Case Report

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2019;10:1s:351-356.

Radix Entomolaris: A Clinically Challenging Series of Case Report

P Karunakar[1] Raji Viola Solomon[2] Karthik Basa[3] Nishat Zaidi. S[4]*

[1]Professor and Head, Department of Conservative Dentistry and Endodontics, Panineeya Institute of Dental sciences & Research Centre, Hyderabad, India.
[2]Professor, Department of Conservative Dentistry and Endodontics, Panineeya Institute of Dental sciences & Research Centre, Hyderabad, India.
[3]Senior Lecturer, Department of Conservative Dentistry and Endodontics, Panineeya Institute of Dental sciences & Research Centre, Hyderabad, India.
[4]PG Student, Department of Conservative Dentistry and Endodontics, Panineeya Institute of Dental sciences & Research Centre, Hyderabad, India.

ABSTRACT

Background: The success of endodontic treatment depends on the proper identification of all the canals, thorough chemo-mechanical preparation followed by three dimensional obturation with hermetic seal. Failure of any of these steps may occur due to unusual tooth morphology.[1] Usually mandibular molars have two roots with three canals (mesiobucccal, mesiolingual & distal) but in few teeth, the number of roots and canals vary. A major anatomical variant of the two-rooted mandibular first molar is a tooth with an additional distolingual third root. The variation in the number of roots is called Radix Entomolaris.[2] Proper angulations and interpretation of radiographs help to identify pulp chamber and root anatomy. Achieving the endodontic success in the presence of an RE requires knowledge about its prevalence, diagnosis, morphology, canal confi guration, and clinical approach.[5] This article presents three case reports of mandibular first molars with extra roots.

Keywords: radix entomolaris, variations, extra roots.

INTRODUCTION

The root canal anatomy and confoundingly complex nature of human pulp system provide the majority of significant challenges in achieving a successful result in endodontic treatment. Therefore, it is imperative that aberrant anatomy is identified prior to and during root canal treatment of such teeth. Mandibular first molar can display several anatomical variations as the number of root canals and number of roots may also vary.[6] The major variant in this tooth is the presence of an additional third root; a supernumerary root which can be found distolingually. This anatomical variant found in a permanent mandibular molar was first described by Carabelli and the macrostructure was is called **Radix Entomolaris.**[4] It can be found in the first, second, and third mandibular molars, occurring the most frequently in first molars and least frequently in the second molar.[2-4] The incidence of a separate RE in the first mandibular molar is associated with certain ethnic groups as follows: European 3.4 to 4.2%, African 3%, Eurasian and Indian less than 5%,[7] Caucasians 4.2%, Mongoloids such as Chinese, Eskimo and American Indians have 5% to more than 30% and the overall incidence in German dental school patient was 1.35%.[8]

CASE REPORTS

Case 1

A 27-year-old male named Ramalingam presented in the postgraduate clinic of the Department of Conservative Dentistry and Endodontics of Panineeya Institute of Dental siences & Research center with the chief complaint of swelling on right mandibular side of the face. Clinical examination

Received: Nov. 1, 2019**: Accepted**: Dec. 17, 2019
***Correspondence Dr. Nishat S Zaidi.**
Department of Conservative Dentistry and Endodontics, Panineeya Institute of Dental sciences & Research Centre, Hyderabad, India.
Email: Not Disclosed

pISSN 2278-0076
eISSN 2321-9270

Fig 1: Pre Operative RVG Image Showing Radix entomolaris irt 36.

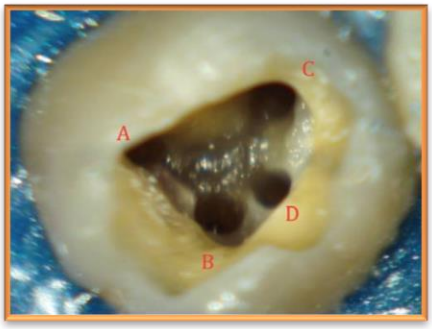


Fig 2: Orifice Enlargement after Access Cavity opening irt 36.

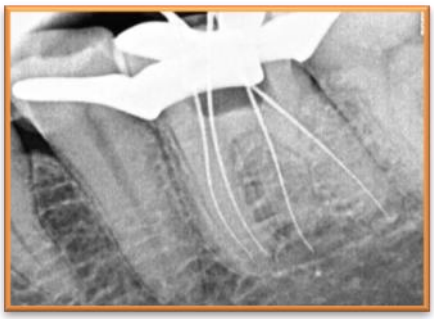


Fig 3: Working length Determination irt 36.

