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Endodontic Management of Radix Entomolaris in Mandibular Molars - A Case Series.

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Abstract:
Understanding both the external and internal anatomy of teeth is crucial for effective dental practice. Dental anomalies are commonly observed and can complicate treatment procedures. Similar to other teeth, the mandibular first molars may also exhibit anatomical irregularities. One particular variation is the occurrence of an additional root located distolingually. Radix Entomolaris (an extra lingual root) is often present in the mandibular first and third molars. In contrast, its occurrence in second molars is just 3% among the Indian population. A comprehensive understanding of root canal anatomy and its variations is essential for clinicians to manage such cases effectively. This study aims to present a series of cases involving mandibular molars with three roots, which is a rare clinical finding.

Key Words*: mandibular molar, radix entomolaris, variation.*

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I. Introduction:

A comprehensive understanding of dental anatomy, along with awareness of potential variations from the standard, is essential for achieving success in endodontic procedures. Successful endodontic treatment entails identifying the root canal openings, performing chemo-mechanical cleaning and shaping of the root canals, and subsequently ensuring a dense filling of the root canal that provides a hermetic seal. Variations in anatomy are a recognized feature of mandibular permanent molars. The first molars typically have two roots, which include two mesial canals and one distal canal; however, variations in the number of roots and the morphology of the canals are frequently observed. The existence of a third root in the permanent first molar is the most significant variation within this category.

Carabelli identified an extra root situated in the distolingual region of mandibular molars, which he termed “radix entomolaris” (RE), while referring to it as “radix paramolaris” (RP) when found in the mesiobuccal (MB) region. Radix entomolaris (RE) is defined by the presence of an additional third root (i.e., the supernumerary root or extra distal root), usually located lingually. There have been rare reports of RE in mandibular second molars, although it is occasionally seen in mandibular third molars. A review of existing literature indicates that RE has been documented in the first (7.4%), second (1%), and third mandibular permanent molars (3.7%), with the lowest occurrence or absence in the second molar. This paper aims to present a case series on the endodontic treatment of radix entomolaris in mandibular first, second, and third molars.

II. Case Report 1

A 33-year-old male came for endodontic treatment of the mandibular right third molar. On clinical examination, the tooth was deeply carious and had irreversible pulpitis. Radiograph of the right mandibular first molar was normal without any periapical changes. After rubber dam application and anaesthetizing the tooth, access preparation was done with an endo-access bur, and canal orifices were located with a DG 16 endodontic explorer. Initial negotiation of the root canals was conducted with K-file 10. The fourth disto-lingual canal orifice was present far from the distal root canal orifices. The canal lengths were determined radiographically with a K file ISO 15 size and electronically with an apex locator. They were cleaned with 2.5% sodium

hypochlorite along with EDTA and shaped with the protaper rotary system till a size of F-2, and the patient was recalled after 3 days. At the next appointment patient was asymptomatic. Master cone radiograph revealed proper fitting of cones. Canals were dried with paper points, and obturation was done by using bioceramic sealer.

