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Endodontic Management of Abnormal Mandibular Molars: Radix Entomolaris

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ABSTRACT :

Successful dental practise requires an understanding of the tooth's surface and interior anatomy. Dental treatments are complicated by the frequent occurrence of tooth anomalies. Mandibular first molars are susceptible to anatomical malformations just like any other tooth. Extra distolingual roots are one example of an anatomical variation. Radix entomolaris (RE) is the name given to this distolingual root. Endodontic therapy may be complicated by the existence of an extra root. For this excess root to be found and to avoid misinterpretation, which can lead to an unfavourable outcome, proper diagnosis is essential. This article's goal is to report the effective treatment of two instances that presented with RE.

Keywords : Radix entomolaris, distolingual root, endodontic treatment

Introduction :

The best option for salvaging a tooth with pulpal involvement and symptoms is root canal therapy. A thorough cleaning and shape of the root canals as well as the provision of a three-dimensional obturation that is fluid and bacterial impermeable are necessary for a successful endodontic procedure. However, changes in the structure of the root canals can make root canal therapy more difficult. Therefore, thorough understanding of the various root canal anatomy is essential for successful endodontics.

The mandibular first molar is susceptible to abnormalities and anomalies in its development, much like any other tooth in the oral cavity. First molars on the mandible typically have two roots: mesial and distal. The most prevalent variation, which is frequently described in the literature, is the appearance of a third root. This additional root is known as radix paramolaris if it is positioned mesiobuccally and as radix entomolaris (RE) if it is located distolingually.[1] Carabelli was the first to describe this.[2]

In comparison to the mesial and distal roots, the radix entomolaris is typically shorter and curved. It can also appear individually or fused with the remaining root, which could make diagnosis and treatment more challenging.[3]

Based on the placement of RE's cervical part into four types—A, B, C, and AC—Carlsen and Alexandersen categorised RE into four categories in 1990. Cervical sections with two normal distal roots and one normal distal root, respectively, are referred to as Types A and B. Type C refers to the cervical portion that is medially positioned, whereas Type AC refers to the cervical portion that is between medially positioned and distally positioned.

De Moor et al. categorised RE into the following categories in 2004 based on the root/root canal curvature:[4]

Type 1: a single, straight root and/or root canal.

Type 2: the existence of a coronal third that is bent but appears straighter in both the middle and apical thirds.

Type 3: curvature in the coronal third with the curve beginning in the middle or apical third and orientated buccally.

In 2010, Song et al. categorised two new forms of RE:

Small type: RE root length that is less than 50% of the distobuccal root's length.

Conical type: longer RE rootless type than tiny type with no internal root canal.[5]

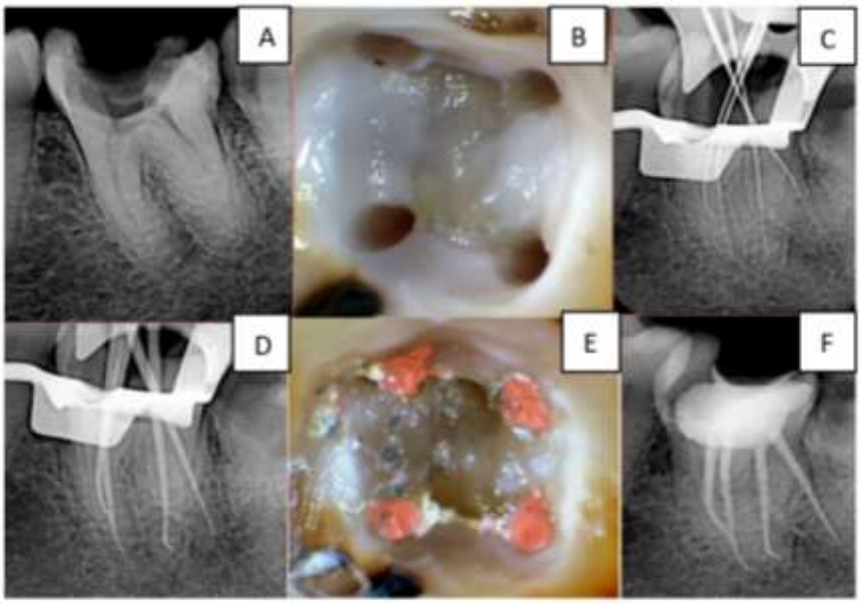
RE preference is influenced by both genetic and ethnic factors. 5% of the population of Eurasians, Indians, White Caucasians, and Africans have RE roots. It affects races including Native Americans, Eskimos, and Chinese, with a prevalence of 5–30%.[6] The diagnosis and treatment of RE are crucial

for a successful treatment, regardless of the observed variances in prevalence. In this paper, a case series on the diagnosis and treatment of RE in mandibular molars is presented.

