

**A CASE REPORT ON ENDODONTIC MANAGEMENT OF MANDIBULAR CANINE WITH 2 ROOT CANALS****Manju Krishna E. M.*¹, Asha Pius² and Robin Theruvil³**¹PG Student, ²PG Student, ³Professor

Department of Conservative Dentistry and Endodontics St Gregorios Dental College Chelad, Kothamangalam.

***Corresponding Author:** Manju Krishna E. M.

PG Student, Department of Conservative Dentistry and Endodontics St Gregorios Dental College Chelad, Kothamangalam.

Article Received on 03/05/2020**Article Revised on 24/05/2020****Article Accepted on 14/06/2020****ABSTRACT**

Endodontic therapy may sometimes fail because morphological features of the tooth adversely affect the treatment procedures. Many investigators have reported the anatomical variations associated with mandibular canines. The root canal anatomy of permanent mandibular canines varied widely in an Indian population. Mandibular canines are recognized as usually having one root and one root canal in most cases., but it may possess two canals and even less frequently two roots and two or three canals. This case report describes a clinical case of mandibular canine with two canals. Human mandibular canines do not present internal anatomy as simple as could be expected. The existence of mandibular canines with more than one root canal is a fact that clinicians thought to keep in mind, in order to avoid failure during endodontic treatment. The presence of a second canal in these teeth leads to difficulties in endodontic treatment. The precise knowledge of the dental root canal system's anatomy is essential in the success of the root canal therapy, because the failure to detect the accessories canals and the incomplete radicular obturation leads to the infection of the periapical space, which will ultimately result in the loss of the tooth.

KEYWORDS: Anatomy, endodontics, mandibular canine, two canals.**INTRODUCTION**

The aim of endodontic treatment is the elimination of infection from the root canal and the prevention of reinfection.^[1] Missed canal/root is one of the main reasons for the failure of the root canal treatment. However, root canal treatment may fail because of factors including persistent infection of the root canal, unsatisfactory intracanal procedures that may lead to poor canal preparation, broken instruments and incomplete root canal fillings. Morphological features of the tooth may also adversely affect endodontic procedures.^[2] Variation in root and root canal morphology can be found in any tooth in the dental arch with varying degree of incidence. A thorough knowledge of the external and internal anatomy of teeth with its possible aberration is essential to ensure the success of endodontic treatment. Many clinicians have the perception that a given tooth will contain a specific number of roots and/or canals. Careful evaluation of research material has, however, shown that variations in tooth morphology are common. Many investigators have reported on the anatomical variations associated with mandibular canines.^[3,4]

A thorough knowledge of the root canal morphology and its variations is an indispensable prerequisite for the

success of the root canal treatment. Many roots have additional canals and a variety of canal configurations. Occasionally during the formation of a root, a break develops in Hertwig's epithelial root sheath producing a small gap. This results in "accessory canals" and can be formed anywhere in the root, leading to periodontal-endodontic communication.^[5] Mandibular canine is usually considered a monoradicular tooth with single root canal. Like other teeth in the dental arch, mandibular canine also does not always display the basic anatomy with one root and one canal. Several researchers have reported anatomical variations with varying degrees associated with mandibular canines.^[6]

one root and two root canals has been reported to be about 0%–24% in various ethnic groups. However, the occurrence of two roots with two or more canals is rare ranging from 0% to 5%. Despite the low occurrence of anatomical variations in mandibular canine, endodontists should be aware of possible variations with respect to the number of roots and root canals.^[7] The following clinical report describes endodontic treatment of one mandibular canine with two canals.

CASE REPORT

A 48-year-old female patient presented with pain in the lower right mandible. (Figure 1) The diagnostic radiograph showed coronal radiolucency approaching pulp and widening of the periodontal ligament space in relation to 43. (Figure 2) The right lower canine (43) was tender on percussion. The tooth showed delayed response to pulp vitality tests as compared to healthy contra lateral tooth. Based on the clinical and radiographic examination, a diagnosis of irreversible pulpitis with acute apical periodontitis was established and root canal treatment was planned. The treatment was explained to the patient and consent was obtained. On careful evaluation of the diagnostic radiograph, it was seen that in the mandibular canine two canals were present. Local anesthesia was administered and rubber dam was placed. Access was achieved using a round diamond bur. The two orifices were located one buccal and one lingual [Figure 3]. Working length was established radiographically for both canals [Figure 4].

