



ENDODONTICAL MANAGEMENT AND ITS COMPLICATION ON RADIX ENTOMOLARIS – A REPORT OF CASE SERIES

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ABSTRACT

The primary objective of the endodontic treatment relies on the identification and complete cleaning and shaping of the root canal system. Missed canals and the failure to remove all the microorganisms and pulp remnants from the root canal system are probably the main reason for endodontic failure. Normally the permanent mandibular first molar has two roots, mesial and distal. But mandibular molars may have an additional root located either buccally (radix paramolaris) or lingually (radix entomolaris). Understanding of the presence of an additional root and its root canal anatomy is essential for successful treatment outcome. This case report describes the prevalence and morphology of radix entomolaris.

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INTRODUCTION

The successful endodontic treatment depends on thorough chemomechanical cleaning and shaping of root canals to create a fluid impervious seal between the root canal and periapical tissues. Endodontic failure is due to incomplete removal of pulpal tissue and microorganism from the root canal.¹

Establishing adequate access for complete cleaning and shaping is an integral part of this procedure. In order to achieve these endodontic goals, the clinician must have an in-depth of knowledge of root canal anatomy and should be aware of its anatomical diversities such as Extra root, Extra canals, Webs, Fins and Isthmuses that may complicate the endodontic procedure.²

According to Swartz, Skidmore and Griffen, Mandibular first molar has a significantly lower success rate when compared with other teeth. Permanent Mandibular First Molars generally has two roots (One Mesial and one distal root) with two mesial and one distal root canals. Carabelli (1844) was the first to report on mandibular first molars with supernumerary roots. The third root located on disto-lingual named as Radix entomolaris. Bolck reported the occurrence of buccally placed additional root named as Radix paramolaris.^{2,3}

Hence, the purpose of this case report was to know about the anatomical variations in mandibular molar and its endodontical management.

Etiology

The etiology for Radix Entomolaris is still unknown; it can be because of external factors during tooth formation or can be attributed to atavic gene or polygenic system

Classification

Radix Entomolaris (RE) RE can be classified into four different types depending on the location of its cervical part²

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.

Based on the study by Ribeiro, *et al.* another classification of RE was given by De Moor *et al.* elaborating the curvature of the root or the root canal in to three types⁴

Type 1: A straight root or root canal.

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

Type 3: 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 variants of RE²

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1. Small type: Length shorter than half of the length of the distobuccal root.
2. Conical type: Smaller than the small type and having no root canal within it.

Case report: 1

A 22 years old Female Patient was reported to the department of Conservative Dentistry & Endodontics (Sri Siddhartha Dental College and Hospital) with the chief complaint of pain in the lower right back teeth region for past 2 weeks. Pain was spontaneous and lingering in nature which aggravates while drinking hot and cold substances. On clinical examination there was a deep carious lesion present on the buccal surface of mandibular first molar(Fig: 1). On radiographic examination caries involving pulp and the presence of third additional root was observed on distolingual aspect of the tooth(Fig :2). A diagnosis of Symptomatic Irreversible Pulpitis of 46 was made and endodontic treatment was planned.

Tooth was anesthetized using 2ml of 2% lidocaine containing 1:200,000 epinephrine and isolated under rubber dam. Access cavity preparation was done using a round diamond Endo – Access bur and an Endo –Z bur (Fig: 3). Two mesial canal orifice (Mesiobuccal, Mesiolingual), one distal orifice (Distobuccal) was located and another orifice was located on Distolingual aspect of tooth. To obtain a straight line access, the shape of the access cavity was modified from triangular form to more trapezoidal form. Canals were explored with precurved K file ISO number 10 & 15 (Dentsply Mailefer, Switzerland). Working length was determined using root ZX apex locator and confirmed using radiographic method using Buccal object rule (SLOB technique) (Fig:4). The root canals were cleaned and shaped using ProTaper Gold rotary files (DentsplyMailefer, Switzerland) in all the canals. During instrumentation adequate irrigation was performed using 3 % sodium hypochlorite followed by saline rinse and canals were lubricated with EDTA. Master cone was selected (Fig: 5) and Obturation was done with Guttaperchapoints (Fig: 6) followed by GIC restoration.



Fig 3



Fig 4



Fig 5



Fig 1

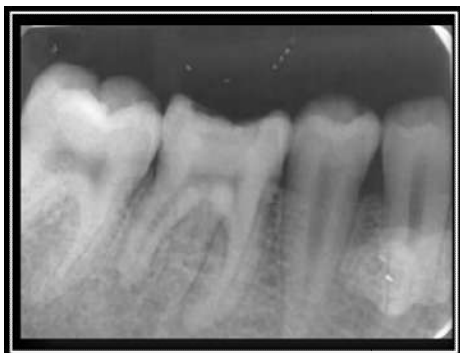


Fig 2



Fig 6

Case report: 2

A 30 year old male patient was referred to the department of Conservative Dentistry & Endodontics (Sri Siddhartha Dental College and Hospital) with the chief complaint of pain in the lower right back teeth region. The patient reported a history of intermittent pain for past 10 days, which aggravates on chewing food. On clinical examination, there was a deep

carious lesion present on the mandibular right first molar and was tender on percussion.