Fig 4: Master Cone RVG irt 36.

Fig5: Post severing the GP.

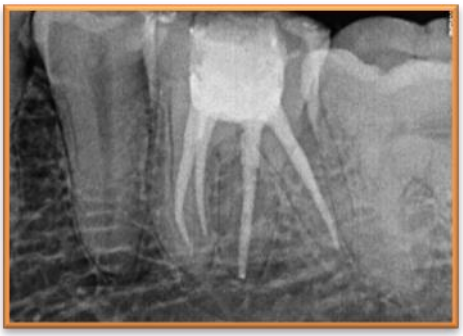
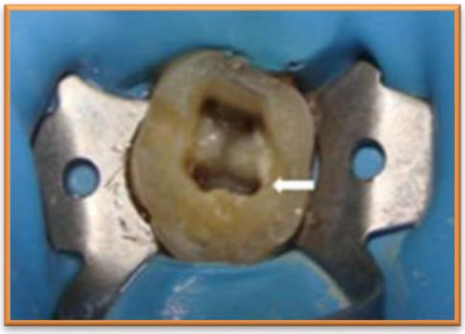


Fig 6: Composite Post endodontic build-up.

CASE 2

Fig 1: Pre Operative RVG Image Showing additional distal root - Radix entomolaris irt 46 with Access opening done (Rct initiated)



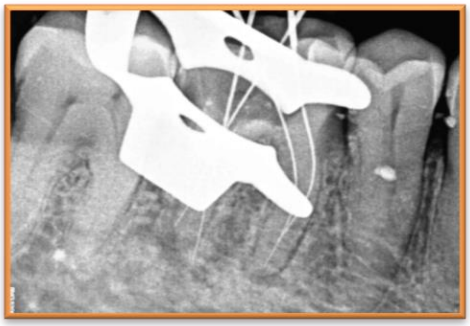


Fig 2: Orifice Enlargement after Access Cavity opening irt 46.

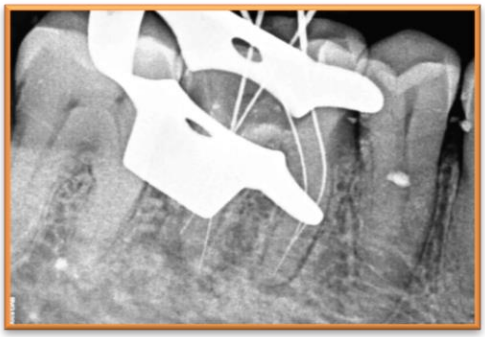


Fig 3: Working length Determination irt 46.

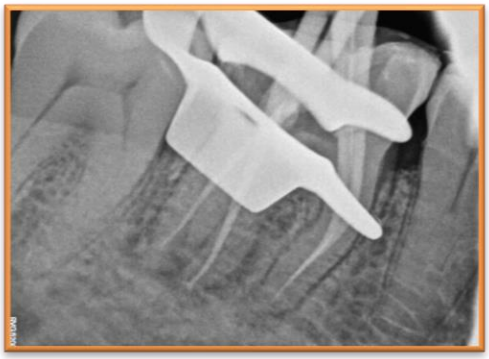


Fig 4: Master Cone RVG irt 46.

Fig5: Post GP condensation.

Fig 6: Amalgam Post endodontic build-up

revealed deep occlusal pit in mandibular left first molar (tooth 36). The tooth was very sensitive to percussion and apical palpation.

On radiographic examination of tooth 36, apart from deep distal occlusal caries involving the distal pulp horn, (ill case 1, Figure-1) the presence of an additional distal root outline which was more towards the center of the two roots was noticed on the radiograph . Following pulp testing, a diagnosis of pulp necrosis and acute alveolar abscess was made. The patient was suggested to undergo root canal treatment and an emergency access opening was made to allow drainage. Following the initiation of root canal treatment under rubber dam isolation, the close inspection of the pulp chamber revealed the presence of two mesial and two distal canal(DB, Central DL) orifices (Figure - 2). The presence of all the orifices were confirmed using an endodontic explorer [DG16, Hu-Friedy, Chicago] and a Dental loupes [Oro, India].