Chemo mechanical preparation was performed using ProTaper File system (Dentsply-Maillefer, Ballaigues, Switzerland) in crown down manner. A 5.25% solution of sodium hypochlorite and 17% ethylenediaminetetraacetic acid were used alternatively as irrigants at every change of instrument. The apical preparation was done until F2 file size in both the canals. Calcium hydroxide (Prime dental PVT, India) was placed as an intracanal medicament for 1 week and master cone radiograph taken with corresponding ProTaper cones.(Figure 5) and obturation done using AH Plus sealer (Dentsply).Postobturbation radiograph was recorded [Figure 6]. Post space preparation done in relation to 43 with peesoreamer in buccal canal with remaining 5mm GP.(Figure 7).Direct cast post wax pattern taken in relation to 43 with inlay wax.(Figure 8). Cast post luting done in relation to 43 with dual cure resin cement.(Figure 9).Full ceramic crown luting done in relation to 43 with GIC.(Figure 10). The patient was asymptomatic during the follow-up period of 10 months.



Figure 1: Preoperative photograph



Figure 2: Preoperative radiograph



Figure 3: Buccal and lingual canals



Figure 4: Working length radiograph



Figure 5: Master cone radiograph.



Figure 6: Obturation radiograph.



Figure 7: Post space preparation radiograph.



Figure 8: Cast post wax pattern.

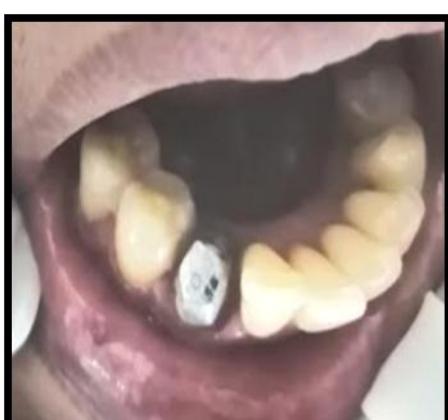


Figure 9: Cast post int 43.



Figure 10: Post-operative photograph.

DISCUSSION

Proper diagnosis and identification of the possible permutations of the canal morphology are essential for the success of endodontic treatment. Failure to locate and treat an extra root/canal is one of the most common causes of root canal treatment failure. Knowledge of anatomic variations is essential because endodontic success is related to a thorough debridement of the root

canal system. There are many studies in favor of multiple visit root canal treatment than single visit as the placement of antibacterial dressing is essential for eradicating all infections from the root canals. However, few recent studies have advocated the treatment of teeth with apical periodontitis in single visit. Kvist *et al.*⁸ observed no statistically significant difference between the groups of teeth with apical periodontitis

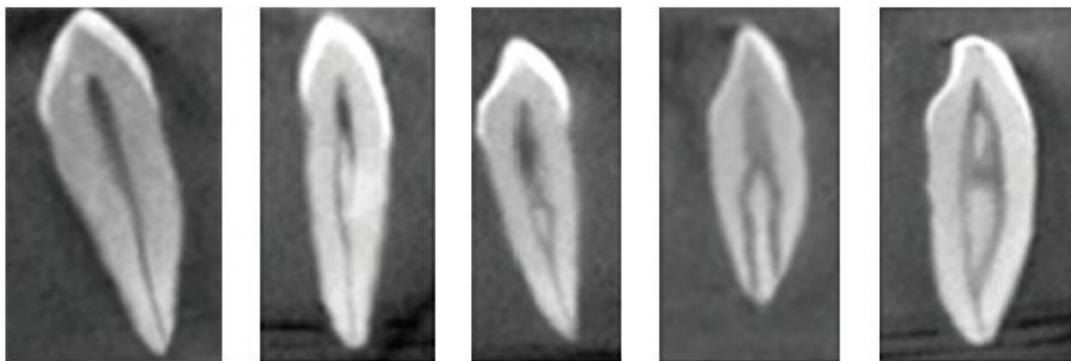
treated with either single or multiple visit approach. Detailed clinical and radiographic examinations are critical factor in detecting morphological variations. Mandibular canines are recognized as usually having one root and one root canal in the majority of cases. It has been reported that 15% of mandibular canines presented with two canals with one or two foramina.^[9,10]

There was a mention of a case of a mandibular canine that had two roots and three radicular canals.^[11] There is also evidence of even three canals with only two apexes,^[12] but also of two roots with two separate canals.^[13] In mandibular canine with two roots, roots are generally positioned buccally and lingually which can be easily overlooked on preoperative radiograph due to superimposition of roots and canals. Radiographs taken with different horizontal angulations may help in

identification or at least suspicion of root and root canal variations. Successful and predictable endodontic treatment requires knowledge of biology, physiology and root canal anatomy.

Various researchers have carried out studies to demonstrate variation in the root/canal anatomy in different races using different methods.^[14] Various root canal patterns are seen mandibular canine in Indian populations.

