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Endodontic management of radix entomolaris - A case series

[1]Dr. Jaini Thakkar, Department of Conservative Dentistry and Endodontics, Dharmsinh Desai University, Nadiad.

[2]Dr. Dipti Choksi, Department of Conservative Dentistry and Endodontics, Dharmsinh Desai University, Nadiad.

[3]Dr. Barkha Idnani, Department of Conservative Dentistry and Endodontics, Dharmsinh Desai University, Nadiad.

[4]Dr. Riddhi Doshi, Department of Conservative Dentistry and Endodontics, Dharmsinh Desai University, Nadiad.

Corresponding Author: Dr. Jaini Thakkar, Department of Conservative Dentistry and Endodontics, Dharmsinh Desai University, Nadiad.

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Abstract

Mandibular first molars have many anatomical variations; one such variation is presence of an extra root. It can be seen lingually which is known as radix entomolaris or can be seen buccally which is known as radix Paramolaris. For the success of endodontic treatment, there should be proper identification and localization of all the canals, proper cleaning and shaping of the canals followed by three dimensional obturation with proper hydrodynamic seal. Root canal failure may occur if any of the above step is failed due to anatomical variations. So, proper diagnosis, identification and treatment of this kind of anatomical variation need proper knowledge of root and root anatomy and configurations which leads to better outcome.

Thus, this case series discusses the endodontic management of RADIX ENTOMOLARIS in first as well as second molar.

Introduction

The basic goal of endodontic therapy is to remove bacteria from the infected root canal and to avoid reinfection. This is accomplished primarily by thorough root canal cleaning and shaping, followed by a three-dimensional filling with a fluid tight seal [1,2].

To attain these endodontic goals, the clinician must have a thorough understanding of root canal anatomy and be aware of anatomic variations such as additional roots, extra canals, webs, fins, and isthmuses that may complicate the endodontic treatment [3].

The majority of mandibular first molars have two roots, one mesial and one distal, with two mesial and one distal canals [4,5]. The presence of an additional third root; a supernumerary root located lingually referred to as distolingual root, RADIX ENTOMOLARIS (RE), initially identified by CARABELLI, who discovered this anatomical variance present in the permanent mandibular first molar. RADIX PARAMOLARIS is

another type of Radix that denotes the existence of additional root on the buccal side [6]. Radiographic methods are commonly used to provide a preliminary diagnosis of these variations. Techniques such as SLOB RULE or CLARK'S RULE, as well as CBCT, are effective for diagnosing anatomic variance. Along with the radiographic assessment, the clinical examination is essential [7].

Clinical examination of the tooth crown and examination of the cervical morphology of the roots using: [8,9]

- Periodontal probing can facilitate identification of an additional root.
- Using various instruments like endodontic explorer, path finder, DG 16 probe and micro-opener
- Champagne effect- bubbles produced by remaining pulp tissue in the canal, while using sodium hypochlorite in pulp chamber.
- An extra cusp (tuberculum paramolar) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity.

The presence of RE in the mandibular first molar is commonly associated with certain ethnic groups. In populations having Mongoloid traits i.e Chinese, Eskimo and American Indians have the frequency ranging from 5-30%. However, in Eurasian and Indian populations it is not common and seen in less than 5% and in African populations less than 3%. Radix entomolaris can be found on first, second and third mandibular molar teeth, occurring least frequently on second molars [10].

According to literature RE has been reported occurring in the first molar by 7.4%, second molar less than 2% and third mandibular permanent molars by 3.4 % occurring with a least frequency or none on the second molar. Tratman and others surveyed for second molar in the Indian population and found its frequency <5%. There was no specific incidence rate in relation to mandibular second molar. Thus, this case report describes rare occurrence of radix entomolaris in lower first and second molar.

Case 1

A 28-year-old male patient came to the department of Conservative Dentistry and Endodontics, Dharmsinh Desai University with chief complain of pain in lower right back tooth region since ten days. The patient revealed a history of mild intermittent pain for the past ten days, which had increased in intensity during the past two days. The patient reported prolonged sensitivity to hot and cold substances. The pain was spontaneous and aggravated particularly at night. The patient had no significant medical history. On clinical examination there were no signs of mobility in the tooth and swelling in that region. Deep Class-II disto-occlusal carious lesion was present irt 46(Figure 1). Pulp sensibility test showed delayed response irt 46.

