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# Mandibular Incisor with Two Canals: Case Reports

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**ABSTRACT**

The root canal anatomy of mandibular incisors is commonly regarded as simple, usually consisting of a single root with a single canal. However, anatomical variations, including the presence of a second canal, are not uncommon and may lead to missed canals, persistent symptoms, and treatment failure if not properly identified. This case report presents two clinical cases of mandibular anterior teeth with two canals. In the first case, a previously treated mandibular lateral incisor exhibited a missed lingual canal, identified upon retreatment and confirmed radiographically. In the second case, both the mandibular central and lateral incisors demonstrated canal bifurcations—Type II and Type III Vertucci configurations—requiring careful access modification and thorough endodontic management. These cases highlight the importance of considering anatomical variations in mandibular incisors during endodontic treatment. Proper access cavity design, use of angled radiographs, and a high index of suspicion are essential for the detection of additional canals, thereby ensuring long-term treatment success.

**Key Words:** Mandibular incisors, Two canals, canal configuration, Missed canal, Endodontic retreatment.

## I. INTRODUCTION

The success of endodontic therapy is heavily dependent on complete identification, debridement, and obturation of the entire root canal system. The main cause for endodontic failure is the presence of untreated or missed canals, which often result from an insufficient understanding of the complex and variable anatomy of the root canal system. These anatomical variations, if not identified and treated appropriately, can serve as reservoirs for persistent infection and ultimately compromise the prognosis of the treatment.

Mandibular incisors are smallest tooth in the mouth, having a little more than half the mesiodistal diameter of the maxillary central incisors.The mandibular central incisor generally has an average overall length of approximately 20.8 mm, whereas the lateral incisor is typically slightly longer, measuring around 22.1 mm.[1]While most studies indicate that both types of incisors are single-rooted in all observed cases, a small number of reports have identified the presence of two roots in a very limited percentage of specimens—specifically, 0.1%[2] and 0.3%[3], respectively. Earlier it was believed that permanent mandibular incisors are associated with a single root alongwith a single root canal. However, studies revealed high variation in root canal morphology of mandibular incisors due tothe presence of the second canal, lateral canal and apical deltas.[4,5,6] Lack of identification of such anatomical variations or additional canals may lead to endodontic treatment failure.

## CASE REPORT 1

### PRESENTATION OF CASE

A 29-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College, Kottayam, with a chief complaint ofintermittent pain and swelling in the lower left anterior region for the past two week. The patient had a history of root canal treatment performedthree monthsearlier. Clinical examination revealed an intraoral vestibular swelling associated with the lower lateral incisors, and the tooth was tender to percussion. A pre-operative intraoral periapical radiograph revealed a root canal treated mandibular right lateral incisor with peri apical radiolucency. (Figure

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1) A distal angulated radiograph revealed a missed lingual canal.

**TREATMENT PLAN**

Non-surgical endodontic retreatment of the mandibular right lateral incisor to address the missed lingual canal.

**TREATMENT PROCEDURE**

After informing the patient about the treatmentplan, and obtaining consent, Localanaesthesia(2% lidocaine with 1:200,000 epinephrine) was administered. The access cavity was re-opened, and the gutta- percha was removed using gutta percha solvent and retreatment files (ColteneHyflex Remover retreatment rotary files). Upon complete removal of the previous obturation material, careful examination led to the identification of the missed lingual canal. The canal was negotiated with a size #10 K-file and working length determined using an electronic apex locator and confirmed radiographically. (Figure 2) The canal system was then instrumented using ColteneGenEndoNiTi rotary files, with 5.25% sodium hypochlorite used as an irrigant between files. Following cleaning and shaping, an intracanal calcium hydroxide medicament was placed and left in situ for two weeks. At the end of the medication period, the patient was asymptomatic.All canals were irrigated thoroughly, dried with sterile paper points, and a master cone radiograph was taken (Figure 3). The canals were then obturated using gutta-percha and a zinc oxide eugenol-based sealer via the lateral compaction technique. (Figure 4) Finally, a composite resin restoration was placed to seal the access cavity. (Figure 5)

Figure 1- Preoperative radiograph

Figure 2 –Determination of working lengthFigure 3- Verification of the fit of the master cone

