



Research Paper

Radix entomolaris; An endodontic dilemma for dentist: A case report

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Abstract

Anatomical variations are always present in teeth anatomy with different populations. Success of endodontic treatment depends on the proper scouting identification and thorough chemo mechanical preparation of all the canals followed by three dimensional obturation. Usually first mandibular molars have one mesial and distal root but in some cases there are anatomical variations wherein the number of roots and root canals vary. Normally the permanent mandibular first molar has two roots i.e. mesial and distal. But mandibular molars may have variations of an root located either mesio-buccally (radix paramolaris) or distolingually (.radix entomolaris). Radix entomolaris is detected by identifying the presence of a double or extra root outline in the preoperative radiograph, modifying the access opening and closely inspecting the pulp chamber and it is endodontically treated same as cleaning, shaping, and obturation of the canals. The report describes the endodontic management of mandibular molar with RE..

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I. INTRODUCTION

As stated by Barrett, "of all the phases of anatomic study in the human system, one of the most complex is that of pulp cavity morphology."^{1,2} So a thorough knowledge of the common root canal morphology and its possible variations is fundamental because missing treatment of even one of the canal can lead to endodontic treatment failure. For the success in endodontics, a thorough knowledge of dental anatomy and an understanding of the potential for variations from the normal are required. Eradication of microbes from root canals and impeding of further reinfection is the basic support of endodontic treatment. This is gained by an thorough root canal cleaning and forming, a three-dimensional filling with a fluid-tight seal. Setting up sufficient access for cleaning and shaping is a basic and essential part of this process. Gaining these goals, the clinician is supposed to have integral knowledge of the root canal anatomy, and its anatomic varieties, including additional roots, extra canals, webs, fins, and isthmuses that may complicate the endodontic procedure.

II. MORPHOLOGY

Carlsen and Alexanderson classified RE based on the location of its cervical part into four types.[8-10] Type A– It has a distally located cervical part with two normal distal root components

Type B–Same as Type A; but, only one normal distal root component

Type C–It has a mesially located cervical part

Type AC–Central location between mesial and distal root components.

De Moor et al. classified RE-based on the curvature in buccolingual orientation into three types

. [11] 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 buccally oriented curve starting from the middle to apical third.

Wang et al. gave another classification for RE depending on its radiographic appearance⁶. Type 1: Presents the most identifiable radiographic image

Type 2: A large beam angulation is necessary mesially or distally for their identification

Type 3: Identification becomes extremely difficult because of the overlap of the adjacent distobuccal root.

Carlsen and Alexanderson classified RP based on the location of its cervical part into two types.[13] Type A– Refers to an RP in which the cervical part is located on the mesial root complex .

Type B–Refers to an RP in which the cervical part is located centrally, between the mesial and distal root complexes .

Case Report 1

A female patient, aged 18 years old, reported with a chief complaint of pain in the lower left back tooth region since 10 days. On clinical examination, there were deep occlusal caries in relation to #36 and the tooth was tender on percussion. Thermal and electric pulp test elicited a negative response. Intraoral periapical radiograph (IOPAR) showed occlusal radiolucency approximating pulp space with widening of periodontal ligament space at apical third of the roots. Diagnosis of symptomatic apical periodontitis was made, and RCT was recommended [Figure 1a-c]. RCT procedure was initiated under local anesthesia by giving inferior alveolar nerve block (LIGNO × 2% with 1:80,000 adrenaline, Indoco Remedies Ltd., Mumbai, India) with rubber dam isolation. Access cavity was prepared; orifices were located using DG-16 an endodontic explorer (Dentsply, United Kingdom)

During this procedure, a dark line guided toward an extra orifice which was located toward distolingual part of pulpal floor indicating the presence of RE, which was confirmed by radiographic image .⁷ Working length was determined with an apex locator and then confirmed with a radiograph. Radix root showed Type 2 configuration of the canal.¹⁷ .Cleaning and shaping were performed with rotary Protaper files (Dentsply, Maillefer, and Swiss made CH-1338 Ballaigues) in crown down manner. Apical preparation was done until size F3 Protaper file (master apical file). The canals were irrigated sequentially with 2.5% sodium hypochlorite, 0.2% w/v chlorhexidine gluconate (Vishal DentocarePvt., Ltd., India), and 17% ethylenediaminetetraacetic acid (RC help) during instrumentation and finally with normal saline. Calcium hydroxide intracanal medicament was placed in the first visit. In the next visit a, irrigation was done. The canals were then dried with paper points, master cone selection was done with the help of radiograph and obturated with laterally condensed gutta-percha (Dentsply, Maillefer, Swiss made CH-1338 Ballaigues) and AH plus sealer (Dentsply DeTrey , Germany). Postendodontic restoration was done with composite.

PREOPERATIVE IOPA X-RAY (Fig 1-a)



WORKING LENGTH IOPA X-RAY(Fig 1-b)



MASTER CONE IOPA (Fig 1-c)



POST OBTURATION IOPA



Case report no:2

A 19-year-old male patient reported with a chief complaint of pain in lower right back teeth region since 15 days. On clinical examination, there was a deep Class I caries, and the tooth was tender on percussion in relation to #46. Thermal and electric pulp test elicited a negative response. Radiograph showed coronal

radiolucency approximating pulp space with periodontal ligament space widening at apical third of the roots. The tooth was diagnosed with chronic apical periodontitis. RCT was initiated for the tooth. The location of extra orifice and radiographic image indicated the presence of Radix Entomolaris.⁷ Radix root showed Type 1 configuration of the canal. RCT was completed with standard protocol .