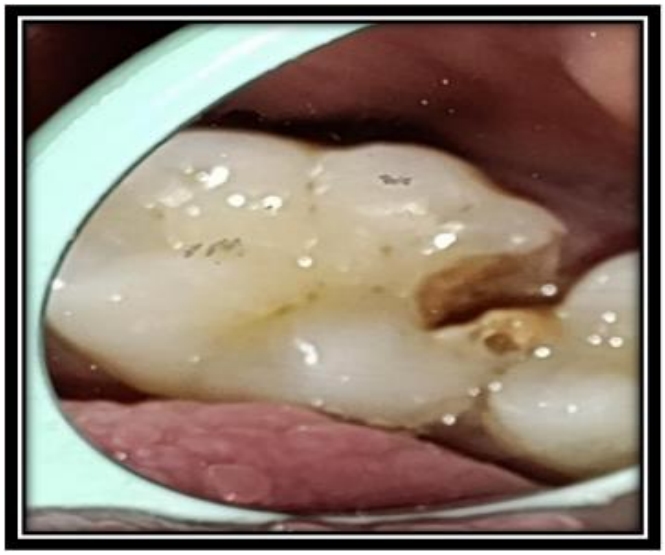

Figure 1: Preoperative Intraoral Photograph.

Radiographic examination shows carious lesion involving enamel, dentin and approaching the pulp. The presence of third additional root was also revealed on the distal side (figure 2). Final diagnosis was made as Symptomatic irreversible pulpitis irt 46 and treatment

plan was Root Canal Treatment with 46 followed by prosthesis.

Figure 2 Preoperative IOPA

On first appointment after administration of local anesthesia, after caries excavation, pre-endodontic build up was done using composite and rubber dam application was done. Traditional access cavity preparation was done with the help of ENDO-ACCESS BUR and ENDO-Z BUR. Two mesial canal orifices (Mesiobuccal, Mesiolingual) and two distal canal orifices were located (distobuccal and distolingual {RADIX}) (figure 3).

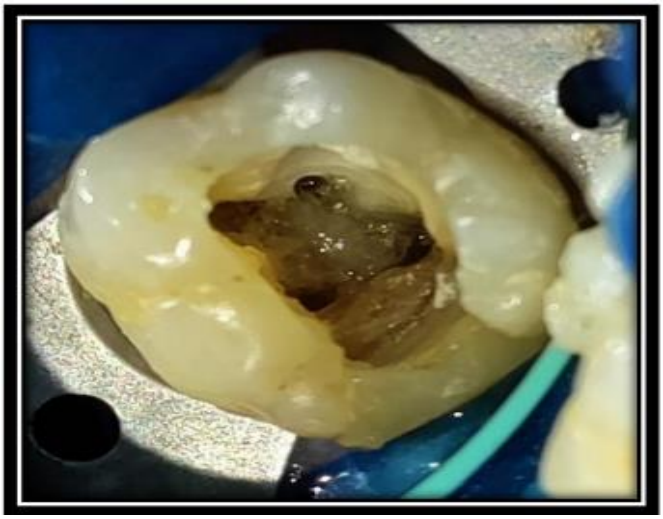

Figure 3: Access Opening

Canal patency was checked with No.10K file for all canals and working length was taken using No.15K file, determined using electronic apex locator (J Morita) and checked using intraoral periapical radiograph (figure 4). Glide path for all the canals was prepared till 25 Kfile and then biomechanical preparation was completed using Neo Endo – S files till 30/4%. After each file, recapitulation and continuous irrigation in the canals were done with 3% sodium hypochlorite and 17% EDTA. Final irrigation was done using normal saline. Canals were dried using absorbent paper points and calcium hydroxide was placed as an intracanal medicament for canal sterilization and disinfection. Temporary dressing was given and patient is recalled for obturation.

