



## MANDIBULAR INCISOR WITH EXTRA CANAL & PERIAPICAL LESION- AN ENDODONTIC CHALLENGE

<b>Dr. Ankita Srivastava*</b>	Post Graduate Student, Department of Conservative Dentistry and Endodontics, D.A.P.M. R.V Dental College, Bangalore *Corresponding Author
<b>Dr. Arun. A</b>	Reader, Department of Conservative Dentistry & Endodontics, D.A.P.M. R.V Dental College, Bangalore
<b>Dr. H. Murali</b>	Professor & Head, Department of Conservative Dentistry & Endodontics, D.A.P.M. R.V Dental College, Bangalore
<b>Dr. Divakar. K. P</b>	Lecturer, Department of Conservative Dentistry and Endodontics, D.A.P.M. R.V Dental College, Bangalore
<b>Dr. Deepa Yadav</b>	PG Diploma in Conservative Dentistry and Endodontics, D.A.P.M. R.V Dental College, Bangalore

### ABSTRACT

The successful endodontic therapy demands extensive knowledge of tooth morphology and its variations. It is presumed to have a single canal in single-rooted teeth. Mandibular incisor sometimes marks a challenge for the clinician because of its small size, varied internal anatomy and a higher probability of two canals. This case report highlights the presence of extra canal in mandibular anterior teeth (Vertucci's type II) with a periapical lesion. Various methods to detect its presence, modification in access preparation and healing of periapical lesion has been described in this case report.

**KEYWORDS** : Mandibular incisor, apical periodontitis, extra canal.

### INTRODUCTION:

The success of endodontic therapy requires extensive knowledge on the anatomy of root canal system and its variations in accordance with adequate removal of pulpal tissue and microorganism, cleaning and shaping as well as sealing the canal space.<sup>1</sup> An endodontically treated teeth should be assessed radiographically, as well as diagnosed for pulpal and periapical status, for it to be considered successful.<sup>2</sup> Various factors leading to endodontic failure includes presence of peri-radicular infection, residual pulpal remnants, root fractures, underobtured/overobtured root canals, unfilled and missed canals. Data analysis of study in terms of individual teeth showed major endodontic treatment failure occurred in the mandibular incisors with the rate of (5.5%) when compared to maxillary incisors.<sup>3</sup> Ingle states the most common cause of failure in endodontic therapy are apical percolation and subsequent diffusion stasis into the canal.<sup>4</sup> Various morphological divergence in the root canal anatomy includes presence of an extra canal, multiple foramina, apical delta, furcation accessory canal which are often difficult to detect. Insufficient knowledge of these variations may be a major cause for the failure of endodontic therapy.<sup>5</sup> Therefore effective access preparation is must for locating and negotiating extra canal in a highly complex and variable canal system for the good result.<sup>6</sup>

Several variations in the morphology of the root canal exist. Vertucci has classified morphological variations of mandibular incisors into 8 types. Normally, mandibular incisors have single canal with single foramen.<sup>6</sup>

The prevalence of mandibular incisors with 2 canals is more than 40% and with separate apical foramen more than 1%.<sup>5</sup> Extension and modification of preparation buccolingually beneath the cingulum is necessary to negotiate the presence of extra canal.<sup>7</sup>

This case report describes the occurrence of 2 separate canals at the orifice, which continued and joined as one in the apical third of the root.

### CASE REPORT:

51-year old male Jaggaish Naidu reported to the department of conservative dentistry and endodontics of D.A.P.M R.V dental

college, Bangalore with sensitivity and dull pain in the lower anterior region since a month. There was no history of trauma and medical history was non-contributory. Intraoral examination revealed the presence of severe attrition, and erosion on the lower left and right central incisors and teeth was tender on percussion. On pulp testing and thermal testing both the teeth 31,41 showed a negative response. Radiographic evaluation revealed the presence of periapical radiolucency around the apex of 31 and 41 and presence of 2 canals was observed in 41 and same was observed in radiovisiography (rvg). Diagnosis of chronic apical periodontitis was made and endodontic therapy was initiated for the same. Following armamentariums were used in this study.