In mandibular canines the various canal patterns were Type I (79.6%), Type II (3.2%), Type III (13.6%), and Type V (2%) based on Vertucci's classification and four of the mandibular canines (1.6%) had a (2-1-2-1) canal configuration which is Type XIX as per Sert and Bayirli's.^[15]



Variations in the internal anatomy among populations could be due to the differences in genetics and racial variations in the population. It also requires proper instruments and the knowledge to use these instruments effectively. Teeth with extra roots and/or canals pose a particular challenge. Inability to identify and treat these additional root canals may cause treatment failures. Careful examination of preoperative radiographs can aid in locating additional canal or roots. Thus, root canal therapy of these teeth should be carried out by using X-rays from different angulations, efficient explorers, wider access openings, adequate illumination and image magnification whenever possible. Necessary precautions have to be taken during root canal therapy of these teeth and hence instrumentation of these canals was carried out using nickel titanium files, due to their flexibility, lesser risks of ledge formation and perforations. It is important to detect such anatomical variations before the initiation of endodontic treatment to prevent iatrogenic mishaps and to gain high success. The dental anatomical knowledge is an essential condition in the practice of endodontics. Hence, before the beginning of the treatment, a thorough knowledge of the root canal anatomy is important to achieve good results.

CONCLUSION

Failure to control infection in the root canal system has an adverse impact on outcome. Clinicians therefore

should be aware of anatomical variations in the teeth they are managing and should never assume that canal systems are simple. Although the incidence of mandibular canine with two roots and two or three canals is low, it can exist. A thorough knowledge of the tooth and root canal morphology, clinical exploration, and detailed radiographic interpretation as well as use of advanced radiographic technique may be helpful in detecting root canal aberrations and to achieve success. The majority of mandibular canines have one root and root canal, but 15% may have two canals, and a smaller number may have two distinct roots, both of which should be identified and managed.

REFERENCES

1. Sjogren U, Hagglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. *J Endod*, 1990; 16: 498-504.
2. Nair PN, Sjögren U, Krey G, Kahnberg KE, Sundqvist G. 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. *J Endod*, 1990; 16: 580-8.
3. Andrei OC, Mărgărit R, Dăguică L. Treatment of a mandibular canine abutment with two canals. *Rom J Morphol Embryol*, 2010; 51: 565-8.

4. Versiani MA, Pécora JD, Sousa-Neto MD. The anatomy of two rooted mandibular canines determined using micro-computed tomography. *Int Endod J.*, 2011; 44: 682-7.
5. K. Luukko, P. Kettunen, I. Fristad, and E. Berggreen, "Structure and functions of the dentin-pulp complex," in *Pathways of Pulp*, K. M. Hargreaves and S. Cohen, Eds 457–458, Mosby Inc., St.Louis, Mo, USA, 10 th edition, 2011.
6. Vanwter GA. Dental anomalies. *D Cosmos*, 1886; 28: 64.
7. Pineda F, Kuttler Y. Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. *Oral Surg Oral Med Oral Pathol*, 1972; 33: 101-10.
8. Kvist T, Molander A, Dahlén G, Reit C. Microbiological evaluation of one- and two-visit endodontic treatment of teeth with apical periodontitis: A randomized, clinical trial. *J Endod*, 2004; 30: 572-6.
9. Soleymani A, Namaryan N, Moudi E, Gholinia A. Root canal morphology of mandibular canine in an Iranian population: a CBCT assessment. *Iran Endod J.*, 2017; 12: 78–82.
10. Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol*, 1984; 58: 589-99.
11. Heling I, Gott lieb-Dodon I, Chandler NP. Mandibular canine with two roots and three root canals. *Endod Dent Traumatol*, 1995; 11: 301-2.
12. Orguneser A, Kartal N. Three canals and two foramina in a mandibular canine. *J Endod*, 1998; 24: 444-5.
13. Victorino FR, Bernardes RA, Baldi JV, Moraes IG, Bernardinelli N, Garcia RB, et al. Bilateral mandibular canines with two roots and two separate canals: Case report. *Braz Dent J*, 2009; 20: 84-6.
14. Vaziri PB, Kasraee S, Abdolsamadi HR, Abdollahzadeh S, Esmaeli F, Nazari S, et al. Root canal configuration of one rooted mandibular canine in an Iranian population: An *in vitro* study. *J Dent Res Dent Clin Dent Prospects*, 2008; 2: 28-32.
15. Somalinga Amardeep N, Raghu S, Natanasabapathy V .Root Canal Morphology of Permanent Maxillary and Mandibular Canines in Indian Population Using Cone Beam Computed Tomography. *Anat Res Int*, 2014; 2014: 731859.