

Navigating Additional Canals in Mandibular Teeth: A Case Series

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ABSTRACT

Morphological variation exists in mandibular teeth. Thus, the clinician should be mindful of all the possibilities of variation. Following case series exhibit the variation of morphology in mandibular teeth within the Pakistani population reported at Operative and Endodontics Department of Islamabad Dental Hospital

Keywords: Canine teeth, Endodontics, Mandibular incisor, Premolar, Root canal morphology.

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Introduction

Knowledge of root canal anatomy is significant for the success of root canal treatment. Tooth may not present with typical morphological anatomy. Failure to acknowledge the variation in root canal treatment and elimination of bacteria can lead to serious post-operative consequences.¹ Mandibular teeth also depicts variation in its typical anatomical morphology such as presence of two canals in mandibular incisors, canine, and premolars. According to Yang et al. 15% of Iran and Turkish population have prevalence of two canals in mandibular central and lateral incisor² whereas 10% population had two canals in mandibular canine.³ Mandibular second premolar exhibits the most variation and may present with any of eight vertucci's classification.⁴

This case series aims to present the cases of mandibular teeth with unusual anatomy such as mandibular central incisors, canine and second premolar with two canals and roots and to highlight

the importance of exploring different root canal anatomy thereby enhancing patient care.

Case Report. 1

An 86-year-old male presented to the department of Operative and Endodontics with the chief complaint of pain in lower anterior region. The pain was severe and spontaneous in nature since one week. On clinical examination, the left mandibular central incisor was carious mesiofacialy. On cold testing there was a lingering response and the tooth was tender. Based on clinical and radiographic findings a diagnosis of symptomatic irreversible pulpitis and symptomatic apical periodontitis was established. Endodontic treatment of the tooth was planned. Local anesthesia was administered with 2% lidocaine and 1:100,000 epinephrine. Isolation was achieved through rubber dam. After caries removal, access to pulp chamber was achieved facially to conserve tooth structure. After access opening, the single canal was observed to be a little offset towards facial side and the orifice shape was slit type. Therefore,

the floor of the chamber was explored using DG-16 probe. Another canal was located on the lingual side. The two canals are shown in (figure 1a). Working length was established using electronic apex locator and a digital radiograph was taken using slob technique which revealed vertucci type 2 classification in mandibular left central incisor (figure 1b). The facial canal was wider as compared to lingual canal. Crown down technique

was used for cleaning and shaping using rotary protaper file with 3% sodium hypochlorite as an irrigant. Irrigation and recapitulation were carried out throughout the canal cleaning and shaping. Obturation was done with protaper gutta percha F2 with calcium-based sealer (sealapex) and permanent restoration was done using composite as shown in (figure 1c). Patient was advised full coverage restoration.

