



NON SURGICAL MANAGEMENT OF INTRA ORAL SINUS IN MANDIBULAR CANINE WITH TWO CANALS AND MANDIBULAR FIRST PREMOLAR WITH TWO ROOTS: A CASE REPORT.

Dr. Manpreet Kaur*	Post graduate student, Department of Conservative Dentistry & Endodontics, National Dental College & Hospital, Derabassi. *Corresponding Author
Dr. Navjot Singh Mann	Professor & Head, Department of Conservative Dentistry & Endodontics, National Dental College & Hospital, Derabassi.
Dr. Ashu Jhamb	Reader, Department of Conservative Dentistry & Endodontics, National Dental College & Hospital, Derabassi.
Dr. Divya Batra	Senior Lecturer, Department of Conservative Dentistry & Endodontics, National Dental College & Hospital, Derabassi.
Dr. Kreena Rattu	Post graduate student, Department of Conservative Dentistry & Endodontics, National Dental College & Hospital, Derabassi

ABSTRACT The root canal morphology of teeth is more often highly complex and variable. Therefore, any attempt to perform successful endodontic treatment must be preceded with thorough and detailed knowledge of the root canal morphology and its possible variations¹. The majority of mandibular canines are single rooted with one root canal. The possibility of having two canals in mandibular canines is reported to be infrequent^{2,3}. Mandibular first premolars have also been typically described in literature as single-rooted with incidence of extra roots to be rarely present⁴. This paper describes a case report on non surgical management of intra oral sinus with presence of two root canals in mandibular canine (Vertucci Type II) and two rooted mandibular first premolar (Vertucci Type IV) in same patient, which is a rare entity.

KEYWORDS : mandibular canine, mandibular first premolar, two canals, two roots, endodontic treatment.

INTRODUCTION

The main purpose of endodontic treatment is the eradication of infection from the root canal space and preventing its reinfection.⁵ In order to perform a quality endodontic treatment, which will ensure the tooth's longevity, it is imperative that the dentist focuses on morphology of root canal system and its variations which may adversely affect the endodontic procedures.⁶ This paper attempts at explaining a rare case of successful endodontic management of a right mandibular canine with two canals and right mandibular first premolar with two roots in same patient with diagnostic and inter-operative radiographic records along with a substantial data on the incidence of extra canals and extra roots in these teeth.

CASE REPORT

A 65 year old female patient reported to the Department of Conservative Dentistry and Endodontics in National Dental College & Hospital, Punjab with the chief complaint of decayed teeth and pain on chewing in relation to right front & back region of mandible since 2 weeks. Proper clinical examination was done and case history was taken. Patient's medical history was non-contributory. Clinical examination showed deep proximal caries with presence of intra oral sinus and tenderness on percussion wrt 43 & 44 (Fig.1) [Tooth notation given according to FDI System].



Fig.1 – Intra oral sinus

Vitality tests on the involved teeth (43, 44), showed no response to cold & heat tests and EPT. Radiographic examination revealed carious pulpal exposure involving 43, 44 (Fig.2).



Fig.2 – Pre-operative IOPA radiograph

The clinical, radiographic examination and vitality tests led to a diagnosis of asymptomatic irreversible pulpitis with apical periodontitis in relation to 43 & 44 requiring endodontic therapy. The tooth was anaesthetized followed by isolation of tooth using rubber dam. Access cavity was prepared with a round diamond bur in a high speed airtor hand piece. A sharp DG16 endodontic explorer was used to locate the orifices, and the access was modified accordingly (Fig. 3 & 4).

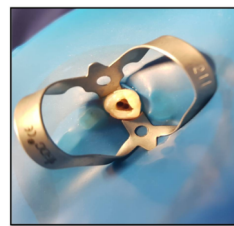


Fig. 3 – Access opening wrt 43

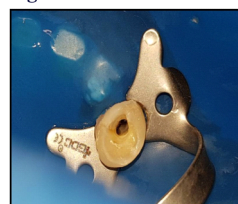


Fig. 4 – Access opening wrt 44

The working length was established using Root ZX mini (J Morita, Tokyo, Japan) electronic apex locator and confirmed radiographically (Fig. 5 & 6).