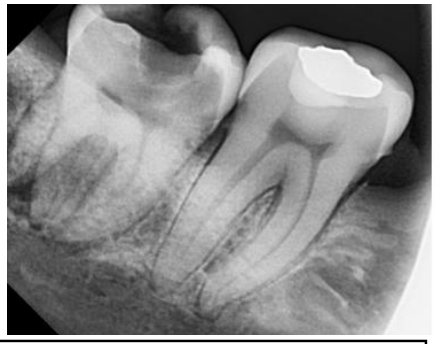

Figure 1: Preoperative radiograph of radix with tooth 48

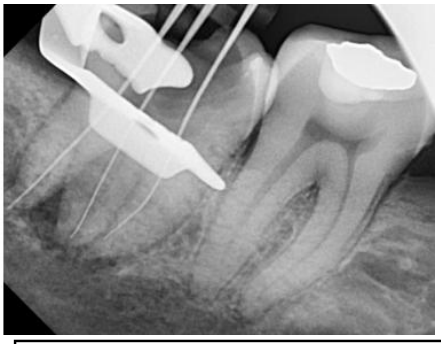

Figure 2: Working length determination with tooth 48

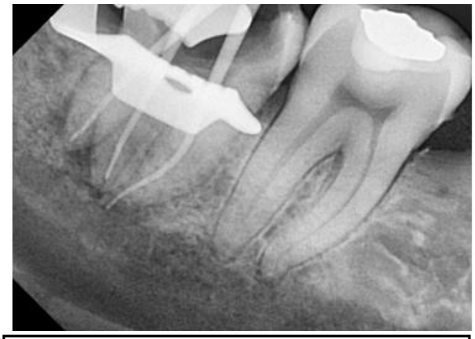

Figure 3: Master cone Iopa radiograph with tooth 48

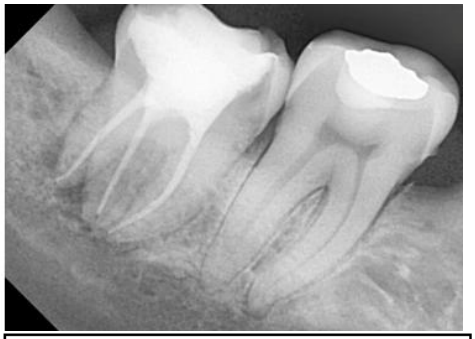

Figure 4: Post-obturation Iopa radiograph with tooth 48

III. Case Report 2

A 25-year-old female patient was referred to the Department of Conservative Dentistry and Endodontics with the chief complaint of continuous dull pain in the lower left mandibular second molar tooth. An intraoral and radiographic examination revealed a deep carious lesion approaching the pulp in the right mandibular second molar. After anaesthetizing the tooth, endodontic access cavity preparation was done using an Endo Access bur, and mesiobuccal, mesiolingual, and distobuccal orifices were located with a DG 16 endodontic explorer (Hu-Friedy, Chicago, IL). Canal patency was established using a #10 K file. Radiographic length determination showed a separate distal root, identified as a RE (radix entomolaris), and working length was determined by intraoral periapical radiograph, which was verified by electronic apex locator (PropexII; Dentsply, Maillefer). Root canal instrumentation was performed with ProTaper Ni-Ti rotary files (Dentsply Maillefer, Tulsa) using a crown-down technique upto F1 size for the mesial canals and F2 size for the distal canals. After each instrumentation, the root canals were disinfected with 3% sodium hypochlorite solution and saline solution simultaneously. After completion of biomechanical preparation, a closed dressing was applied. On recall after a week, the patient was asymptomatic. Root canal obturation was done with corresponding protaper gutta-percha cones (Dentsply Maillefer) using AH Plus resin sealer (Dentsply, Maillefer). A postoperative radiograph was taken and subsequently.

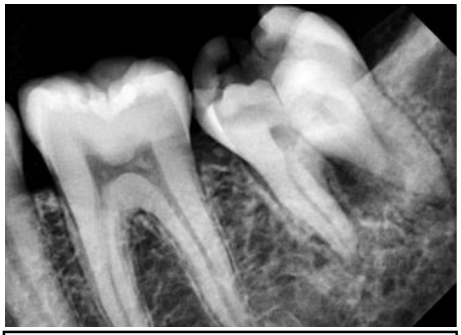

Figure 5: Preoperative radiograph of radix with tooth 37

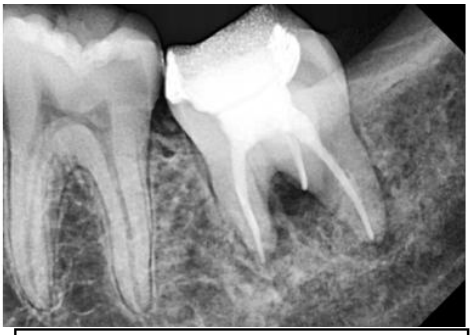

Figure 6: Post-obturation Iopa radiograph with tooth 37

IV. Case Report 3

A 21-year-old female was referred for endodontic treatment of the mandibular right first molar with irreversible pulpitis. Root canal treatment in 46 was initiated under rubber dam isolation, following local anesthesia. An access cavity was prepared, four distinct canal orifices were found, and they were coronally enlarged with an orifice opener. Initial negotiation of the root canals was performed with a K-file #10. The lengths of these canals were measured radiographically and verified using an apex locator. The canals were cleaned with 2.5 % sodium hypochlorite solution and Glyde (Dentsply Maillefer), and shaped with Protaper gold rotary files with crown-down technique. All canals were obturated using bioceramic sealer.

