRACT

Root canal morphology is not uniform, variations of root canals are routinely encountered by endodontists making the root canal treatment more challenging. C shaped canal is a variation commonly encountered in mandibular second molars. The main identifying feature of such canals is the presence of fins or webs interconnecting with the main canals. Such canal systems require meticulous mechanical and rigorous chemical preparation to ensure success of the treatment. Proper assessment of tooth morphology, preoperative radiograph along with consideration towards racial predilection will greatly help in accurate identification of such canals pre-operatively. This paper reports a case of C shaped canal in mandibular second molar diagnosed and treated taking all the precautions and adapting necessary modifications in the steps of conventional root canal treatment steps where required thus increasing the likelihood of success.

Key words: C shaped canal; Mandibular second molar; Tooth morphology

Citation: Shrestha S, Agrawal N, Vikram M, Singh V, Ayer A, Rai A. C shaped canal: Variation and Recommendations. JCMS Nepal. 2018;14(1):62-4.

INTRODUCTION

Root canal morphology stands as an enigma to endodontists due to variations that are routinely encountered. C shaped canal configuration is one such anatomical variations which is seen quite commonly among Asian population.[1-2] It was first reported by Cook and Cox in 1979 and is named so for the cross-sectional morphology of the root canal.[3] C shaped canal configuration is generally seen in permanent mandibular second molar with single large root although it can even be present in mandibular premolars, maxillary molars and mandibular third molars.[4-7] The success of any root canal treatment depends on the thorough cleaning shaping and obturation of canal space which is dependent on the knowledge of root canal anatomy and adaptation of necessary treatment modifications where required. C shaped canal configuration may have clinical presentation with variations in number as well as course in the tooth which definitely proves to be a challenge during every step of root canal treatment. If such canals can be recognised before the initiation of treatment many mishaps including irreparable damage to tooth like perforation can be avoided thus increasing the likelihood of success in such cases.[7-8] The identification, working length determination, cleaning, shaping and obturation all the steps of root canal treatment present as a difficulty in the cases of tooth with C shaped canal morphology due to the complex three dimensional anatomy of tooth with interlacing and interconnection of canal space.[9] Here we report a case of C shaped canal in mandibular second molar in a mongloid patient which was successfully identified and treated taking all the necessary precautions and modifications of the treatment protocol where required.