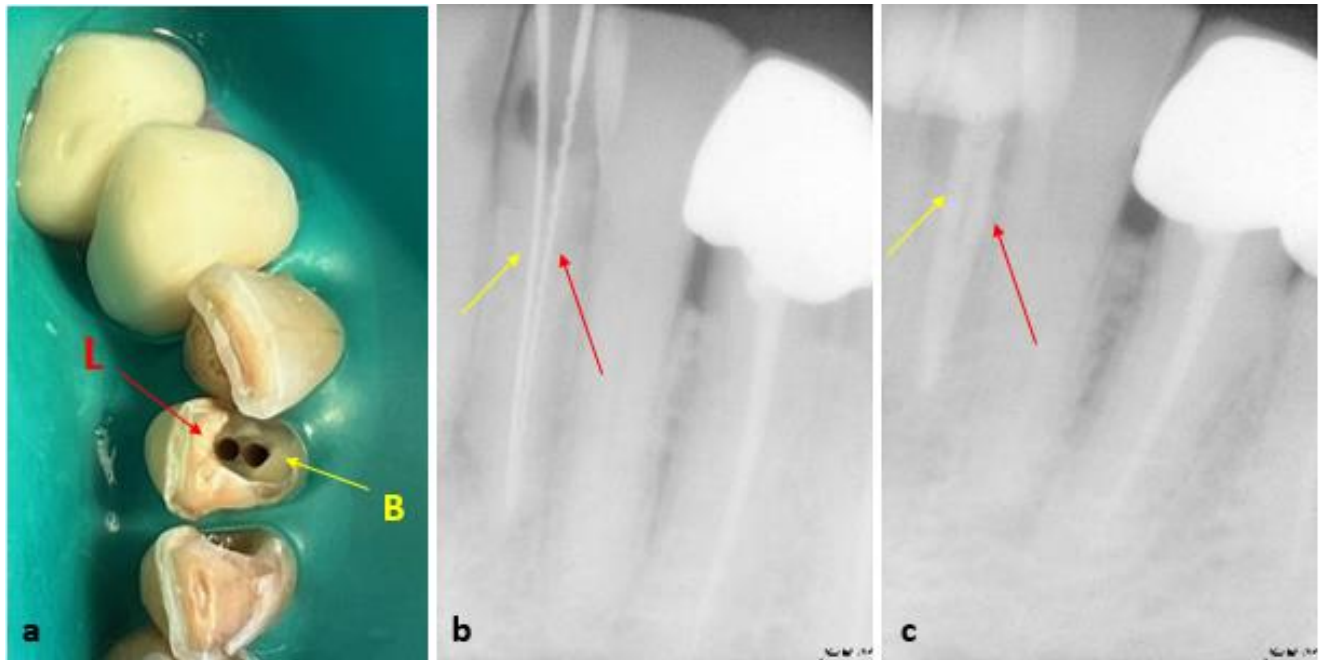


Figure 1: a) clinical picture of mandibular left central incisor with facial and lingual canal orifice after cleaning and shaping, b) Distal shift working length radiograph, red arrow indicates H file in lingual canal and yellow arrow indicates K file in buccal canal, c) Radiograph of obturation

Case Report 2

A 32-year-old male presented to the department of Operative and Endodontics with chief complaint of dull pain on the lower left side. The pain was dull and continuous since two weeks. The patient gave a history of root canal treatment and a bridge in the area two weeks back from a private clinic. On clinical examination, there was a bridge in place with canines used as abutments. Mandibular left canine was tender to percussion. On close observation, the previous obturation in mandibular left canine seemed to be deviated from the usual central pathway indicating the possibility of another canal.

Based on history, clinical and radiographic examination, a diagnosis of previously endodontic treated tooth with symptomatic apical periodontitis was made. After informed consent, nonsurgical retreatment was decided. Local anesthesia was given with 2% lidocaine and 1:100,000 epinephrine. Bridge was removed using mandrel crown removal. Following isolation access opening was re-established and previous obturation was removed using H files and orange oil. After thorough mapping of floor using DG-16 probe another catch was found lingually at the terminus of developmental groove as shown in (figure 2a), and confirmed by digital

periapical radiograph. Working length radiograph revealed mandibular left canine exhibited vertucci classification type 2 (2-1). The canals was then prepared and obturated using the same protocol as

in the previous case (figure 2bc). Patient was advised refabrication of the prosthesis.