PREOPERATIVE IOPA X-RAY

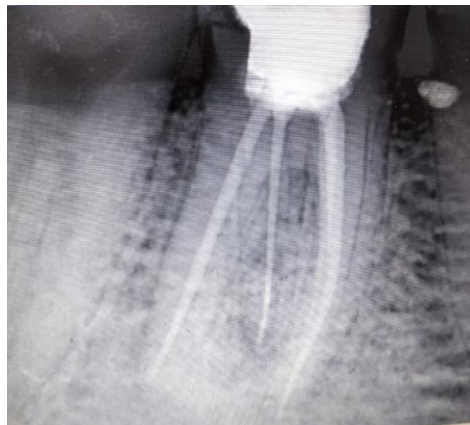


WORKING LENGTH IOPA



C

POST OBTURATION IOPA XRAY



Case report no : 3

A 28-year-old male patient reported with a chief complaint of pain and swelling in lower right back teeth region since 7 days. On clinical examination, there was a Class II mesio occlusal silver amalgam filling , and the tooth was tender on percussion in relation to #47. Radiograph showed mesiocoronal radiolucency approximating pulp space with periodontal ligament space widening at apical third of the roots. Diagnosis of irreversible pulpitis was made, and RCT was recommended. Type 1 radiographic image revealed the presence of additional mesiobuccal root.⁷ Access cavity was modified from triangular to more trapezoidal shape to locate the additional canal. Radix root showed Type 1 configuration of the canal.¹⁷ RCT was completed with standard protocol .

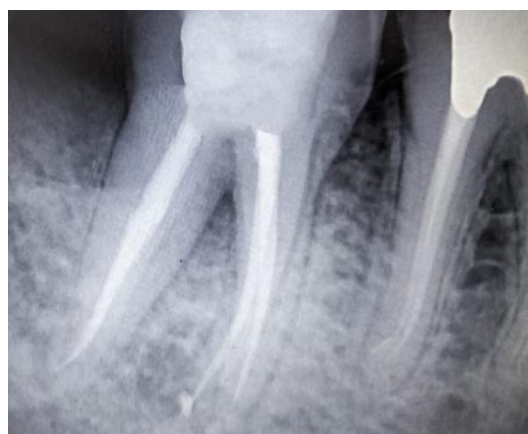
PREOPERATIVE IOPA X-RAY



WORKING LENGTH IOPA X-RAY



POSTOBTURATION IOPA



III. DISCUSSION

The indepth knowledge of root canal morphology and the configuration of the teeth plays an pivotal role in the success of endodontic treatment . Radix entomolaris and Radix paramolaris can be seen most commonly in the first, second and third mandibular molar, with the least frequency in the second molar. RE has a Bilateral occurrence in a range from 50 to 67% ⁸. If the primary molars has an additional root then the chance of presence of extra root in an adjacent molar is more than 94.3%. Therefore, primary molars with additional root can be used to forecast the extra root present posterior to it.⁹ For successful endodontic therapy there should be Correct diagnosis, Appropriate Chemo-mechanical preparation and a three dimensional obturation.

One of the most important step for a successful root canal treatment is an accurate diagnosis. In complete removal of microorganisms and pulpal tissue can lead to the failure of an endodontic treatment¹⁰. To avoid any iatrogenic error , a minimum of two angulated diagnostic radiographs are a must along with a careful clinical examination. If RE is diagnosed before commencement of the endodontic treatment, a modified trapezoidal access cavity isprepared and additional canal orifice can be searched for. With a good understanding of the law of symmetry, various methods like visualization of the dentinal map and the canal bleeding points using magnification, ultrasonic tips, staining the chamber floor with 1% methylene blue dye, performing champagne bubble test, will help identify the missed canal.¹⁰ The tactile sensation using hand instrument like Endodontic explorer, Pathfinder, DG 16 probe and Micro-openers are also helpful.. Advanced imaging techniques can aid to locate and confirm additional canals in case of multirouted teeth, especially molars. These techniques include digital radiography, fiber-optic illumination, dental endoscopy and oroscopy, surgical loupes, operating microscope, micro-computed tomography (CT), visualization endograph using Ruddle's solution, and magnetic resonance microscopy.^{6,11-16}. Apart from these difficulties in locating the canals, the clinicians are

prone to commit some iatrogenic errors like straightening of a root canal resulting in loss of working length, ledge formation, zipping, transportation or even perforation in radix cases .

IV. Conclusions

Teeth never have the same morphology . A number of variations in the root morphology occur which pose a challenge to a clinician. This particular variation radix Entomolaris may pose a challenge for clinicians who lack proper diagnostic aids and proper knowledge of root canal anatomy. A correct diagnosis should be made with two preoperative radiographs taken at two different angles before starting the treatment. So thorough knowledge of anatomy and awareness of the variations make the treatment more successful and if the clinician exhibits proper skill, these cases can be done with ease.

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