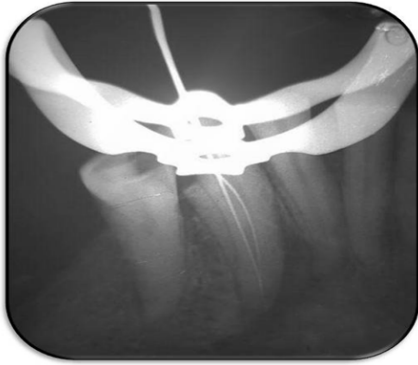


Fig. 5 – Working length radiograph wrt 43

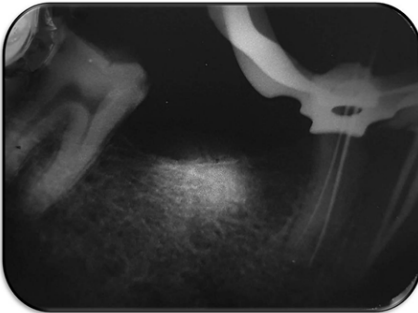


Fig. 6 – Working length radiograph wrt 44

The canals showed Vertucci type II configuration (two separate canals leave pulp chamber and join short of apex to form one canal) in single rooted 43 and Vertucci Type IV (two separate canals extend from pulp chamber to apex) in two rooted 44. Chemo mechanical preparation was performed using ProTaper File system (Dentsply-Maillefer, Ballaigues, Switzerland) using crown down technique. A 5% solution of sodium hypochlorite and 17% EDTA were used alternatively as irrigants at every change of instrument. The apical preparation was done until F2 file size in both the canals wrt 43 & 44 respectively and master cone radiographs were taken (Fig. 7 & 8).

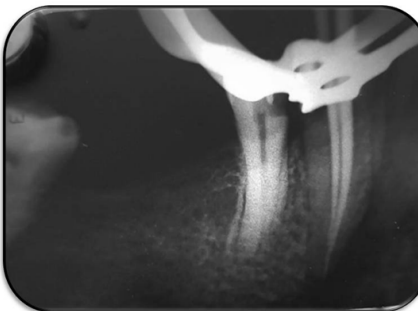


Fig. 7 – Master cone radiograph wrt 43

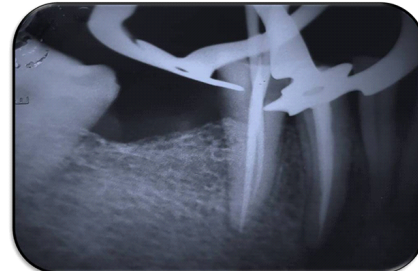


Fig. 8 – Master cone radiograph wrt 44

The canals in 43 & 44 were obturated with corresponding ProTaper cones and patient reported to be asymptomatic with healing of intra oral sinus (Fig. 9).



Fig. 9 – Healing of sinus

DISCUSSION

Successful endodontic treatment requires an in-depth knowledge of anatomical variations in teeth, especially extra canals and roots⁷. Numerous methods have been employed for studying root canal anatomy, including replication techniques, ground sections, clearing techniques and radiography. Advanced modes of radiographic imaging includes spiral computed tomography (SCT), micro-computed tomography (micro CT) and cone beam computed tomography (CBCT) which provides three-dimensional view of the pulp space anatomy and identification of rare aberrations⁸. In this case report, 2 canals in right mandibular canine and 2 roots in right mandibular first premolar were found in the same patient. Therefore, extra investigations such as CBCT were not planned due to concerns regarding radiation dosages.

Special attention must be given to the preparation of access cavity which is the key to find all orifices. Proper access to the pulp chamber can be improved by enlarging main canal with GG drills. A good tactile sense and pre curving the instruments before negotiating can be helpful. After access opening, the use of magnifying loupes or endodontic microscope, also proves very beneficial and makes treatment easier. The use of dyes like methylene blue and performing “champagne bubble test” using NaOCl have also been reported to be valuable aids in locating extra or hidden canals^{9,10}. In absence of direct access, the cleaning, shaping and filling of these teeth can be extremely difficult. Inability to recognize the presence of extra root or canals can often lead to acute flare ups during treatment and subsequent failure of endodontic therapy¹¹.