On radiographic examination a radiolucent coronal area involving the pulp and additional root was noted (**Fig: 7**). Tooth was diagnosed as symptomatic irreversible pulpitis and apical Periodontitis and Endodontic management was planned. In the first visit profound anaesthesia was achieved using 2 % Lidocaine for inferior alveolar nerve block. Rubber dam isolation was done and access cavity preparation was done using Endo Access bur and Endo Z bur. On clinical examination fourth Distolingual canal orifice was present on the distal root canal. To create an initial glide path ISO K file 8, 10 and 15 sizes was used. Working length was determined using apex locator (Root ZX apex locator). Canals were enlarged with NiTi Protaper Gold rotary files and 3% sodium hypochlorite followed by saline irrigation. Master cone was selected (**Fig: 8**) and canals were dried using paper points and obturated with guttapercha (**Fig: 9**).



Fig 7



Fig 8



Fig 9

Case Report: 3

A 35 year old Male patient was reported to the department of Conservative Dentistry & Endodontics (Sri Siddhartha Dental College and Hospital) with the chief complaint of pain in the lower left back teeth region for past 15 days. Pain was intermittent, which aggravates on chewing food. On clinical examination, there was a deep carious lesion present on the mandibular right first molar and was tender on percussion. On radiographic examination a radiolucent coronal area involving the pulp and ill- defined radiolucency at the distal root (**Fig: 10**). Tooth was diagnosed as symptomatic irreversible pulpitis and apical Periodontitis. Endodontic management was planned, anesthesia was achieved using 2 % Lidocaine under rubber dam isolation. Access cavity preparation was done and canals were explored with ISO K file 10 and 15 sizes. Working length was determined using apex locator (Root ZX apex locator) and canals were enlarged with NiTi Protaper Gold rotary files followed by 3% sodium hypochlorite and saline irrigation. Calcium hydroxide intra canal medicament was placed and cavity restored with zinc oxide eugenol cement. The patient was recalled after 2 weeks. Tooth was asymptomatic and master cone radiograph was taken. The canals were dried using paper points, master cone selected (**Fig: 11**) and obturated with gutta percha (**Fig: 12**).



Fig 10



Fig 11

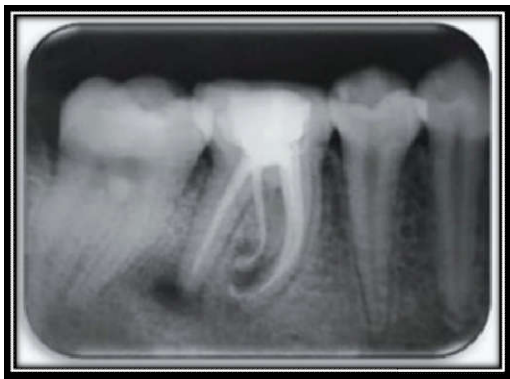


Fig 12

DISCUSSION

Endodontic success depends on the complete cleaning and shaping and three dimensional obturation of entire root canal system. Missed canals and the failure to remove all the microorganisms and pulp remnants from the root canal system are probably the main reason for persistent infection around endodontically treated molars.⁴

Witherspoon *et al* reported that the success rate of endodontical treated mandibular first molars is around 81.48%. In his study he reported that the incidence of missed roots or canals of requiring retreatment was as high as 42%. In case of mandibular first molar, 86% of missed canals are found in the distal root and 14% in the mesial root.⁵ Carebelli 1844 found an unusual root canal morphology of the mandibular first molar is Radix Entomolaris, which is the presence of additional distolingual root.^{2,3}

Identifying the additional root or extra canals by using various methods like ^{1,6}

1. Angled radiograph (SLOB)
2. Following the dark line on the floor of the pulp chamber
3. Troughing of the grooves with ultrasonic tips
4. Performing the sodium Hypochlorite Champagne Bubble test
5. Staining the Chamber floor with 1 % Methylene Blue dye
6. Visualizing the Bleeding points
7. Use of Microscope/ Magnifying Loops
8. CBCT

The shape of the access cavity was modified from classical triangular form to trapezoidal or rectangular form in order to locate distolingual root. An initial relocation of the orifice to the lingual without excessive removal of dentin helps to achieve straight-line access and avoid perforations.²

Based on literature, radix entomolaris had severe degree of curvature relatively longer length and smaller radius of curvature. Manual preflaring is recommended to prevent instrument separation. Hence using precurved files, adequate coronal enlargement avoids easy passage of the endodontic file that allows irrigants to the apical segment in larger volume.^{1,6} Along with the glide path, proper determination of the canal curvature and working length would reduce the procedural errors such as ledging and transportation. The 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.²

Interdisciplinary Considerations

Oral Surgery

Radix entomolaris may pose difficulty during extraction. Tooth should be luxated thoroughly during extraction, as distolingual root might fracture than mesial and distobuccal roots.

Orthodontics

During Orthodontic procedure, presence of additional distolingual root and its curvature makes difficult during tooth movement.

CONCLUSION

Clinicians should be aware of these unusual root morphologies in the mandibular first molar. The initial diagnosis is utmost importance, to facilitate the endodontic procedure and to avoid treatment failures. Proper interpretation of radiographs taken at different horizontal angulations may help to identify number of roots and their morphology. The morphological variations of RE in terms of root inclination and root canal curvature, demand careful and adapted clinical approach to avoid or overcome procedural errors during endodontic therapy.

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