Figure 4: Working Length IOPA

On second appointment Patient was checked for any signs and symptoms irt 46. So, obturation was planned. The tooth was asymptomatic, so intracanal medicament was removed using irrigants. The canals were dried using absorbent paper points, mastercone selection of 30/4% was done and obturation was done using single cone obturation technique using Grossman's sealer (figure 5).

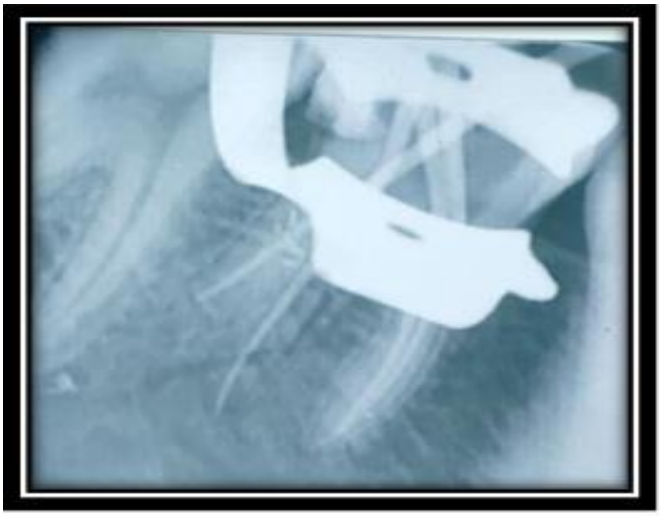

Figure 5: Master Cone IOPA

Post-endodontic composite restoration was done and post- operative radiograph was taken (figure 6). Patient was kept on follow up.

Figure 6: Post-Operative IOPA

Case 2

An 18-year-old male patient came to the department of Conservative Dentistry and Endodontics with chief complain of pain in lower left back tooth region. The patient revealed a history of mild intermittent pain for the past 20 days, which had increased in intensity during the past three days. The patient reported prolonged sensitivity to hot and cold substances. The pain was spontaneous and aggravated particularly at night. The patient had no significant medical history. On clinical examination there were no signs of mobility in the tooth and swelling in that region. Deep Class-I occlusal carious lesion was present irt 37. Pulp sensibility test showed delayed response irt 37 Tooth was tender on percussion irt 37 (figure 7).

Figure 7: Preoperative Intraoral Photograph

Radiographic examination shows carious lesion involving enamel, dentin and approaching the pulp. The presence of third additional root was also revealed on the distal side (figure 8). So final diagnosis was made as Symptomatic irreversible pulpitis with symptomatic apical periodontitis irt 37 and treatment plan was Root Canal Treatment irt 37 followed by prosthesis.

Figure 8: Preoperative IOPA

On first appointment after administration of local anesthesia, rubber dam application was done. Traditional access cavity preparation was done with the help of ENDO ACCESS BUR and ENDO-Z BUR. Two mesial canal orifices (Mesiobuccal, Mesiolingual) and two distal canal orifices were located (distobuccal and distolingual {RADIX}) (figure 9).

Figure 9: Access Opening

Canal patency was checked with No.10K file for all canals and working length was taken using No.15K file, determined using electronic apex locator (J Morita) and checked using intraoral periapical radiograph (figure 10).

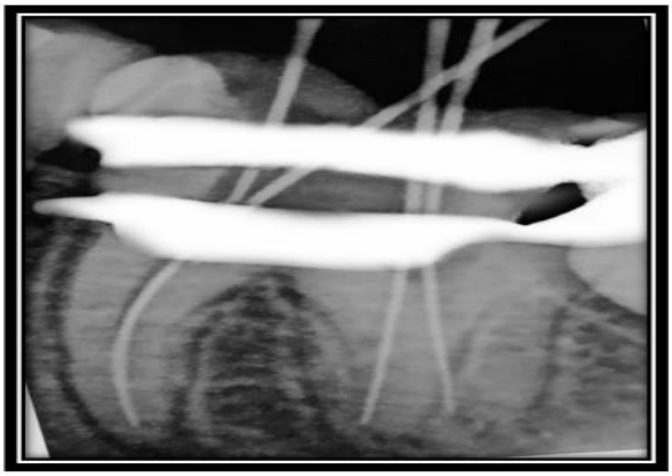

Figure 10: Working Length IOPA

Glide path for all the canals was prepared till 25 K-file and then biomechanical preparation was completed using Neo Endo – S files till 30/4%. After each file, recapitulation and continuous irrigation in the canals were done with 3% sodium hypochlorite and 17% EDTA. Final irrigation was done using normal saline. Canals were dried using absorbent paper points and calcium hydroxide was placed as an intracanal medicament for canal sterilization and disinfection. Temporary dressing was given and patient is recalled for obturation.

