Case Report

Endodontic Management of Mandibular Molar with Additional Root: A Report of Two Cases

Sumant Raj[1], Shubham Shukla[1], Lalit Agarwal[2], Manoj Hans[3], Chandra Vijay Singh[4]

[1]Post Graduate Student, Department of Conservative and Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India, [2]Reader, Department of Conservative and Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India, [3]Professor and Head, Department of Conservative and Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India, [4]Professor, Department of Conservative and Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India

ABSTRACT

Typically, mandibular first molars contain a single mesial and distal root, but anatomical deviations can occasionally be observed. In mandibular molars, the presence of an extra lingual root distally is referred to as radix-entomolaris. For those teeth to have a favorable treatment outcome, a proper diagnosis must be made before starting root canal therapy. The report describes the endodontic management of a mandibular molar with an additional root.

Key words: Anatomical-variation, Endodontic-treatment, Mandibular-molar, Radix-entomolaris

INTRODUCTION

The main aim of the endodontic procedure is to eliminate bacteria from the canal, and prevention of reinfection is accomplished by thoroughly cleaning and shaping the pulp chambers and root canals through biomechanical preparation (BMP), followed by air-tight sealing with a suitable obturating material. Having a thorough understanding and awareness of atypical canal anatomy significantly contributes to the successful outcome of endodontic treatments. The majority of the lower first molars have one mesial, one distal root with two mesial canals and one distal canal.[1,2] Typically, the mesial root of mandibular molars contains two root canals. These canals may either remain separate with distinct apical foramina or join together near the root's end to form a single foramen. The distal root usually has a single canal that is often shaped like an oval or a bean. Occasionally, variations in root and canal morphology are encountered, though they are uncommon. Some mandibular molars exhibit extra roots or canals, which might only be recognized during clinical procedures. Mandibular molars may occasionally present with an additional root , positioned either lingually referred to as the radix entomolaris or buccally, known as the radix paramolaris.[3]

Carabelli *et al*. found that the presence of an extra root in the lower first molar is referred to as radix-entomolaris (RE). This additional third root is typically located on the distolingual side. RE can be observed in the first, second, and third lower molars, with the lowest occurrence seen in the second molars. When the additional root is present mesiobuccally, it is called radix-paramolaris. Research indicates that RE is <5% common in individuals of European, Caucasian, African, and Eurasian descent, and Indian populations, whereas it is 5–30% common in races within people belonging to East Asian or related ethnic groups, including Native Americans, Chinese, and Eskimos.[4-6] The clinical method for identifying and adjusting endodontic treatment for lower first molars with RE is highlighted in this article.

CASE REPORT-1

A 45-year-old male patient visited the Department of Conservative Dentistry and Endodontics, IDS, Bareilly. The patient experienced intermittent pain in the left lower back tooth area for 1 month. The discomfort was triggered by consuming hot foods and drinks and typically lasted for 2–3 h.

On clinical examination, a root canal was initiated in the lower left mandibular first molar. A radiograph of the lower first molar showed that the access opening was already done [Figure 1]. Again, a radiograph was taken at various angulations to confirm the same. An additional root was present between the mesial and distal roots irt 46. A cone beam computed tomography (CBCT) was done to specify the presence of additional roots [Figure 2]. The opening to

Corresponding Author:
Dr Sumant Raj, Department of Conservative and Endodontics, institute of Dental Science, Bareilly, Uttar Pradesh, India
E-mail: sumantraj88092@gmail.com