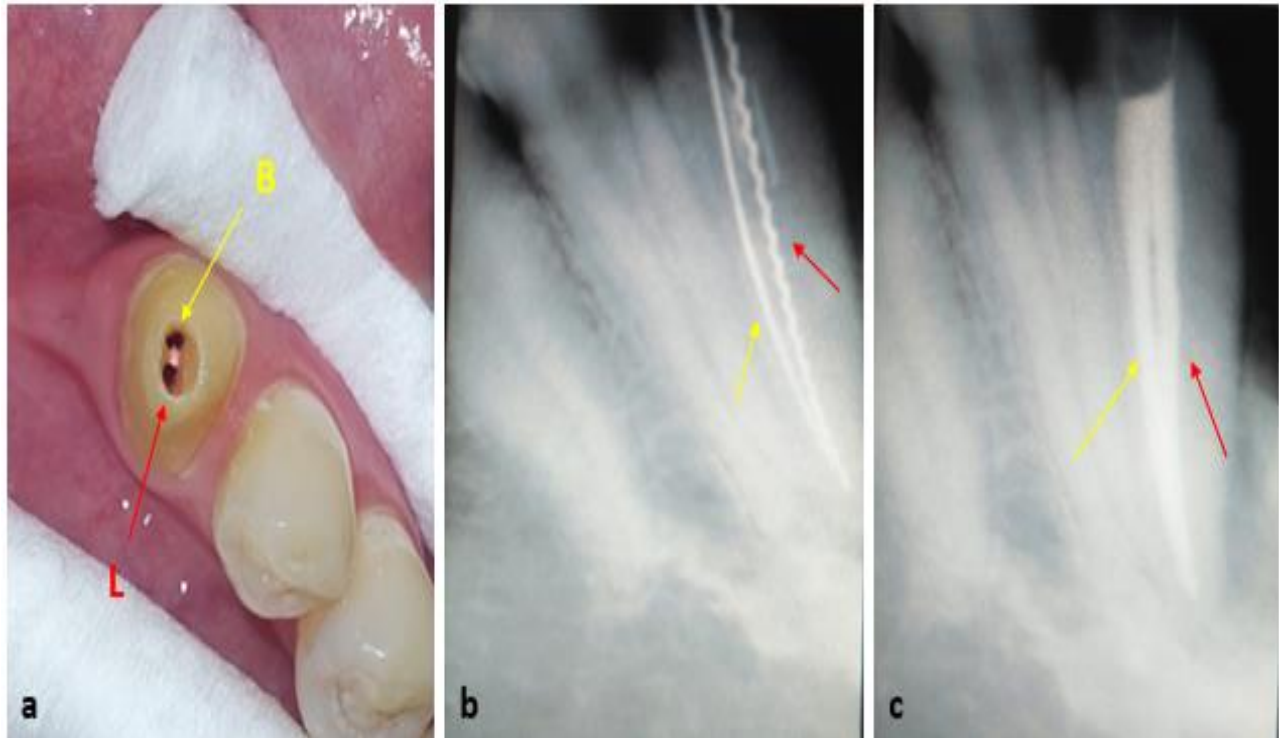


Figure 2: a) clinical picture with facial and lingual canal orifice, b) Distal shift working length radiograph, c) Post obturation radiograph

Case Report 3

A 26-year-old female presented to the department of Operative and Endodontics with chief complaint of pain in lower right teeth for the past 5 days. The pain was spontaneous and nocturnal that increased with postural changes. On clinical examination, mandibular right second premolar was carious. Sensitivity testing showed a positive response and on mechanical testing the tooth was tender to percussion. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis associated with mandibular right 2nd premolar was made. After administering local anesthesia and isolating with rubber dam an emergency access opening was performed (figure 3a). Initially only one

orifice was found and upon advancing the file into the canal there was an obstruction at 13mm from the coronal reference point. The file was precurved and reinserted and the obstruction was bypassed successfully towards the buccal side. The file was offsets buccally, indicating an additional canal. A second file was then inserted lingually, and digital radiograph with distal shift was taken which confirmed a two-rooted tooth with deep bifurcation. (Figure 3b) revealed significant curvature. Subsequent exploration with GG drills and straight-line access facilitated further treatment. Working length, canal preparation and obturation was done using the same procedure as in the previous case (figure 3c,d).