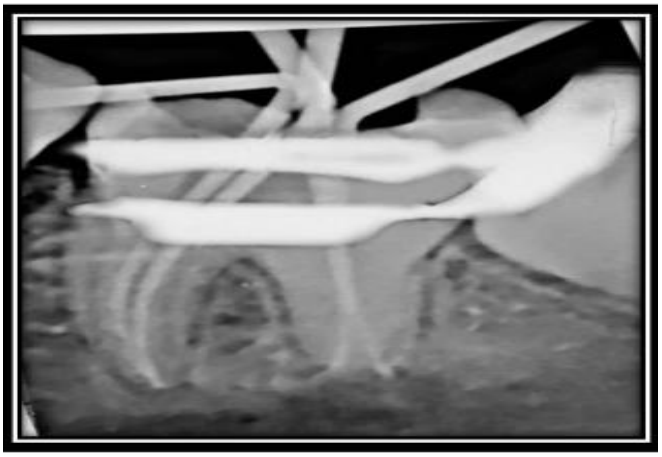

Figure 11: Master Cone IOPA

On second appointment Patient was checked for any signs and symptoms irt 37 and patient was asymptomatic. So, obturation was planned. Intracanal medicament was removed using irrigants [normal saline and 3% sodium hypochlorite]. The canals were dried using absorbent paper points, master-cone selection of 30/4% was done (figure 11) and obturation was done using single cone obturation technique using Grossman's sealer. Post-endodontic composite restoration was done and post-operative radiograph was taken (figure 12). Patient was kept on follow up and recall for prosthesis.

Figure 12: Post-Operative IOPA

Discussion

Anatomic variations of permanent mandibular molars have been observed in the literature. The RE is positioned distolingually, with its coronal third wholly or partly attached to the distal root [12].

The aetiology is yet unknown. Its formation in dysmorphic, supernumerary roots could be related to external factors during odontogenesis or penetrance of an atavistic gene or polygenetic system, whereas in eumorphic roots, racial genetic factors influence the more profound expression of a particular gene, resulting in a more pronounced phenotypic manifestation. An RE can be present on the first, second, and third mandibular molars, with the second molar being the least common. Some studies estimate a 50- 67 percent bilateral occurrence of the RE [13].

Classification of radix entomolaris are

CARLSEN&ALEXANDER SEN (1990) [14] classified radix entomolaris (RE) into four different types based on the location of its cervical part.

- 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) [15] classified radix entomolaris based on the curvature of the root or root canal.

- 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) [16] further added two more newly defined variants of RE.
- 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.

In endodontics, the existence of RE or a radix Paramolaris has clinical implications, and a precise identification of these supernumerary roots can prevent complications of a "missing canal" during root canal therapy.

A comprehensive evaluation of the preoperative radiograph, as well as the interpretation of certain signs or features, such as an unclear view or outline of the distal root contour or root canal, might suggest the presence of a "hidden" RE [17].

In the current case report, the canal orifices were located and identified utilising traditional methods, including the DG16 endodontic explorer, knowledge of the roots, and root canal anatomy, as well as conventional periapical radiographs to assess canal design. In both these cases

RE was classified ad De Moor's Type I which was managed successfully [18].

Conclusion

Clinicians should be aware of the RE's distinctive root morphological abnormalities in root inclination and root canal curvature. A careful and specialized diagnostic and therapeutic strategy to avoid or overcome procedural errors during endodontic treatment.

The early detection of a radix entomolaris or Paramolaris before root canal therapy is critical for facilitating the endodontic treatment and avoiding 'missed 'canals. To identify these extra roots, preoperative periapical radiographs exposed at two distinct horizontal angles and clinical diagnosis are necessary.

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