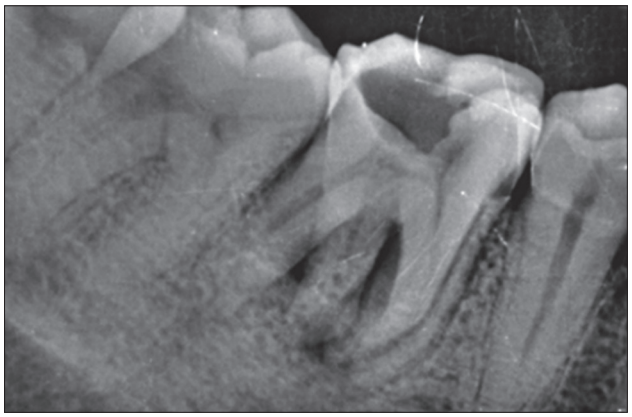


Figure 1: Pre-operative radiograph

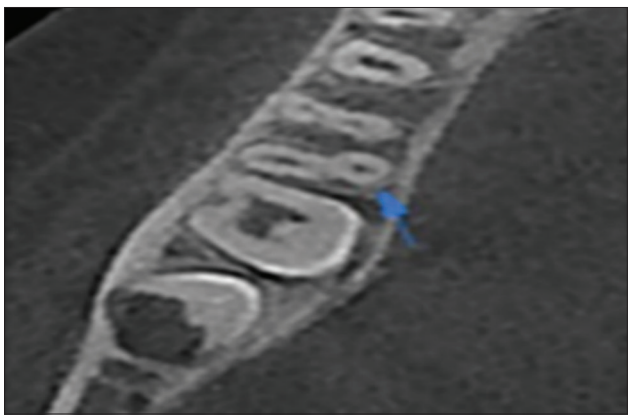


Figure 2: Axial section of cone beam computed tomography

the pulp chamber was made under local anesthesia (LA) using a bur designed for endodontic access.

Initially, the distal canal was identified on the buccal side, and the presence of a supplementary canal on the lingual surface.

The access cavity shape was altered from triangular to trapezoidal to enable identification of the fourth canal. A dental endodontic explorer was employed to locate the root canal orifices, and a size 15 K-file (Mani) was used to confirm canal patency. Working length (WL) was established using an apex-locator (Root ZX, J. Morita) and further verified with radiographic imaging [Figure 3]. BMP was done with Neoendo, Rotary file system (Orikam, India). During instrumentation, 1.3% sodium-hypochlorite (NaOCl) served as the irrigating solution, followed by a final rinse with 17% ethylenediaminetetraacetic acid (EDTA). The root canals were then obturated using gutta-percha points with the cold lateral-condensation technique [Figure 4]. The accessed tooth was restored using composite resin (Ivoclar Vivadent), and a radiograph was taken following the obturation [Figure 5]. At the 6-month follow-up, the patient showed no symptoms, and imaging examination indicated the absence of pathological signs.

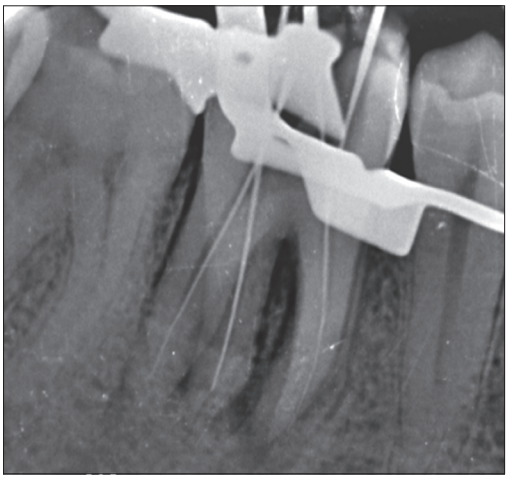


Figure 3: Working length

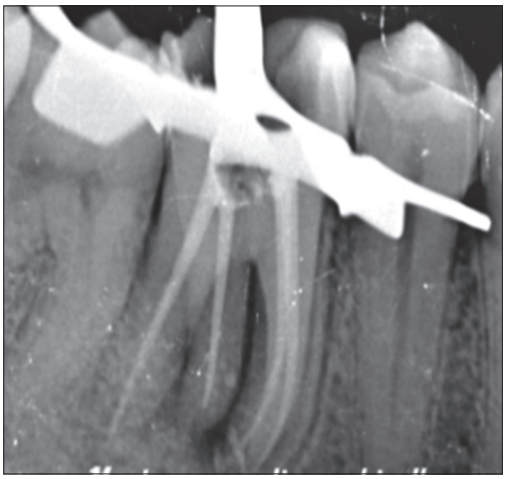
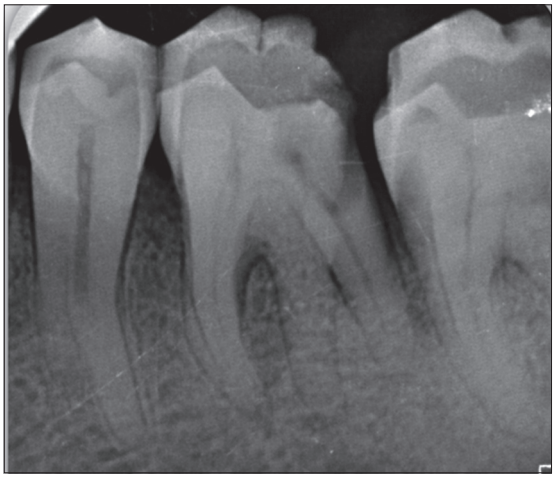
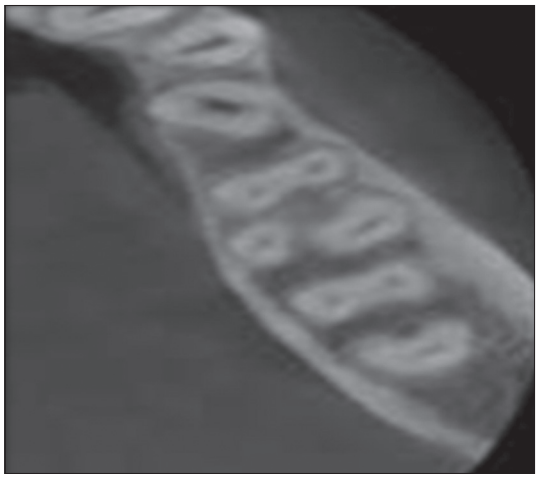