Figure 4- Post obturation radiograph

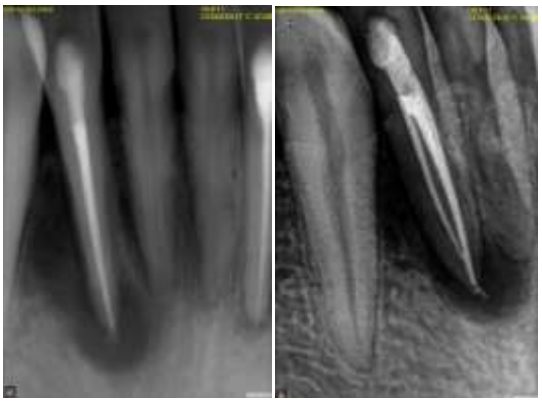

Figure 5 – Post operative radiograph

**CASE REPORT 2**
**PRESENTATION OF CASE**

A 45-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College, Kottayam, with a chief complaint of pain in the lower left anterior region for the past few weeks. The patient provided a history of visiting a dental clinic, where an emergency root canal access opening had been performed. A pre-operative intraoral periapical radiograph showed the presence of two distinct canals in the right mandibular

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central incisor (41) whereas the lateral incisor (42) demonstrated a bifurcated canal system that rejoined at the apical third, forming a single apical foramen.(figure 1) Periapical radiolucency was evident in relation to both teeth, suggestive of chronic apical periodontitis.

Figure 1 – Preoperative radiograph i.r.t 41, 42

**TEATMENT PLAN**

Non-surgical endodontic treatment of 41, and 42

**TREATMENT PROCEDURE**

Following rubber dam isolation, access cavities were refined.In mandibular central incisor access cavity widened buccolingually and extended into cingulum gingivally, which revealed the presence of the lingual canal. The patency was checked using a no. 10 k file. The working lengths were estimated using an apex locater and then confirmed with a radiograph. (Figure 2)Biomechanical preparation was carried out using rotary instruments till 25-4% in both central and lateral incisors. Copious irrigation with 5.25 % sodium hypochlorite was used between each file throughout the procedure. After cleaning and shaping, intracanal calcium hydroxide medicament was given for 1 week. During the next visit after a week, the tooth was asymptomatic and obturation was done using the lateral condensation technique. Finally, post-obturation restoration was done using composite.

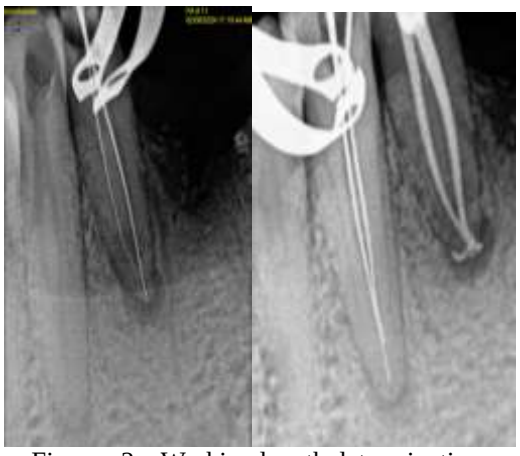

Figure 2 – Working length determination

Figure 3- Master cone x- ray

Figure 4 – Post operative radiograph

## II. DISCUSSION

Successful root canal therapy relies on a thorough understanding of both the normal and aberrant internal anatomy of the tooth being treated. Studies have reported numerous deviations from typical canal morphology, including the presence of multiple apical foramina, loops, fins, and apical deltas. Therefore, clinicians must

approach each case with the assumption that anatomical variations are common and should be expected as part of standard endodontic practice.Although the endodontic treatment of mandibular incisors is often considered straightforward—due to their typically single root and single canal—these teeth can present with anatomical complexities.

According to Ingle, up to 40% of mandibular incisors exhibit two canals (buccal and lingual), but only 2–3% have two separate apical foramina.[7]

Canal configuration of mandibular incisors was classified by Vertucci into four types in 1974 [8]
Type I: Single canal continues from the pulp chamber to the apex.
Type II: Two separate canals leave the pulp chamber, but join and form one canal short of the apex.
Type III: Single canal leaves the pulp chamber, but it divides into two within the body of the root and merges again to exist as one canal.
Type IV: Two separate and distinct canals are present from the pulp chamber to apex.
Here the first case depicted the presence of 2 canals in mandibular lateral incisors exhibiting Vertucci Type 2

Configuration and in second case central incisor exhibits Vertucci type 2 and lateral incisor shows type 3 configuration.