Case 1 :

A 25-year-old female patient complained of pain near the left mandibular back teeth when she visited the conservative dentistry and endodontics department. It was a terrible throbbing pain that was brought on by food impaction. The extraoral examination indicated a slight edema in the left mandibular region, which was painful to the touch. An intraoral examination of tooth number 36 revealed a grossly decayed by dental caries with a small increase in mobility. The tooth's test for pulp sensitivity to heat and electricity came back negative.

Radiographic analysis revealed the presence of an additional root between the mesial and distal roots. In order to determine whether the extra root is on the buccal or lingual side, angulated digital radiographs were taken. It was established that the extra root was situated in the lingual aspect and hence RE by applying the same lingual opposite buccal rule. It was determined that the tooth had symptomatic apical periodontitis. The endodontic procedure was explained to the patient as an effort to save and save the tooth. It was agreed to move through with endodontic therapy because the patient was willing to have the tooth saved.

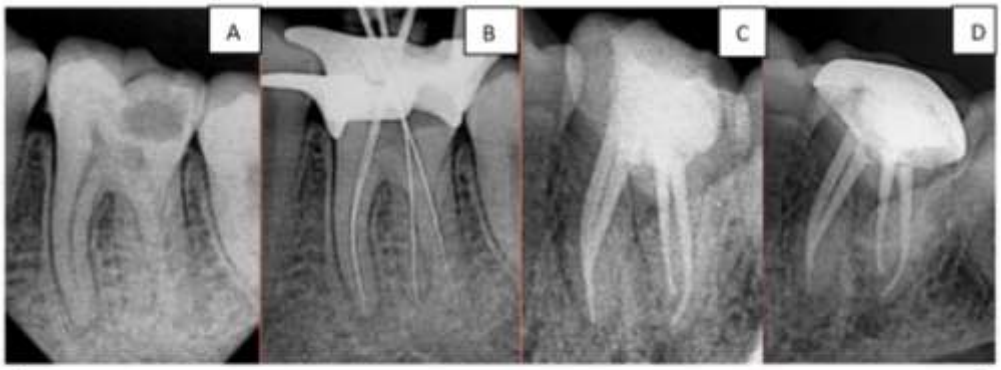


A: Pre operative radiograph, B: Root canal orifices, C: Working length determination, D: Master cone, E: Obturation, F: Post operative radiograph

A rubber dam was put in place after local anaesthesia. Caries was excavated. A fissure bur with a round and safe-end tapered end was used to prepare the access cavity. The pulp chamber's ceiling was completely moved, and two mesial canal orifices and one distal orifice were discovered. The distal root canal's aperture was where the RE's orifice was situated on the lingual side. The working lengths were calculated electronically using the Propex II apex locator from Dentsply/Maillefer in Ballaigues, Switzerland. The apex locator values were then radiographically confirmed. The root canals were thoroughly cleaned and shaped while being irrigated with a 2.5% sodium hypochlorite solution. After that, EDTA was used to rinse the canals and finally rinsed with normal saline. The four canals were prepared up to F2 ProTaper files. The access cavity was temporarily sealed with a temporary repair (Coltene AG, Altstatten, Switzerland) and the root canals were medicated with a calcium hydroxide dressing (Endocal, Albuca, Montreal, Canada). The root canals were obturated one week later. The four canals' equivalent sized gutta-percha master cones were initially chosen, and it was positioned in the canal. AH Plus sealant was applied for sealing. After obturation the tooth was restored with composite resin.

Case 2 :

An outpatient department referral for a male patient, age 29, whose main complaint was pain in the lower left first molar (#36). The patient has been experiencing sporadic and inchewing pain for a week. On inspection, #36 had severe cavities over the occlusal surface, and there was discomfort to the touch and vertical percussion. Thermal testing revealed no response, and electricpulp testing revealed delayed reading. A second distal root was visible and radiographic evaluation revealed periapical radiolucency in connection to the distal root. It was determined that the patient had symptomatic apical periodontitis, and endodontic therapy was started.