Figure 4: Mastercone radiograph

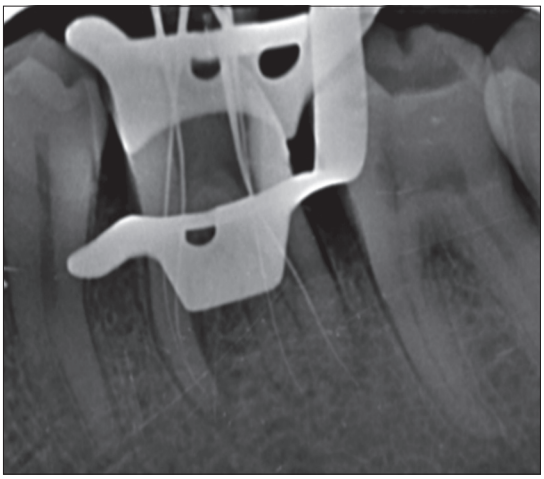
Figure 5: Post-operative radiograph



AQ6 **Figure 6:** Pre-operative



AQ6 **Figure 7:** Axial Section of CBCT



AQ6 **Figure 8:** Working length

Figure 9: Mastercone radiograph AQ6

Figure 10: Post-Operative radiograph AQ6

CASE REPORT-2

A 49-year-old male patient presented to the Department of Conservative Dentistry and Endodontics, IDS, Bareilly, with a primary complaint of pain in the right lower back tooth region lasting for 10 days [Figure 1]. On clinical examination, the right lower first molar exhibited caries, and a diagnosis of irreversible pulpitis was established. Radiographic analysis identified an additional third root, with no associated periapical pathology. An additional root was present between mesial and distal roots irt 46. CBCT was done to confirm the presence of an additional root [Figure 2]. A root canal treatment (RCT) was planned for the tooth, and the patient gave their informed consent. Following access cavity preparation, LA was given, and A dental endodontic explorer was utilized to navigate the canal orifices. In contrast to the other three distolingual canal orifices, the fourth orifice was approached more lingually.

Radiographic measurement of the canal lengths was performed using a #10 K-file [Figure 3]. Cleaning and mechanical preparation of the canal system were carried out with the rotary Neoendo file system, preparing the apical portion up to size 25/06. For disinfection, 1.3% NaOCl was used, followed by a final rinse with 17% EDTA. After BMP, a temporary restoration was placed, and the patient was scheduled for a follow-up. At the subsequent appointment, the patient showed no symptoms. An X-ray image featuring the master cone was captured. Canals were gently dried with paper points, then obturated using gutta-percha cones with AH Plus sealer (Dentsply DeTrey, Germany) [Figure 4]. The access cavity was then restored with composite resin (Ivoclar Vivadent), and an X-ray was taken following obturation [Figure 5].

