

Radix Entomolaris: A Case Report

Dr. Tamanna Kumari ⁽¹⁾

M. D. S. Conservative Dentistry and Endodontics

Email: [tamana.tanu1992\[at\]gmail.com](mailto:tamana.tanu1992@gmail.com)

Abstract: Mandibular molars can have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris). An awareness and understanding of this unusual root canal morphology can contribute to the successful outcome of root canal treatment. In the following case reports, the endodontic treatment of mandibular first molars with RE and clinical guidelines for successful management are explained.

Keywords: Endodontic treatment, mandibular molar, anatomical variations, radix entomolaris, radix paramolaris

1. Introduction

The success of the endodontic therapy depends on the complete cleaning and shaping of the root canal systems, on the tridimensional obturation and on the proper coronary sealing. For that purpose, the knowledge on the morphology of the root canal system as well as its variations may contribute for endodontic treatment success. It is known that the mandibular first molar may display several anatomical variations.

Due to its root canal complexity mandibular first molars have a significantly lower success rate compared with other teeth ⁽¹⁾. Clinicians must have an in - depth knowledge of the morphology of root canal systems and its variations that may affect the outcome of the success of the treatment

Permanent mandibular first molars in Caucasian populations are generally two rooted teeth (one mesial and one distal root) with two mesial and one distal root canals. ^(2, 3)

The number of roots for the mandibular first molar teeth may also vary. Carabelli (1844) was the first to report on mandibular first molars with supernumerary roots. The third root was located on the disto - lingual side and was called radix entomolaris (RE). ⁽⁴⁾ In very rare cases, the mandibular first molar can also present with an additional root at the mesio - buccal side and is called radix paramolaris. ^(5, 6)

Its incidence ranging from 0% - 43.7%, with highest prevalence among the Mongolian and Eskimo traits. Incidence among the Indian population is found to be very low and only 0.2%. ⁽⁷⁾

Radix entomolaris can be found on first, second and third mandibular molar teeth, occurring least frequently on second molars. ⁽⁸⁾ Studies have also reported a bilateral occurrence with as frequency of 50 - 67%. ⁽⁹⁾

According to Calberson, et al. the etiology behind the formation is still unclear but it could be related to external factors during odontogenesis. Racial genetic factors can also influence profound expression of a particular gene that can result in the more pronounced phenotypic manifestation. ⁽¹⁰⁾

For successful endodontic treatment of all canals of the tooth careful radiographic diagnosis plays a pivotal role.

Radiographs taken at different angulations reveal the basic information regarding the anatomy of a tooth and can thus help to detect any aberrant anatomy such as extra canals/roots. In conventional radiography is that it produces a twodimensional image of a three - dimensional object, resulting in the superimposition of the overlying structure. To achieve a more detailed understanding of the morphological structure of root canals and their interrelations, more advanced diagnostic tools are required. ⁽¹¹⁾

However, due to the fact that the RE is found mainly in the same bucco - lingual plane of the disto - buccal root, it may cause superimposition on the preoperative periapical or panoramic image. This often results in inaccuracy to reveal this anatomic variation. ⁽¹²⁾

In the following case reports, the endodontic treatment of mandibular first molars with a RE and clinical guidelines for successful management are explained.

Case Report 1

A 22 year old male patient was referred to Department of Conservative dentistry & Endodontics, H. P. Dental College Shimla, with pain in his mandibular left first molar for the past four days. On clinical examination of the patient his mandibular right first molar had a deep carious lesion. Tooth was severely tender on percussion. Intra Oral Periapical (IOPA) Radiograph of tooth showed a broad coronal radiolucent area involving the pulp. Radiograph also revealed the presence of apical radiolucency. From patient history and clinical examination, a diagnosis of acute apical periodontitis was established.