Armamentarium

A- I=Aerotor Handpiece, II=Mouth Mirror, III=Straight Explorer, IV=DG16, V=Cotton Tweezer, VI=Endogauge, VII=5ml Syringe, VIII=Endo access Bur, IX=K File Size 8, X=K File Size 10, XI=Gates Glidden Size 2, XII= Spreader Size 15-40, XIII=K File 15-40, XIV=K File 45-80, XV=Lentulospirals

B- Rubber Dam Kit

C- Irrigants used i- 3% Sodium Hypochlorite ii- RC-Prep iii- 0.9%

Saline

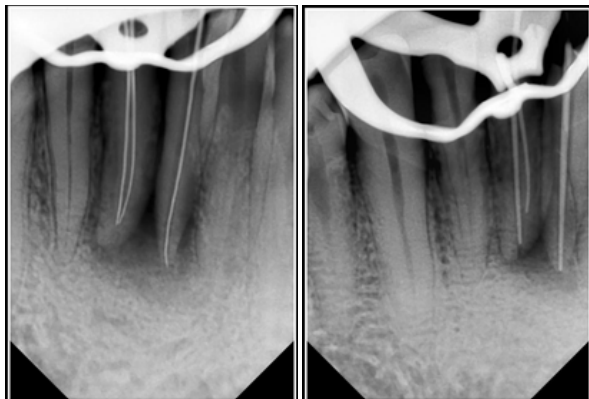
**Pre-Op Radiograph & Clinical**



**Figure 1**

**Figure 2**

Local anesthesia was administered and a rubber dam was applied. Access opening was done of 31,41 with Endo access round diamond bur. Further, the access cavity was modified and widened buccolingually and extended into cingulum gingivally, which showed the presence of extra canals. The lingual shoulder was removed using Gates Glidden size 2. Patency was checked using 8 size k file followed by 10 size k file. Working length was determined by placing 15 size K file in 31,41. Root canal length estimation was confirmed by radiovisiography(rvg) and radiographs. Working length was noted (figure 3). A chemo-mechanical preparation was done for 31 and 41 using conventional hand K files in step back manner. 3% solution of sodium hypochlorite and 0.9% saline were used alternatively. The canal was dried with paper points. Calcium hydroxide dressing was coated in the canal using lentulospirals and placed with paper points and access cavity was temporarily sealed with IRM.



**Figure 3:Working Length**

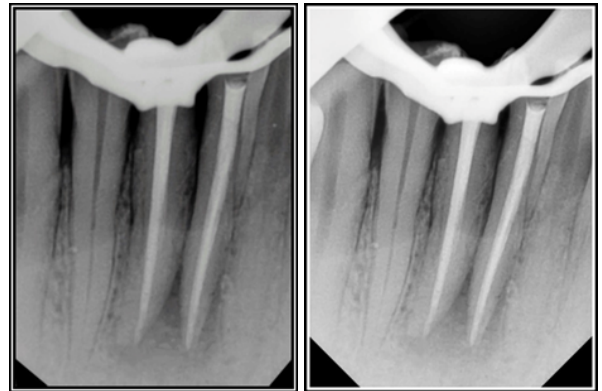
**Figure 4:Master Cone**

After 2 weeks of follow up, the teeth were asymptomatic, canals were obturated by Grossman sealer by cold lateral condensation technique. Post operative rvg showed well-obturated canal of 31,41 (figure 5) and post-endodontic restoration was done with GIC.



**Figure 5:Obturation**

Patient was asymptomatic at 6 months and 12 months recall visit and radiographic evidence of healing of periapical lesion was noted shown in figure 6 and figure 7.



**Figure 6: 6 month follow-up**

**Figure 7: 12 month follow-up**

**DISCUSSION:**

An essential requirement for a good endodontic result is a well-designed access preparation. The instruments and materials are trickier to handle in the highly complex and variable root canal system without sufficient access to canals and the apex.<sup>5</sup> Clinically; the presence of extra canal is indicated when there is continuous bleeding in teeth with pulpitis/normal pulp in spite of complete instrumentation. And the presence of apical rarefaction on the lateral side of the root may hint towards the presence of extra canal in cases with necrotic pulp or pulpless canals.<sup>4</sup>

Radiographically, the disappearance of the canal space, narrowing of the canal and sudden change in the canal ratio density indicates its presence.<sup>5</sup> Hence, it is important to take radiographs in different angulations. Along with it, manual exploration of the canal with an endodontic file or endodontic explorer facilitate its presence.<sup>10</sup> Certain other methods which help in identifying the orifices includes ultrasonics, furcation staining, champaign bubble test, use of 17 %EDTA, 95% ethanol, and Stropko irrigator.<sup>1</sup>

According to studies on mandibular incisors canal morphologies, it was concluded that type I and type III are much more common than type II. The canals are either ovoid or ribbon-shaped in mandibular incisors, with single canal ranging from 71.8-73.6% and double canal in 26-28.1%.<sup>8</sup> Extra canal if not identified cannot be prepared and obturated, retaining the irritants in the pulp space which causes the failure of treatment, attachment apparatus disease, and radiographic lesions of endodontic origins.<sup>10,11</sup>

Mandibular incisors are most difficult access cavities to prepare because of their small size and varied internal anatomy. Therefore it is clinically critical to remove lingual shoulder. Teeth having two canals that are buccolingually oriented and lingual canal is missed often. To prevent this, the access preparation should be extended into the cingulum gingivally which, if present, is placed directly beneath it.<sup>7</sup>