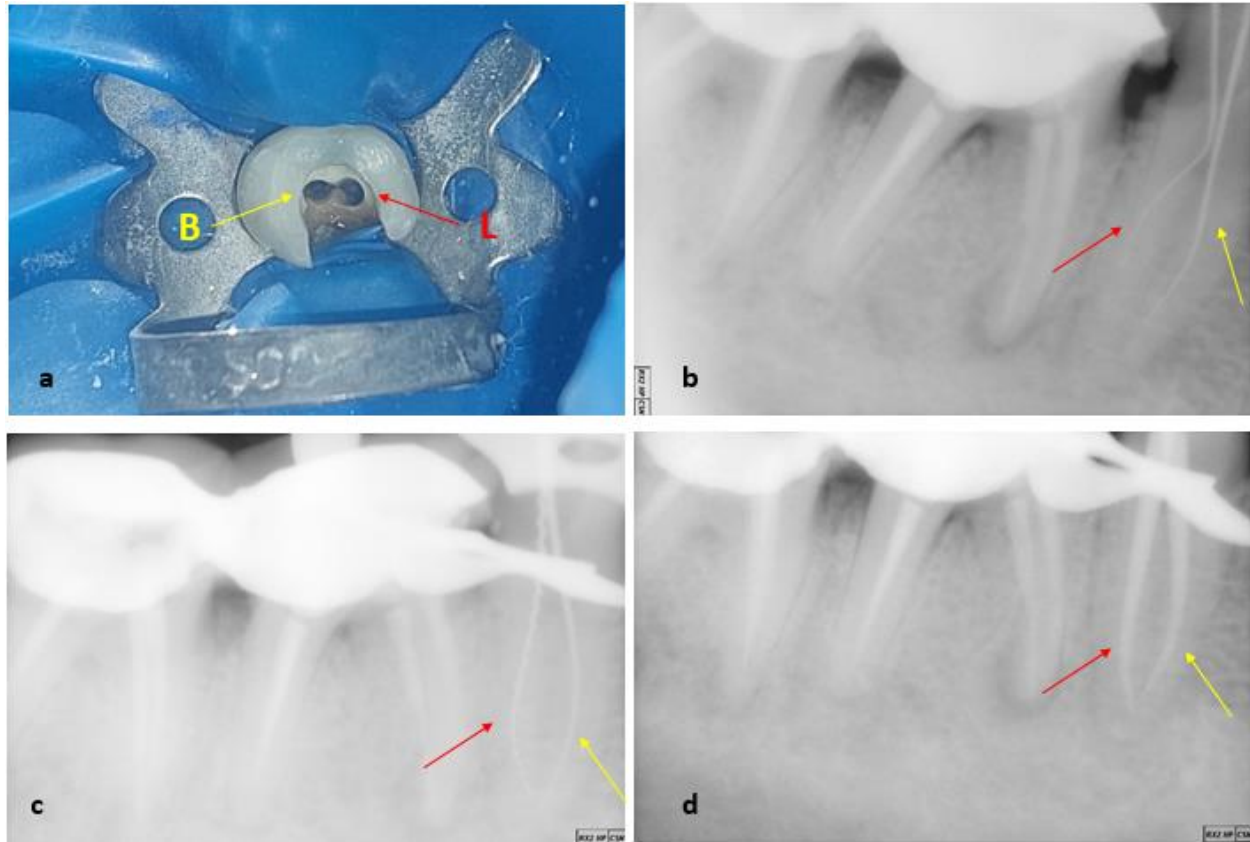


Figure 3 a) clinical picture with 2 orifices Buccal (B) Lingual (L), b) Distal shift radiograph of right 2nd premolar with 2 separate roots, c) Working length radiograph, d) obturation radiograph

Discussion

In cases with unusual anatomy successful endodontic treatment depends upon multiple factors. Thorough knowledge of root canal morphology and its possible variations, use of magnification, tactile examination of floor with sharp explorer, angled pre- and post-operative radiographs and use of advanced tools like Cone Beam Computed Tomography (CBCT) are important elements.⁶ Although CBCT is an important tool in such cases but due to financial constrains patients mostly refuse this modality. Angled radiographs can be used as an alternate, which proved valuable in our cases. In addition to this, tactile examination with DG 16 also proved helpful in present cases. Additionally, using Gates-Glidden (GG) drills to modify the access cavity helps increase visibility and access to root canals, especially in cases with

unusual anatomy.⁶ We used GG drills in case 3 to explore additional canals.

According to a study conducted in Pakistan, the anatomy of mandibular incisors exhibits significant variation. Notably, the study revealed that 7.5% of these teeth possess a Vertucci classification Type 2 configuration, similar to our case report one.⁷ significantly previous studies reported that 85% of mandibular canine exhibit type 1 whereas only 15% of mandibular canines show type 2 classification.^{8,9} Similarly, our case report 2 documented this rare variation.

Premolars exhibit variable canal morphology as well as presence of number of roots. In terms of root number, 77% of the 2nd premolars have a single root and 23% have two roots. Regarding significance of root canals, 62.5% have single canal and 37.5% have two root canals.¹⁰ Similarly, the cases mentioned in this case series had variable anatomy as well as canal

configuration in the mandibular 2nd premolar. As shown in case report.3 where 2 roots were present in mandibular 2nd Premolar.

These findings have important implications for dentists and endodontists and emphasize the need for careful examination and diagnosis in treating mandibular teeth.

In the present study, a high percentage of infectious and sharp waste was improperly disposed of in participating dental hospitals and clinics. However, the vast majority of them disposed of their solid waste in conventional ways.

Conclusion

Success of the endodontic treatment depends on the canal configuration and number of roots present. Tooth can deviate from the usual pattern therefore the clinician should have an insight of variation that exists within the teeth.

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