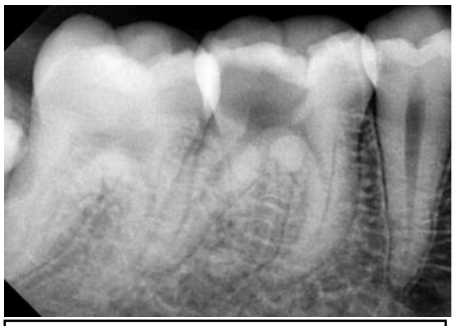

Figure 7: Preoperative radiograph of radix with tooth 46

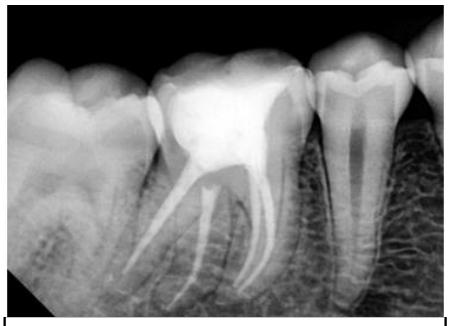

Figure 8: Post-obturation Iopa radiograph with tooth 46

V. Discussion

To achieve the best endodontic outcome of these radix entomolaris molars, it is utmost necessary to have a sound clinical approach as described by Calberson et al. Thorough knowledge of the presence of extra root and its orifices, analyzing with periodontal probing for cervical morphology, presence of an extra cusp or more prominent distolingual lobe in combination with a cervical prominence. Use of an angled radiograph (SLOB technique) to identify an additional root that appears as a shadow or a thin radiolucent line in the radiograph, and use of advanced radiographic technology such as Cone Beam Computed Tomography (CBCT) are ways to identify this morphological variant. The identification and external morphology of these root complexes, containing a lingual or buccal supernumerary root, are described by Carlsen and Alexandersen.

Morphology

Carlsen and Alexanderson classified radix entomolaris (RE) based on the location of its cervical part into four types:

Type A– Distally located cervical part with two normal distal root components.
Type B– Same as Type A; however, only one normal distal root component.
Type C– Mesially located cervical part.
Type AC– Between the mesial and distal root components.

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

Type I– Refers to a straight root/root canal.
Type II– Refers to an initially curved entrance that continues as a straight root/root canal.

Type III– Refers to a first curve in the coronal third of the root canal, followed by a second curve which is buccally oriented, initiating from the middle to the apical third.

Recently, ***Wang et al.*** gave another classification for RE depending on its radiographic appearance.
Type 1– Presents the most identifiable radiographic image
Type 2– A large beam angulation is necessary mesially or distally for their identification
Type 3– Merging of the adjacent distobuccal root makes identification extremely difficult.

The radix entomolaris is located distolingually, with its total or partial coronal third fixed to the distal root. The dimensions of the radix entomolaris varied from a short-tapered extension to a mature root with normal length. In most cases, the pulp extension is radiographically visible. Generally, the radix entomolaris is smaller than the disto- and mesiobuccal roots and may be separated from the other roots or partially fused to them. Visual magnifications, such as magnifying glasses and operating microscopes, as well as the use of computed tomography, are important tools for the identification of extra canals by clinicians.

VI. Conclusion

Every effort should be made to investigate the presence of extra canal orifices and unusual canal morphologies. This is possible through a thorough understanding of root canal anatomy, a proper interpretation of the radiographs, and a careful inspection of the pulp chamber under suitable magnification. All of this would help in avoiding or overcoming any procedural errors during root canal therapy, thus reducing the incidence of retreatment.

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