Studies have reported the occurrence of anaerobic gram-negative bacteria in the root canal of necrotic teeth with apical periodontitis. LPS (Lipopolysaccharide), a component of the gram-negative bacterial cell wall, is a powerful endotoxin and has the ability of strong toxic action in the periapical tissues which results in releasing inflammatory mediators such as tumor necrosis factor (TNF) and interleukins(IL) by stimulating macrophages. Signs and symptoms of pain, tenderness to percussion and pain on palpation are coupled with such mediators. LPS are released during cell replication and result of cell lysis. Studies have reported that due to alkaline hydrolysis of calcium hydroxide, Lipid A ester bond of LPS breaks down. It was reported in other studies that irrigating solutions were ineffective against LPS, while intracanal medicament with calcium hydroxide seemed to inactivate the cytotoxic effect of the

endotoxin. Studies have concluded that mean reduction of 59.9% of endotoxin was achieved after chemo-mechanical preparation, whereas Khan et al concluded that calcium hydroxide denatures IL-1 $\alpha$ , TNF $\alpha$  And calcitonin gene-related peptide by 50-100%.<sup>12</sup>

Hence, Calcium hydroxide was used as an intracanal medicament in this case study because of its antimicrobial effect. The canal was obturated with cold lateral condensation technique.

#### CONCLUSION:

Besides, the successful root canal treatments, there comes unavoidable possibility of non-healed and endodontic failures. Clinically, endodontic failures can occur due to coronal leakage, fracture, overextension, and under filling, blocks, ledges, perforations and missed canals. Irritants are retained in missed canal leading to clinical symptoms, periodontal disease, and radiographic lesion of endodontic origins. Therefore, clinician must be aware of the anatomy and complexity, interpretation of the radiographs for treatment of such atypical cases.

#### REFERENCES:

1. Moghadam, E. H., Assadian, H., Moghaddam, K. N., Amini, A., Hashemzahi, M., Adeli, M., ... & Naghipour, A. (2017). Endodontic treatment of three mandibular incisors with two canals and two separate foramina: A case report.
2. Tabassum, S., & Khan, F.R. (2016). Failure of endodontic treatment: The usual suspects. *European journal of dentistry*, 10(1), 144.
3. Iqbal, A. (2016). The Factors Responsible for Endodontic Treatment Failure in the Permanent Dentitions of the Patients Reported to the College of Dentistry, the University of Aljouf, Kingdom of Saudi Arabia. *Journal of clinical and diagnostic research: JCDR*, 10(5), ZC146.
4. Hema, B. S., & Chandu, G. S. (2011). Endodontic Management of Type II Canal in Mandibular Incisors: A Case Report. *Indian Journal of Stomatology*, 2(4).
5. Kakde, D. D., Balsaraf, O. D., Kamble, A. B., & Munde, P. B. (2016). Mandibular incisors with two canals in a patient: A rare case. *Journal of International Medicine and Dentistry*, 3(3), 164-167.
6. Yogesh, B., Ali, M., Sreedevi, P., Kumar, A., B. A., & R., V. (2017). Endodontic Treatment of Mandibular Incisors With Two Root Canals: A Case Report. *International Journal of Advanced Research*, 5(4), 981-985. doi:10.21474/ijar01/3905
7. Kokane, V. B., Patil, S. N., Gunwal, M. K., Kubde, R., & Atre, S. (2014). Treatment of two canals in all mandibular incisor teeth in the same patient. *Case reports in dentistry*, 2014.
8. Daokar, S. G., Kalekar, A. S., Ghunawat, D. B., & Kakde, D. D. (2015). All the mandibular incisors with double canals in a single patient: A rare case. *Journal of international oral health: JIOH*, 7(2), 46.
9. Mittal, S., Kumar, T., Sharma, J., Mittal, S., & Ahuja, T. (2014). Endodontic Management of a Mandibular Central Incisor with Type IV Canal Pattern: A Case Report. *Journal of clinical and diagnostic research: JCDR*, 8(3), 262.
10. Kashid, V., & Baonerkar, H. (2015). Mandibular Incisors with Type II Anatomy in a Single Patient: Report of Two Cases. *Indian Journal of Oral Health and Research*, 1(2), 74.
11. ARORA, D., NAGPAL, A., PAUL, R., & HANS, M. Missed canals: The Usual Suspects of Endodontic Failure.
12. Martins, J. N., Saura, M., & Pagona, A. (2011). One appointment endodontic procedure on teeth with apical periodontitis: Is this a criterion for success?—A literature review. *Revista Portuguesa de Estomatologia, Medicina Dentária e Cirurgia Maxilofacial*, 52(3), 181-186.