DISCUSSION

The outcome of the root canal procedure relies on a clinical triad: Accurate diagnosis, thorough chemo-mechanical preparation, and effective three-dimensional obturation. Among these, the first step – precise diagnosis – is the most critical factor in achieving a favorable outcome in endodontic treatment. Negligence in clearing pulpal tissue and bacteria from every pulp canal is the primary cause of RCT failure. Hence, A precise diagnosis is essential for the success of root-canal therapy.[8] Digital radiographs were captured from various angles to reduce the possibility of overlooking any.[9] According to Carbberson *et al.*, the percentage of prevalence by radix classification indicates that these root variations vary by ethnicity.[3] RE occurs in <5% of the Indian population, making it an uncommon finding during dental treatments. Although the precise cause of RE remains unclear, some authors suggest it may result from disturbances in tooth development (odontogenesis) or be influenced by strong genetic factors.[3] In South India, Chandra *et al.*, 2011 conducted a study on a sample of 1000 teeth, of which 133 had radix entomolars, corresponding to 13.3%.[10] In India, Bharti *et al.*, 2011, conducted a study on 1265 teeth, which showed 20 radix entomolars, corresponding to a prevalence of 1.58%.[11]

Clinical approach

To avoid any of the iatrogenic mistakes, various angulated diagnostic radiographs are necessary with careful clinical examination. An access opening designed in a modified trapezoidal form should be made, and extra canal orifices can be looked for if RE is identified before stratifying the endodontic treatment. Grasp of the symmetry law will enable you to identify the missed canal using a variety of techniques, such as using ultrasonic tips, applying 1% methylene-blue dye to stain the chamber floor, performing the champagne bubble test, using CBCT, and magnifying the dentinal map and bleeding points.

De Moor *et al.* concluded that frequently, the canals of RE exhibited consistent morphological characteristics.

Therefore, straight-line access and glide path preparation must be prioritized to prevent procedural errors following initial root-canal exploration using a small file (size 10 k or less) along with radiographic, WL, and curvature determination. Having a thorough understanding of root canal anatomy is essential for the endodontist. Teeth undergoing endodontic treatment may exhibit several root curve types as well as other structural alterations. The likelihood of treatment success may be decreased if a root canal system is not found.[12]

CONCLUSION

For the clinician, the multifaceted aspects of the canal system frequently present a barrier. Endodontic treatment outcomes may suffer if the RE is not found. To avoid any delay in the detection of RE, clinical radiographs at various angulations must be taken and properly interpreted. Endodontic success thus depends on a precise diagnosis and in-depth understanding of the variance in root canal shape, prevalence, and canal layout of RE.

REFERENCES

1. Vertucci FJ. Root canal anatomy of the human permanent teeth. Oral Surg Oral Med Oral Pathol 1984;58:589-99.
2. Barker BC, Parsons KC, Mills PR, Williams GL. Anatomy of root canals. III. Permanent mandibular molars. Aust Dent J 1974;19:408-13.
3. Calberson FL, De Moor RJ, Deroose CA. The radix entomolaris and paramolaris: Clinical approach in endodontics. J Endod 2007;33:58-63.
4. Tratman EK. Three-rooted lower molars in man and their racial distribution. Br Dent J 1938;64:264-74.
5. Curzon ME, Curzon JA. Three-rooted mandibular molars in the Keewatin Eskimo. J Can Dent Assoc (Tor) 1971;37:71-2.
6. Turner CG 2nd. Three-rooted mandibular first permanent molars and the question of American Indian origins. Am J Phys Anthropol 1971;34:229-41.
7. Yew SC, Chan K. A retrospective study of endodontically treated mandibular first molars in a Chinese population. J Endod 1993;19:471-3.
8. Abella F, Patel S, Duran-Sindreu F, Mercade M, Roig M. Mandibular first molars with disto-lingual roots: Review and clinical management. Int Endod J 2012;45:963-78.
9. De Moor RJ, Deroose CA, Calberson FL. The radix entomolaris in mandibular first molars: An endodontic challenge. Int Endod J 2004;37:789-99.
10. Chandra SS, Chandra S, Shankar P, Indira R. Prevalence of radix entomolaris in mandibular permanent first molars: A study in a South Indian population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;112:e77-82.
11. Bharti R, Arya D, Saumyendra VS, Kulwinder KW, Tikku AP, Chandra A. Prevalence of radix entomolaris in Indian population. Indian J Stomatol 2011;2:165-67.
12. Nahar AB, Radix entomolaris: Case reports. IP Ind J Conserv Endod 2019;4:58-61.

Author Query???
AQ6: Kindly cite figures 6-10 in the text part