Figure 1



Figure 2



Figure 3

After local anaesthesia and rubber dam isolation, the tooth was accessed. Four distinct canal orifices were located and negotiated using k - flex file ISO 15 (Dentsply Malleifer). The working length was determined by periapical radiograph. After debriding pulp tissues, Calcium hydroxide powder mixed with saline was placed and closed dressing was placed and patient was recalled after 5 days. At the second appointment the coronal access was defined with coronal flare and canals were shaped with rotary instruments under copious irrigation with 2.5% sodium hypochlorite and lubrication with EDTA. The canals were enlarged by rotary instrument to the working length. Calcium hydroxide powder mixed with saline was placed after cleaning and shaping, and the access cavity was sealed with a temporary coronal sealing material. At the third appointment, the patient was completely asymptomatic and canals were dry. The root canal system was obturated with Gutta percha and lateral condensation.

Case Report 2

A 22 - year - old Indian female patient reported complaining of pain in a lower - right posterior tooth for a few days. The lower right first molar tooth had been restored with an amalgam restoration 3 years prior to this. Examination of the tooth revealed a large occlusal amalgam restoration and tenderness to percussion. The mobility of the tooth was within physiologic limits and vitality testing revealed the tooth to be nonvital. The medical history of the patient was non - contributory. Radiographic examination revealed the restoration close to mesial pulp horn and periapical lamina dura widening. A diagnosis of apical periodontitis was made and endodontic treatment was planned.

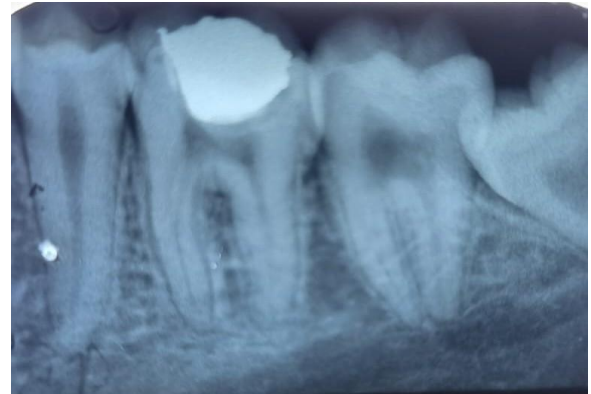


Figure 4



Figure 5

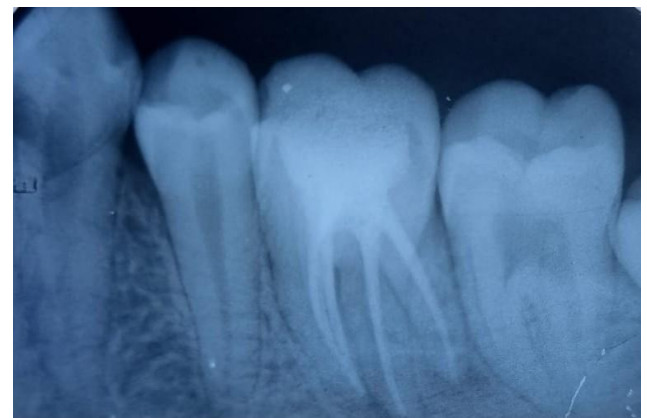


Figure 6

The tooth was anesthetized. The pulp chamber was opened. When the floor of the pulp chamber was reached, three canals orifices were initially identified. On further exploration, a second distal and more lingually located canal was found. The radiograph taken with a mesial angulation to verify the working length and confirm the presence of extra distolingual root. All the canals were cleaned and shaped using rotary Nickle - Titanium files and irrigated using 2.5 sodium hypochlorite and lubrication with EDTA and Calcium hydroxide (DPI India) was used as an intracanal medicament. One Week later, when the tooth was asymptomatic, the obturation was carried out by gutta - percha, Grossman sealer and lateral compaction method.