CASE DESCRIPTION

A 32-year-old female of mongloid race reported to

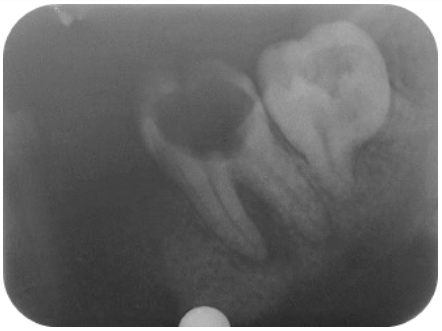

Figure 1: Diagnostic Radiograph

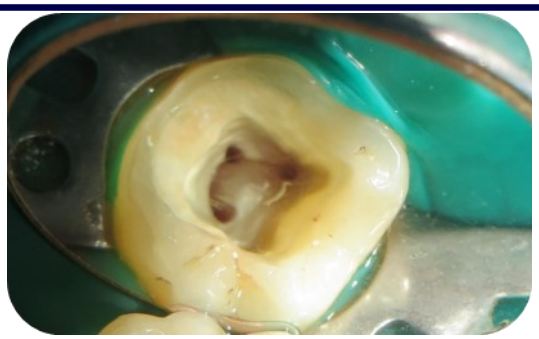

Figure 2: Access cavity

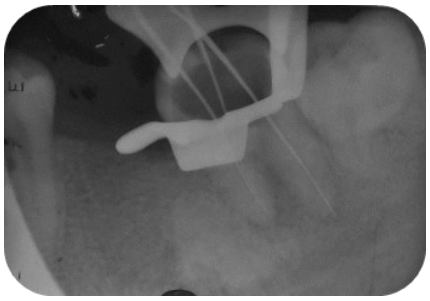

Figure 3: Working length

Figure 4: Master cone

Figure 5: Post-operative radiograph

the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in her lower right back tooth since 1 month. On intraoral examination caries involving pulp was revealed in her right mandibular second molar with tenderness to percussion which required root canal treatment. The diagnostic radiographs (Figure 1) however did not reveal C shaped canal configuration. After giving profound anaesthesia rubber dam was applied and access cavity (Figure 2) was prepared which was deeper than a normal access cavity. After proper orifice enlargement of the root canal C shaped canal configuration was already visualised. Careful initial penetration of canals with size 10 k file (Dentsply) characterised the C shaped canal configuration more accurately. Working length (Figure 3) was determined by placing number 15 k files (Dentsply) of various lengths and biomechanical preparation of canals was done using careful circumferential filing method in the presence of large volumes of sodium hypochlorite irrigating solution. The main canals were prepared till file size 35 and the interconnections till number 20 k file. After biomechanical preparation the canals were finally irrigated with chlorhexidine and calcium hydroxide dressing was kept along with temporary restoration. During next appointment after one week the master cone selection was done (Figure 4). The canals were then obturated (Figure 5) using standard gutta percha points (Dentsply) following the recommended modification of obturation technique for C shaped canals as advocated by Barnett.10 The access cavity was then sealed with Glass Ionomer Cement (GC Fuji) and composite restoration was done. On one month follow up visit upon the completion of treatment the patient was completely asymptomatic and was advised for crown placement.

DISCUSSION

C shaped canal is a relatively common finding in East Asia region and numerous studies have shown that this entity has racial predilection favouring mongloid races.[1-2] C shaped canal is mostly found in mandibular molars although it can even be present in mandibular premolars, third molars and maxillary molar to a lesser extent[3-4] which is in accordance to the finding of our case. There are various theories for the formation of C shaped canal but the most lucid explanation is the failure of Hertwig's epithelial root sheath to fuse.[11] Accurate diagnosis of this entity both clinically and radiographically prior to the initiation of treatment will help the clinician to make a strategic treatment plan that will significantly improve prognosis of such cases. Newer three dimensional imaging modality like cone beam computed tomography has been successful in increasing the accuracy of

diagnosing such cases. Due to higher rates of canal irregularities found in C shaped canals it is very difficult to prepare and seal the entire canal system adequately thus meticulous mechanical as well as chemical debridement of canals is of utmost importance. Obturation of C shaped canals requires modification of technique and in our case also we modified the obturation technique as recommended by Barnett[10] where a large diameter file was placed in the distal aspect of the canal after which master cone was placed in the mesial canal. Then this file was withdrawn and master cone was placed in the distal canal followed by placement of accessory cones in the interconnecting fins. Following this technique had certainly ensured proper placement of master cones.

CONCLUSION

Spindle C shaped canals have racial predilection with higher rate of occurrence in mandibular second molar. If careful consideration is given towards its early identification and proper modification of various steps of root canal treatment effective management of such cases can be done without the need for costly equipment.

Conflict of Interest Statement:

None Declared

REFERENCES

1. Seo MS, Park DS. C-shaped root canals of mandibular second molars in a Korean population: Clinical observation and in vitro analysis. Int Endod J. 2004;37:139-44. https://doi.org/10.1111/j.0143-2885.2004.00772.x
2. Jin GC, Lee SJ, Roh BD. Anatomical study of C-shaped canals in mandibular second molars by analysis of computed tomography. J Endod. 2006;32:10-3 https://doi.org/10.1016/j.joen.2005.10.007
3. Jafarzadeh H, Wu YN. The C-shaped Root Canal Configuration: A Review; J Endod. 2007; 33: 517–523. https://doi.org/10.1016/j.joen.2007.01.005
4. Fan W, Fan B, Gutmann JL, Cheung GS. Identification of Cshaped Canal in Mandibular Second Molars. Part I: Radiographic and Anatomical Features Revealed by Intraradicular Contrast Medium; J Endod. 2007; 33: 806–810. https://doi.org/10.1016/j.joen.2007.04.007
5. Manning SA. Root canal anatomy of mandibular second molars. Part I: Int Endod J. 1990;23:34-9. https://doi.org/10.1111/j.1365-2591.1990.tb00800.x. PMID:2391179.
6. Rahimi S, Shahi S, Lotfi M, Zand V, Abdolrahimi M, Es'haghi R. Root canal configuration and the prevalence of C-shaped canals in mandibular second molars in an Iranian population. J Oral Sci. 2008;50:9-13. https://doi.org/10.22037/iej.2017.29. PMID:18403877 .
7. Weine FS. The C-shaped mandibular second molar: Incidence and other considerations. Members of the Arizona Endodontic Association. J Endod. 1998;24:372-5. PMID: 9641116.
8. Fan B, Cheung GS, Fan M, Gutmann JL, Fan W. C-shaped canal system in mandibular second molars: Part II: Radiographic features. J Endod. 2004;30:904-8. PMID: 15564875.
9. Chai WL, Thong YL. Cross-sectional morphology and minimum canal wall widths in C-shaped roots of mandibular molars. J Endod. 2004;30:509-12. PMID: 15220648.
10. Barnett F. Mandibular molars with C-shaped canal. Endod Dent Traumatol. 1986;2:79-81. PMID: 3459655.
11. Orban B, Mueller E. The development of bifurcation of multirooted teeth. J Am Dent Assoc. 1929;16:297-319.