Slowey (1979) has suggested mandibular premolars, to be “endodontist's enigma”, as they present an undoubtedly greatest difficulty of all teeth to perform successful endodontic treatment¹². A study done at University of Washington in 1995 evaluated the failure rate of RCT in all teeth & the results showed that mandibular first premolar had the highest failure rate in study at 11.45%.¹³ Scott and Turner describe the accessory root of mandibular first premolar as Tome's root.¹⁴ The incidence of two roots in mandibular first premolar is reported to be 1.8%.¹³ Vyoma et al. (2016)¹⁵ assessed the root morphology and canal configuration of 200 mandibular first premolars using cone-beam computed tomography imaging (CBCT). They found that 194 had one root (97%) and 6 had two roots (3%); 88.5% had one canal, 10% had two canals, 1.5% had three canals, and 0.5% had C shaped canals. Various studies using clearing technique have shown the 2-rooted mandibular first premolar to be 10% in 100 (Velmurugan & Sandhya, 2009),¹⁶ 1.5% in 400 (Vertucci, 1984)¹⁷ and 2.89% in 138 extracted mandibular first premolars (Jain & Bahuguna 2011).¹⁸

In mandibular canine usually a single canal is present which exits in a single foramen at the apex. At times, two root canals, rarely three root canals or two roots can also be present.¹⁹ The incidence of 2 or more canals in mandibular canines is reported to be 10.6%.¹³ In 2006, Bakianian et al.²⁰ analyzed 100 canines after making transversal slices and detected two canals in 12% of the cases. Similar results were obtained by Kaffe et al. (1985)²¹, in an in-vivo radiological study on 400 mandibular canines, which showed 13.75% with 2 canals. Caliskan et al. (1995)²² reported 19.5% of the mandibular canines having two canals in a study on 100 radiological images.

The etiology behind accessory root formation in teeth is attributed to

two mechanisms: i.e. either by splitting off the Hertwig's Epithelial Root Sheath (HERS) to form two similar roots, or by folding of the HERS to form an independent root which may present with various morphological features.²³ Whilst the exact etiology of accessory roots is still uncertain, as various factors have been proposed, including different ethnicity, several diseases and developmental anomalies, genetic factors, local traumatic injuries and external pressure.^{24,25}

Therefore, numerous factors are responsible for variations in the root and canal morphology of these teeth. Hence, its of paramount importance for the clinician to locate and treat the extra canals or roots in such teeth with all available diagnostic tools that will ensure the successful endodontic outcome.

CONCLUSION

A clear understanding of root and root canal anatomy with its possible variations is essential for effective cleaning, shaping and obturation of the root canal system. Anatomical variations, especially extra canals and roots, should always be kept in mind when treating teeth endodontically. The primary cause of endodontic failure is overlooked root canals. Hence, careful interpretation of the radiograph, radiographs at different angulations, close clinical inspection of the floor of the chamber, proper modification of the access opening, detailed exploration of the tooth, adequate illumination and also image magnification can hint about the anatomical variations in these teeth for a successful treatment outcome.