2. Discussion

Anatomic variations of permanent mandibular molars are documented in the literature. The radix entomolaris may also

be present in first, second and third molar; being less prevalent in second molar. ⁽¹³⁾ Bilateral occurrence of radix entomolaris has also been reported. ^(14, 15) The relationship between radix entomolaris (RE), gender predilection and side distribution is not clear. Few studies have reported more of male predilection for RE while others reported no significant difference between gender and RE. Similarly, no significant difference was reported for side distribution, despite few studies reporting it to be more on left side while others on right side. Bilateral occurrence for RE have been reported to range from 37.14 - 67%. ^(16, 17)

Classification:

Carlsen & Alexandersen (1990) classified radix entomolaris (RE) into four different types based on the location of its cervical part ⁽¹⁸⁾:

Type A: the RE is located lingually to the distal root complex which has two cone - shaped macrostructures.

Type B: the RE is located lingually to the distal root complex which has one cone - shaped macrostructures.

Type C: the RE is located lingually to the mesial root complex.

Type AC: the RE is located lingually between the mesial and distal root complexes.

De Moor et al. (2004) classified radix entomolaris based on the curvature of the root or root canal ⁽¹⁹⁾:

Type 1: a straight root or root canal.

Type 2: a curved coronal third which becomes straighter in the middle and apical third.

Type 3: an initial curve in the coronal third with a second buccally oriented curve which begins in the middle or apical third.

Song JS et al. (2010) further added two more newly defined variants of RE ⁽²⁰⁾:

Small type: length shorter than half of the length of the distobuccal root.

Conical type: smaller than the small type and having no root canal within it.

The radix entomolaris is located distolingually, with its total or partial coronal third fixed to the distal root. The dimensions of the radix entomolaris varied from a short tapered extension to a mature root with normal length. ⁽²¹⁾

The presence of a RE has clinical implication in endodontic treatment. An accurate diagnosis of these can avoid complications or a 'missed canal' during root canal treatment. ⁽²²⁾

Once a diagnosis is reached and an access cavity has to be prepared, care should be taken to establish a "straightline" access. With the disto - lingually located orifice of the RE a modification of the classical triangular access cavity to a trapezoidal form is required to locate and access the root canal. The laws of orifice location may aid in the location of extra orifices. However, care must be taken to avoid gouging or excessive removal of dentin as this may weaken the tooth structure. ⁽²³⁾

Because the (separate) RE is mostly situated in the same buccolingual plane at the distobuccal root, a superimposition of both roots can appear on the preoperative radiograph and resulting in an inaccurate diagnosis. A thorough inspection of the preoperative radiograph and interpretation of particular marks or characteristics such as an unclear view or outline of the distal root contour. ⁽²²⁾ Based on the literature, the majority of radices entomolaris are curved. In some cases, there is an additional curve starting from the middle of the root or in the apical third. Hence using precurved files, to establish a smooth glide path to the apical segment and Nickel - Titanium rotary files for cleaning and shaping, is the desired option. ⁽²⁴⁾

3. Conclusion

Clinicians should be aware of unusual root morphology variation of the RE in terms of root inclination and root canal curvature demand careful, adapted diagnostic and clinical approach to avoid or overcome procedural errors during endodontic therapy. The initial diagnosis of a RE before RCT is important to facilitate the endodontic procedure and to avoid 'missed canals'. Preoperative periapical radiographs exposed to two different horizontal angles and clinical diagnosis are required to identify these additional roots.

