Clinical Management of Radix Entomolaris

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Abstract

Treatment of mandibular molars have always kept the endodontist sharp and alert as it is one of the teeth that show variations in its external and internal morphology to the extreme. These variations of the root canal anatomy are always a challenge for accurate diagnosis and successful endodontics therapy. A thorough knowledge therefore of the most common anatomic characteristics and its possible variations is essential for the clinician. The common morphology that mandibular 1st molars exhibit is two roots with two mesial and one distal canal. But in some teeth, the number of roots and root canals vary. Mandibular molars can have an additional root located lingually (the Radix Entomolaris) or bucally (the Radix Paramolaris). The possibility of an extra root should be considered and looked for carefully to avoid or overcome procedural errors during endodontic therapy. This report presents three such cases of mandibular 1st molar with extra roots.

Keywords: Mandibular 1st molar, Radix Entomolaris, Anatomic variations, Endodontic treatment.

INTRODUCTION

Root canals may be left untreated during endodontic therapy if the dentist fails to identify their presence, particularly in teeth with anatomical variations or extra root canals. An awareness and understanding of the presence of unusual root canal morphology can contribute to the successful outcome of root canal treatment. It is known that the mandibular first molar can display several anatomical variations. Fabra-Campos and Bond reported the presence of three mesial canals and Stroner noted the presence of three distal canals. Like the number of root canals, the number of roots may also vary. The presences of two distal roots are rare but occur. Yew and Chan (1993) and Steelman (1986) reported a bilateral occurrence of the Radix Entomolaris from 50% to 67%.

The presence of these three-rooted mandibular first molars appears to be less than 3% in blacks, about 3 to 4.2% in whites, less than 5 % in Eurasian and Asian populations, and approximately 5% to more than 30% in Mongoloid traits. An additional third root, first mentioned in the literature by Carabelli, is called the Radix Entomolaris (RE). This supernumerary root is located distolingually in mandibular molars, mainly first molars. An additional root at the mesiobuccal side is called the Radix Paramolaris (RP). Knowledge of their occurrence and location are important to avoid missed canal and to achieve high level of success in endodontic treatment. In this report three such cases are presented.

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CASE REPORTS

Case 1

A 38 year old male patient was referred for endodontic treatment of mandibular right first molar. On examination the tooth revealed deep caries; thermal and electrical pulp testing of the tooth elicited a negative response. The pre-operative radiograph showed deep caries involving the pulp distally. Periapical radiograph was taken from mesial angulation, which revealed presence of an additional distolingual root, which was curved and shorter than the main distal root. Based on the literature evidence, this supernumerary distolingual root was diagnosed as Radix Entomolaris.

The tooth was anesthetized and then isolated using rubber dam. The access cavity was prepared using an endo-access bur. Two distal and two mesial canal orifices were located using an endodontic explorer DG-16. The access was modified into a more trapezoidal cavity in order to locate the orifice of the distolingually located Radix Entomolaris . The canal lengths were determined radiographically with ISO 15 size K-files and confirmed with an apex locator (Rapex 5). Cleaning and shaping was performed using the crown down technique with hand K-files. During preparation, sodium hypochlorite (2.5%) and EDTA (17%) were used for irrigation, disinfection and removal of smear layer. The mesial and distal canals were cleaned and shaped with ISO No. 30 K-files. An interappointment calcium hydroxide dressing was placed in the canals. After one week the calcium hydroxide was irrigated out and master cone radiograph was taken; canals were dried with paper points and obturation was done using GP Points and zinc oxide eugenol sealer by lateral compaction technique. Post endodontic silver amalgam restoration was done.