In the subsequent visits, canals were explored and negotiated using #08 and #10 size K-files. The working length of the canals was determined electronically using an apex locator [Minipex, Woodpecker] and confirmed radiographically (Figure – 3). Canals were cleaned and shaped using rotary Ni-Ti files [ProTaper Gold, Dentsply-Maillefer] and crown-down technique. Canals were irrigated using 2.5% sodium hypochlorite solution and flushed with 17% EDTA solution to remove smear layer. In this patient, the finding of a separate disto-lingual canal orifice and radiographic outline of the roots in the subsequent radiographs indicated the presence of an RE. In the follow up visits, when the patient was found asymptomatic, gutta-percha master cones [ProTaper, Dentsply Maillefer] were selected (Figure -4, 5). Obturation was carried out with master cones and AH26 sealer

[De Trey Dentsply, Konstanz, Germany] .The access opening was restored with composite restoration and the patient was scheduled for post-endodontic treatment (Figure – 6).

Case 2

A 55-year-old female patient reported in the postgraduate clinic of the Department of Conservative Dentistry and Endodontics of Panineeya Institute of Dental siences & Research center with a chief complaint of incomplete root canal treatment with dull aching pain while chewing food on mandibular right first molar (tooth 46). Access opening had been performed in a private clinic and radiographic examination of tooth 46 revealed gauging on the distal side of the access opening with small indistinct periapical radiolucency around the mesial and distal root and apical widening of the periodontal ligament space (Ill case – 2 Figure – 1). It also showed a double distal root outline indicating the presence of an RE. Although tooth 46 showed a mild and delayed response to electric pulp testing, it was not responsive to thermal tests. A diagnosis of pulp necrosis with chronic apical periodontitis was made and root canal treatment was started under rubber dam isolation. After achieving adequate anesthesia, access opening modification was made. Examination of the floor of the pulp chamber showed four canal orifices (Figure – 2).

The endodontic procedure was carried out similar to case 1. Following canal negotiation, working length (Figure – 3) was determined and canals were cleaned and shaped in a crown-down manner using rotary Ni-Ti f les and 2.5% sodium hypochlorite and 17% EDTA solutions as irrigants during instrumentation. Canals were disinfected using calcium hydroxide as an intracanal medicament between the visits. Subsequently, canals were obturated with gutta-percha point master cones (Figure - 4, 5) and AH26 sealer. The access opening was restored with composite and the patient was suggested to undergo full coverage restoration (Figure – 6).

DISCUSSION

Endodontic success of RE depends on its diagnosis, anatomy, morphology, canal configuration and clinical approach employed for accurate diagnosis and to avoid complications like missed canal which is a common reason for failure of treatment. Detection of RE can be based on clinical examination, radiographic and imaging techniques and other accessories.[9]

Radiographically, double periodontal ligament images or an unclear view or outline of the distal root contour or the root canal can hint to the presence of an RE. It is mentioned that the radiographs were successful in over 90% of the cases while identifying additional roots but superimposition of the distal roots can be limiting factor. An angled radiograph (25-30°) can be more useful in this regard and it is said that a mesial angled radiograph is better than a distal angled radiograph for RE detection.[9] However, this requires a thorough inspection of the preoperative radiograph. Clinically, factors such as an extra cusp, prominent distolingual lobe, cervical convexity, complex external contour of the furcation can indicate the presence of an RE. [10,11]

Three-dimensional imaging techniques based on computed tomography (CT) and cone beam computed tomography (CBCT) are useful for visualizing or studying the true morphology of an RE in a noninvasive manner using less radiation.[12] However, cost and access to them are said to be the limiting factors especially in a developing country like India.[13] In the present case series, radiographs alone, including preoperative ones, clearly showed the presence of RE in all the cases signifying the importance of radiographs in the detection of RE and, from patient's point of view, prevented the need for expensive investigations such as CBCT.