References

- [1] Swartz, D. B., et al. "Years of endodontic success and failure". *J Endod* 9.5 (1983): 198 - 202
- [2] Barker B, Parsons K, Mills P, Williams G. Anatomy of root canals. III. Permanent mandibular molars. *Aus Dent J*.1974; 19 (6): 408 - 13.
- [3] Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral surg, Oral Med, Oral Pathol*.1984; 58 (5): 589 - 99.
- [4] Carabelli G, Carabelli G, von Lunkaszprie GC, Georg Carabelli E. *Systematisches Handbuch der Zahnheilkunde*: Georg Olms Verlag; 1844.
- [5] Calberson FL, De Moor RJ, Deroose CA. The radix entomolaris and paramolaris: clinical approach in endodontics. *J Endod*.2007; 33 (1): 58 - 63.
- [6] Sperber G, Moreau J. Study of the number of roots and canals in Senegalese first permanent mandibular molars. *Int Endod J*.1998; 31 (2): 117 - 22.
- [7] Pai V, Singh V, Vaitheeswaran MB, Thapa A, Kundabala M. Radix entomolaris: A case report. *J Nepal Dent Assoc*.2010; 11 (2): 162 - 165.
- [8] Visser JB. *Beitrag zur Kenntnis der menschlichen Zahnwurzelformen*: Buchdruckerei Rotting; 1948.
- [9] Steelman R. Incidence of an accessory distal root on mandibular first permanent molars in Hispanic children. *ASDC J Dent Child*.1985; 53 (2): 122 - 3.
- [10] de Carvalho, M. C. C., & Zuolo, M. L. "Orifice locating with a microscope". *J Endod* 34.1 (2000): 532 - 534
- [11] R. J. G. De Moor, C. A. J. G. Deroose, and F. L. G. Calberson, "The radix entomolaris in mandibular first molars: an endodontic challenge, " *International Endodontic Journal*, vol.37, no.11, pp.789-799, 2004.

- [12] Souza - Flamini LE, Leoni GB, Chaves JFM, Versiani MA, Cruz - Filho AM, Pécora JD, et al. The Radix Entomolaris and Paramolaris: A Micro-Computed Tomographic Study of 3 - rooted Mandibular First Molars. *J Endod.*2014; 40 (10): 1616 - 21.
- [13] Visser JB (1948) Beitrag zur Kenntnis der menschlichen Zahnwurzelformen. *Hilversum: Rotting.*49 - 72.
- [14] Yew SC, Chan K (1993) A retrospective study of endodontically treated mandibular first molars in a Chinese population. *J Endod* 19: 471 - 473.
- [15] Steelman R (1986) Incidence of an accessory distal root on mandibular first permanent molars in Hispanic children. *ASDC J Dent Child* 53: 122 - 123.
- [16] Abella F, Patel S, Durán - Sindreu F, Mercadé M, Roig M (2012) Mandibular first molars with disto - lingual roots: review and clinical management. *Int Endod J* 45: 963 - 978.
- [17] Vivekananda Pai AR, Jain R, Colaco AS (2014) Detection and endodontic management of radix entomolaris: Report of case series. *Saudi Endod J* 4: 77 - 82
- [18] Carlsen O, Alexandersen V (1990) Radix entomolaris: identification and morphology. *Scand J Dent Res* 98: 363 - 373.
- [19] De Moor RJ, Deroose CA, Calberson FL (2004) The radix entomolaris in mandibular first molars: an endodontic challenge. *Int Endod J* 37: 789 - 799.
- [20] Song JS, Choi HJ, Jung IY, Jung HS, Kim SO (2010) The prevalence and morphologic classification of distolingual roots in the mandibular molars in a Korean population. *J Endod* 36: 653 - 657.
- [21] Abuabara A, Schreiber J, Baratto - Filho F, Cruz GV, Guerino L. Análise da anatomia externa no primeiro molar superior por meio da tomografiacomputadorizada cone beam. *RSBO.*2008 Aug; 5 (2): 38 - 40.
- [22] Tu MG, Huang HL, Hsue SS, Hsu JT, Chen SY, Jou MJ, et al. Detection of permanent three - rooted mandibular first molar by conebeam computed tomography imaging in Taiwanese individuals. *J Endod.*2009; 35: 503 - 7.
- [23] P. Krasner and H. J. Rankow, "Anatomy of the pulp - chamber floor, " *Journal of Endodontics*, vol.30, no.1, pp.5-16, 2004.
- [24] F. L. Calberson, R. J. De Moor, and C. A. Deroose, "The radix entomolaris and paramolaris: clinical approach in endodontics, " *Journal of Endodontics*, vol.33, no.1, pp.58-63, 2007.