REFERENCES

- Ramdas, R., Jayasree, S., Kumar, R., Rahman, N. K., Rajesh, M. K., & Raj, G. Management of Mandibular Premolar with Two Roots: Two Case Reports.
- Pineda, F., & Kuttler, Y. (1972). Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. *Oral Surgery, Oral Medicine, Oral Pathology*, 33(1), 101-110.
- Ouellet, R. (1995). Mandibular permanent cuspids with two roots. *Journal (Canadian Dental Association)*, 61(2), 159-161.
- Cleghorn, B. M., Christie, W. H., & Dong, C. C. (2007). The root and root canal morphology of the human mandibular first premolar: a literature review. *Journal of Endodontics*, 33(5), 509-516.
- Sjögren, U. L. F., Hägglund, B., Sundqvist, G., & Wing, K. (1990). Factors affecting the long-term results of endodontic treatment. *Journal of endodontics*, 16(10), 498-504.
- Nair, P. R., Sjögren, U., Krey, G., Kahnberg, K. E., & Sundqvist, G. (1990). Intraradicular bacteria and fungi in root-filled, asymptomatic human teeth with therapy-resistant periapical lesions: a long-term light and electron microscopic follow-up study. *Journal of endodontics*, 16(12), 580-588.
- Goswami, M., Chandra, S., Chandra, S., & Singh, S. (1997). Mandibular premolar with two roots. *Journal of endodontics*, 23(3), 187.
- Kottoor, J., Albuquerque, D., Velmurugan, N., & Kuruvilla, J. (2013). Root anatomy and root canal configuration of human permanent mandibular premolars: a systematic review. *Anatomy research international*, 2013.
- Rödig, T., & Hülsmann, M. (2003). Diagnosis and root canal treatment of a mandibular second premolar with three root canals. *International endodontic journal*, 36(12), 912-919.
- De Moor, R. J., & Calberson, F. L. (2005). Root canal treatment in a mandibular second premolar with three root canals. *Journal of endodontics*, 31(4), 310-313.
- Nallapati, S. (2005). Three canal mandibular first and second premolars: a treatment approach. A case report. *Journal of Endodontics*, 31(6), 474-476.
- Slowey, R. R. (1979). Root canal anatomy: road map to successful endodontics. *Dent. Clin. North Am.*, 23, 555-573.
- Ingle, J. I., Bakland, L. K., & Baumgartner, J. C. (2008). *Ingles endodontics 6th ed.* Hamilton, ON: BC Decker Inc, 1348-1351.
- Scott, G. R., & Turner, C. G. (1997). *Anthropology of modern human teeth* (pp. 382-p). Cambridge: Cambridge University Press.
- Vyoma, S., Rupal, V., Shradha, C., Zarna, S., Pruthvi, P., & Kinha, T. (2016). Evaluation of Root and Canal Morphology of Mandibular Premolars in Urban Indian Population: An In-Vivo Cone Beam Computed Tomographic Study. *International Journal of Medical and Dental Sciences*, 5(2), 1214-1221.
- Velmurugan, N., & Sandhya, R. (2009). Root canal morphology of mandibular first premolars in an Indian population: a laboratory study. *International Endodontic Journal*, 42(1), 54-58.
- Vertucci, F. J. (1984). Root canal anatomy of the human permanent teeth. *Oral surgery, oral medicine, oral pathology*, 58(5), 589-599.
- Jain, A., & Bahuguna, R. (2011). Root canal morphology of mandibular first premolar in a gujarati population-an in vitro study. *Dental research journal*, 8(3), 118.
- Arora, V., Nikhil, V., & Gupta, J. (2013). Mandibular canine with two root canals—An unusual case report. *International Journal of Stomatological Research*, 2(1), 1-4.
- Vaziri, P. B., Kasraee, S., Abdolsamadi, H. R., Abdollahzadeh, S., Esmaeili, F., Nazari, S., & Vahedi, M. (2008). Root canal configuration of one-rooted mandibular canine in an Iranian population: An in vitro study. *Journal of dental research, dental clinics, dental prospects*, 2(1), 28.
- KAFFE, I., KAUFMAN, A., LITTNER, M. M., & LAZARSON, A. (1985). Radiographic study of the root canal system of mandibular anterior teeth. *International Endodontic Journal*, 18(4), 253-259.
- Çalışkan, M. K., Pehlivan, Y., Sepetçioğlu, F., Türkün, M., & Tuncer, S. Ş. (1995). Root canal morphology of human permanent teeth in a Turkish population. *Journal of endodontics*, 21(4), 200-204.
- Türp, J. C., & Alt, K. W. (1998). *Anatomy and morphology of human teeth*. In *Dental Anthropology* (pp. 71-94). Springer, Vienna.
- Ahmed, H. M. A., & Abbott, P. V. (2012). Accessory roots in maxillary molar teeth: a review and endodontic considerations. *Australian dental journal*, 57(2), 123-131.
- Trope, M., Elfgenbein, L., & Tronstad, L. (1986). Mandibular premolars with more than one root canal in different race groups. *Journal of Endodontics*, 12(8), 343-345.