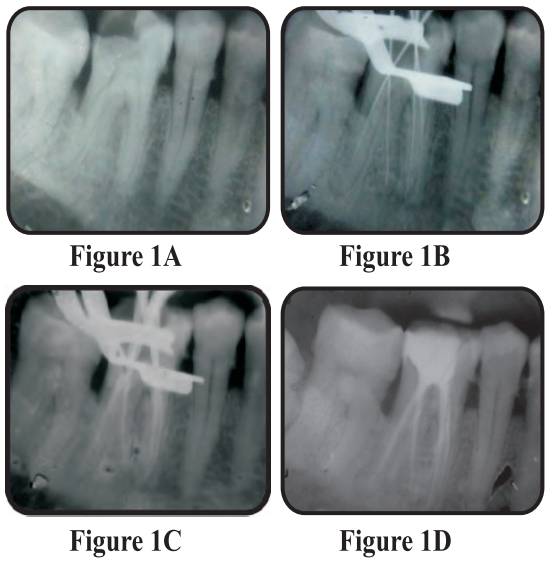

Figure 1A Figure 1B

Figure 1C Figure 1D

Fig. 1 A. Preoperative radiograph of 46 showing the presence of additional distal root.
Fig. 1 B. Initial radiograph for working length determination showing the presence of 4 distinct canals and 3 roots.
Fig. 1 C. Master Cone radiograph
Fig. 1 D. Postoperative radiograph after oburation and core-build up

Case 2

A 28 year old male was referred for endodontic treatment of the mandibular right first molar with irreversible pulpitis. Radiographical examination showed two distal roots and one mesial root with no signs of apical periodontitis.

The tooth was anesthetized and then isolated using rubber dam. Access cavity was prepared and four distinct canal orifices were located using endodontic explorer DG-16. The lengths of these canals were measured using apex locator (rapex 5). The canals were cleaned with sodium hypochlorite (2.5%) and RC Prep, and shaped with Rotary ProTaper system upto F3. All canals were filled with gutta-percha and AH Plus sealer by lateral compaction technique followed Post endodontic restoration with silver amalgam.

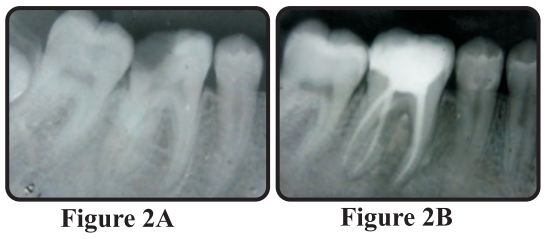

Figure 2A Figure 2B

Fig. 2 A. *Preoperative radiograph of 46 taken with mesial (30 degree) angulation showing additional distolingual root.*

Fig. 2 B. *Postoperative radiograph of Radix Entomolaris*

Case 3

A 24 year old male patient reported with the chief complaint of severe pain in the right lower back tooth region. Pain was of continuous type which disturbed sleep. Pain aggravated on taking hot substances and even on mastication. Preoperative radiograph revealed old fractured amalgam restoration with secondary caries. No distinct distal root was visible, but a diffuse outline of a second distal root could be seen suggestive of Radix Entomolaris. Local anesthesia was administered and the tooth was isolated under rubber dam.

Access opening was done with Endo access bur. One distal and two mesial canal orifices were located using an endodontic explorer. Three canals were located but the dentinal map seemed to be slightly extending in a distolingual direction. Access preparation was modified in that direction with an extra shank bur. The fourth canal was explored with DG 16 explorer (Dentsply, Switzerland). Working length was determined radiographically, cleaning and shaping was performed with hand protaper in a crown down fashion. The canals were irrigated with sodium hypochlorite (2.5%) and RC Prep. Obturation was performed by lateral compaction and access cavity was restored with amalgam. Post obturation radiograph revealed well obturated four canals. Patient was recalled after one week for follow up.

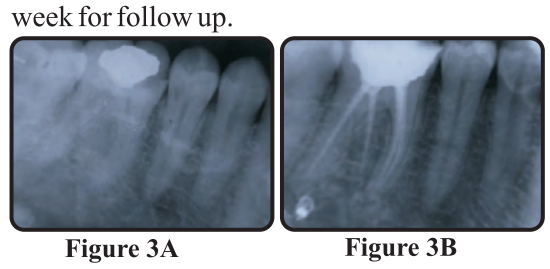

Figure 3A Figure 3B

Fig. 3 A. Preoperative radiograph of 46 with Radix Entomolaris.