The main reason associated with the failed endodontic treatment of mandibular incisors is missed second lingual canal due to inadequate access opening which leads to persistence of lingual shelf over lingual canal thereby preventing its treatment. As the presence of two canals may not be readily visible in the radiographs clinicians should be very careful while interpreting the diagnostic radiographs and look for signs that may suggest presence of such variation radiographically as well as clinically. If there is continuous bleeding from the access cavity, eccentric location of file in the canal, inconsistent apex locator readings or persistent pain even after debridement of canals then the presence of two canals should be suspected and a second periapical radiograph with a different horizontal angulation should be taken to confirm it.[9]

One of the major reasons for failure to detecta second canal is inadequate access cavity preparation which leaves a lingual shelf of dentine over the second (usually the lingual) canal thus many researches recommend that mandibular incisors should be treated as tooth with two canals unless otherwise confirmed.[10]It is recommended that the access cavity be extended well into cingulum of the incisor and proper removal of the lingual shoulder should be performed before coming to conclusion of single or two canal entity.

## III. CONCLUSION

An in-depth understanding of root canal anatomy is essential for the success of endodontic treatment, particularly in teeth like mandibular incisors, which are often underestimated in complexity. This case highlights the clinical implications of missed canals and reinforces the need for careful radiographic evaluation and methodical exploration during treatment. Anatomical variations, such as a second canal in mandibular incisors, occur frequently enough to be considered within the range of normal. Therefore, clinicians must approach each tooth with a high index of suspicion for additional canals to ensure complete debridement, disinfection, and long-term success.

Patient Consent

Written informed consent was obtained from the patient for the publication of this case report and any associated images.

## REFERENCES

[1]. Versiani MA, Pereira MR, Pécora JD, Sousa-Neto MD. Root Canal Anatomy of Maxillary and Mandibular Teeth. In: Versiani MA, Basrani B, Sousa-Neto MD, editors. The Root Canal Anatomy in Permanent Dentition [Internet]. Cham: Springer International Publishing; 2019 [cited 2025 May 19]. p. 181–239. Available from: https://doi.org/10.1007/978-3-319-73444-6_7

[2]. Kayaoglu G, Peker I, Gumusok M, Sarikir C, Kayadugun A, Ucok O. Root and canal symmetry in the mandibular anterior teeth of patients attending a dental clinic: CBCT study. Braz Oral Res. 2015;29:S1806-83242015000100283.

[3]. Zhengyan Y, Keke L, Fei W, Yueheng L, Zhi Z. Cone-beam computed tomography study of the root and canal morphology of mandibular permanent anterior teeth in a Chongqing population. Ther Clin Risk Manag. 2016;12:19–25.

[4]. Kaffe I, Kaufman A, Littner MM, Lazarson A. Radiographic study of the root canal system of mandibular anterior teeth. Int Endod J. 1985 Oct;18(4):253–9.

[5]. Benjamin KA, Dowson J. Incidence of two root canals in human mandibular incisor teeth. Oral Surg Oral Med Oral Pathol. 1974 Jul;38(1):122–6.
[6]. Rankine-Wilson RW, Henry P. THE BIFURCATED ROOT CANAL IN LOWER ANTERIOR TEETH. J Am Dent Assoc 1939. 1965 May;70:1162–5.
[7]. Rotstein I. Ingle's Endodontics. 7th edition. Ingle JI, editor. PMPH USA, Ltd.; 2019. 3463 p.
[8]. Vertucci FJ. Root canal anatomy of the mandibular anterior teeth. J Am Dent Assoc 1939. 1974 Aug;89(2):369–71.
[9]. Singh DrN, Sharma DrS. Mandibular incisor with two canals: A case report. Int J Appl Dent Sci. 2021 Oct 1;7(4):262–3.
[10]. Carrotte P. Endodontics: part 4. Morphology of the root canal system. Br Dent J. 2004 Oct 9;197(7):379–83.