A : Pre operative radiograph, B : Working length determination, C : Post operative radiograph, D : Crown cementation

In order to give local anaesthesia, 2% lignocaine and 1:1,000,000 epinephrine were combined. To prepare the access cavity, a Dentsply Maillefer endoaccess bur number 2 was employed. The orifices of the distal and mesial canals were initially recognised. After altering the access cavity, a second distal canal was located lingual to the first distal canal using an Endo-Z bur (Dentsply, Maillefer). Canal negotiation done by #10 k-file .Working length measurement was carried out with the aid of an apex locator (J Morita Root ZX Mini, Tokyo, Japan) and confirmed with periapical radiograph. Hyflex CM (Coltene Whaledent, USA) was used for cleaning and shaping treatments up to 25/0.04 for the mesial and distal canals, with irrigation using 3% sodium hypochlorite (Parcan Septodont, India) and 17% EDTA in between. The canals were treated intracanally with calcium hydroxide (Metapex, Metabiomed) and then temporarily restored with Cavit (3M ESPE, Germany).

One week later, the patient was summoned back and had no symptoms. Calcium hydroxide was removed under rubber dam isolation by irrigation with normal saline. 2% chlorhexidine (Asep-RC, Anabond, India) was used for the final irrigation. After drying the root canal with paper points, Master cones were selected, followed by obturation with gutta-percha and Sealapex root canal sealer (Kerr, Romula, Michigan, USA) and Composite resin was used for the post-endodontic restoration.

Discussion :

For dental practise and for identifying/treating anthropologic characteristics, understanding tooth and root canal anatomy is crucial. Permanent mandibular first molars typically have three root canals and two roots positioned mesially and distally, however differences in the number of roots and in the architecture of the canals are common.[7] A clinical examination may reveal signs of RE, including an additional cusp, a large distolingual lobe, a bulbous crown, cervical convexity, and a complicated exterior contour of the fusion. On a radiograph, the appearance of a double image of the periodontal ligament or a difficult-to-see distal root and root canal also indicates the existence of RE.

During endodontic therapy, variations in the root configuration can provide challenges. Due to overlapping of the distal root with orthograde radiographs, RE is frequently difficult to diagnose. Only a careful connection between the clinical and radiographic examinations can identify RE. The existence of any ambiguous variations in the radiographs, as well as a comprehensive review of the preoperative radiographs, may suggest RE.

The management of RE may benefit greatly from cone beam computed tomography, as it offers a three-dimensional image of the extra root's length and location.[8] Because of the overhanging dentine, finding the extra canal opening may be challenging. Endodontic failure could result if the orifice is not discovered, the root canal is left untreated and infected, or if necrotic tissue remnants are left in the root canal. To more effectively locate and access the root canal with the distolingually positioned orifice of RE, the traditional triangle access cavity must be changed to a trapezoidal shape.

In order to identify canal orifices during treatment procedures, adjunctive devices including dental loupes, dental operating microscopes, and intraoral cameras are helpful. Methods like looking at the dentinal map, locating canal bleeding spots, using tools like the DG-16, pathfinder, ultrasonic tips, and micro-opener, staining the pulp chamber floor with 1% methylene blue, and the champagne bubble test all aid in locating a missed canal.[9]

Entomolaris roots have a moderate to sharp curvature, particularly in the buccolingual direction, which makes cleaning and shaping difficult and increases the risk of instrument separation, furcal or strip perforation, vertical root fracture, canal straightening, ledge formation, loss of working length, and root canal transportation. Therefore, more attention should be given during orifice enlargement, cleaning, and shaping during endodontic procedures. To avoid procedural errors, flexible nickel-titanium rotary tools with less taper must be utilised during chemomechanical preparation, and 10 K-file or smaller files should be favoured during initial canal negotiation.

Conclusion :

Clinical professionals could be helped in avoiding misdiagnosis and ensuring a successful treatment outcome by having a thorough understanding of the internal architecture of the root canal system and its most common variants. The supernumerary distolingual root of the radix entomolaris is distinctive for being short and typically having a noticeable curve. Iatrogenic errors are therefore common, including misinterpretation of this variation and technical issues with cleaning and shaping including ledge formation, perforation, and instrument separation. Therefore, from the time of diagnosis to the end of the treatment procedure, extreme care should be exercised.

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