Fig. 3 B. Postoperative radiograph showing four distinct well obturated root canals.

DISCUSSION

The anatomy of teeth is not always normal. A great number of variations could occur in formation, number of roots, and their shape. Most dentists are used to treating normal roots with similar traits; as a result, many failures can occur. It must be noted that a patient referred may have one of these rare anatomic variations. One of the variations that occur in the mandibular molars (mainly mandibular first molar) is Radix Entomolaris. Radix Entomolaris is a supernumerary distolingual root. The etiology behind the formation of Radix Entomolaris is still unclear. However its formation could be related to external factors during odontogenesis or presence of an atavistic gene or polygenetic system.

A classification by Carlsen and Alexandersen describes four different types of Radix Entomolaris according to the location of the cervical part of the Radix Entomolaris:

Type A and B - Distally located cervical part of the Radix Entomolaris with two normal and one normal distal root components, respectively.

Type C – Mesially located cervical part

Type AC - Central location, between the distal and mesial root components.

This classification allows for the identification

of separate and nonseparate Radix Entomolaris.

According to the classification by De Moor et al, based on the curvature of the separate Radix Entomolaris variants in bucco-lingual orientation, three types can be identified.

Type I - refers to a straight root/root canal

Type II refers to an initially curved entrance which continues as a straight root/root canal.

Type III - refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.

Since the Radix Entomolaris is mostly situated in the same bucco-lingual plane as the distobuccal root, a superimposition of both roots can appears on the preoperative radiograph, 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 or the root canal, can indicate the presence of a 'hidden' Radix Entomolaris. To reveal the Radix Entomolaris, a second radiograph should be taken from a more mesial or distal angle (30 degrees). This can help in making an accurate diagnosis in majority of the cases.

If a Radix Entomolaris or Radix Paramolaris is diagnosed before endodontic treatment, a modified access cavity can be prepared and the clinician knows what to expect or where to look for the additional canal once the pulp chamber has been opened. With a good knowledge of law of symmetry and law of orifices, various methods like, visualizing the dentinal map and canal bleeding points, using DG-16 explorer, micro-opener, troughing of the grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, champagne bubble test, magnetic resonance microscopy and micro computed tomography will be useful to locate the canals.

CONCLUSION

The presence of Radix Entomolaris has clinical implication in endodontic treatment. With the frequency of occurrence of 5.97% among the Indian population the possibility of an extra root should be considered and looked for carefully. Clinicians should make every possible effort to locate an extra root in mandibular 1st molars for successful endodontic treatment.

REFERENCES

1. Naik A, Ataide IN, Fernandes M, Lambor R. Management of radix entomolaris- A report of 2 cases. JIDA 2011;5:722-24
2. Calberson FL, De Moor RJ, Deroose CA. The radix entomolaris and paramolaris: Clinical approach in endodontics. J Endod 2007; 33: 58-63.
3. De moor R. J. G., Deroose C.A.J.G., Calberson F.L.G. The radix entomolaris in mandibular first molars: an endodontic challenge. Int endod J 2004;37:789-99
4. Skidmore EL, Dick K, Bodell R. Mandibular first molars with multiple mesial canals. J Endod 1994; 20: 610-3.
5. Reddy J. The radix entomolaris- an endodontic challenge Annals and Essences of dentistry 2010;3:90-2
6. Ghoddusi J, Naghavi N, Zarei M, Rohani E. Mandibular first molar with four distal canals. J Endod 2007; 33: 1481-3.
7. Gupta S, Raisingani D, Yadav R. The radix entomolaris and paramolaris: A case report. J Int Oral Health 2011;3:43-50
8. Irodi S, Farook AZ. Three rooted mandibular molar: radix entomolaris and paramolaris. Int J Dental Clinics 2011;3:102-4