Modification of the conventional triangular access to obtain rectangular or trapezoidal outline form assists in locating the orifice of RE. Since canal entrances are equidistant from a line drawn in a mesio distal (MD) direction through the pulp chamber floor and lie on a line perpendicular to this MD line across the center of the floor of the pulp chamber, following the laws of symmetry helps in both detecting and locating an RE. Further, following a dark line on the floor of the pulp chamber may act as a visual aid to indicate the position of an RE canal orifice.[9,14,15] The values based on the mean inter-orifice distance between an RE canal and remaining canals, as found in a

study by Tu *et al*., may also serve as a useful guideline to locate and treat an RE.[12]

In case of any calcifi cation or overlying dentin or pulp roof remnants obscuring the orifi ce of an RE, use of an angled probe, ultrasonics cutting tips along with good illumination and visual aids such as loupes or surgical operating microscopes is said to facilitate the locating of an RE.[9,14] Radix entomolaris, due to variations and complexities in its anatomy coupled with its variable furcation levels, can pose multiple and significant endodontic problems in the form of furcal or strip perforation, weakening of root, vertical root fracture, straightening of the root canal, ledge formation, loss of working length, root canal transportation and instrument separation. These problems are more likely to happen during coronal pre-flaring, canal cleaning and shaping or post-space preparation.[9,14]

A clinical approach to endodontically treat an RE should consist of adopting measures to minimize above complications. Firstly an initial relocation of the orifice to the lingual without excessive removal of dentin helps to achieve straight-line access and avoid perforations. This step should be followed by manual preflaring to prevent instrument separation. It is said that RE exhibits the greatest degrees of curvature among the other roots of a mandibular molar with its canal having relatively longer length and smaller radius of curvature.[14] Because of this a risk of instrument fracture significantly increases with the decrease in the radius of curvature, hence canal preflaring with manual use of stainless steel files is suggested to overcome instrument fracture.

Initial root canal exploration should be done with a small files (size 10 or less) along with creation of a glide path along with the proper determination of the canal curvature and working length would reduce the procedural errors such as ledging and transportation. Finally, use of nickel-titanium rotary files having a taper of not more than 0.04 taper and crown down technique is said to allow a more centered, rounder and conservative canal preparation than the use of stainless steel instruments in RE.[9]

CONCLUSION

The failure to identify and treat an RE can significantly affect the outcome of an endodontic treatment in mandibular molars displaying RE. Although angulated radiographs can play a key role in the identify cation and endodontic management of an RE, the knowledge about prevalence, diagnosis, morphology, canal confi guration of an RE and clinical approach to treat it would be a very important prerequisite to achieve endodontic success in a mandibular molar with an RE.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. De Moor RJ, Deroose CA, Calberson FL. The radix entomolaris in mandibular first molars: an endodontic challenge. Int Endod J 2004;37:789 –99.

2. International Journal of Clinical Pediatric Dentistry, May-August 2010;3(2):105-106

3. International Journal of Current Research Vol. 10, Issue, 06, pp.70537-70540, June, 2018 Babbannavar, 2018. “Radix entomolaris: A series of case report 70537-70540.

4. Filip L. Calberson, Roeland J. The Radix Entomolaris and Paramolaris: Clinical Approach in Endodontics.

5. Vivekananda Pai AR, Jain R, Colaco AS. Detection and endodontic management of radix entomolaris: Report of case series. Saudi Endod J 2014;4:77-82.

6. Bonaccorso A, Tripi TR. Root canal treatment of a three-rooted mandibular first molar: A case report. ENDO (Lond Engl) 2008;2(3):211-218.

7. Tratrnan EK. Three-rooted lower molars in man and their racial distribution. Br Dent J 1938;64:264-674.

8. Schafer E, Breuer D, Janzen S. The prevalence of three-rooted mandibular permanent first molars in a German population. J Endod 2009 Feb;35(2):202-205.

9. Calberson FL, De Moor RJ, Deroose CA. The radix entomolaris and paramolaris: Clinical approach in endodontics. J Endod 2007;33:58-63.

10. Chen YC, Lee YY, Pai SF, Yang SF. The morphologic characteristics of the distolingual roots of mandibular first molars in a Taiwanese population. J Endod 2009;35:643-5.

11. Walker RT, Quackenbush LE. Three-rooted lower first permanent molars in Hong Kong Chinese. Br Dent J 1985;9:298-9.

12. Tu MG, Huang HL, Hsue SS, Hsu JT, Chen SY, Jou MJ, *et al*. Detection of permanent three-rooted mandibular first molar by cone-beam computed tomography imaging in Taiwanese individuals. J Endod 2009;35:503-7.

13. Garg AK, Tewari RK, Kumar A, Hashmi SH, Agrawal N, Mishra SK. Prevalence of three-rooted mandibular permanent first molars among the Indian Population. J Endod 2010;36:1302-6.

14. 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.

15. Krasner P, Rankow HJ. Anatomy of the pulp-chamber floor. J Endod 2004;30:5-16.