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Case Report

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Radix entomolaris in permanent molars: Report of two cases

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Abstract

Molars are frequently affected by caries among children and adolescents. An efficient endodontic intervention is crucial for their successful preservation in oral environment. Proper knowledge of the internal anatomy of a tooth is the stepping stones for successful treatment outcome in regular endodontic practice. Improper diagnosis with inaccurate treatment planning often result a failure in case of molars with extra roots leading to early tooth loss and development of inevitable functional, esthetic, and psychological problems. Though anatomical variation of tooth morphology is common, incidence of an extra lingual root distally in case of mandibular molars i.e. Radix entomolaris is relatively rare. In this article, two case reports of endodontic management of Radix entomolaris (RE) are presented.

Keywords: Endodontic treatment, Extra root, Mandibular molar, Radix entomolaris.

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INTRODUCTION

Success of endodontic treatment was originally based on the triad of thorough debridement, adequate disinfection and a fluid impervious obturation. The broader principles include accurate diagnosis and treatment planning which is based on thorough knowledge of the anatomy and morphology of the root canal system. The dental pulp has a variety of configurations and shapes. Hence meticulous information of internal root anatomy of a tooth including variations such as extra roots, additional canals, fins, isthmuses and webs, is mandatory for better result.

"Radix entomolaris" (RE), an extra third root of mandibular first molar located distolingually, was first identified by Carabelli in 1844 and is notified by different terminologies, e.g. "extra third root", "distolingual root" or "extra distolingual root." [1] Radix paramolaris (RP) located in mesiobuccal position was first described by Bolk in 1915 [2]. The pathogenesis and etiology of RE/RP development is still not well understood. Literatures suggest that, the incidence in dysmorphic roots might be due to external factors during the stages of odontogenesis, or could be related to polygenetic system or penetrance of an atavistic gene. In case of eumorphic roots, the expression of a particular gene is thought to be enhanced by racial genetic factors resulting in more pronounced phenotypic character [3]

It has been reported that in Africans RE is observed with a maximum frequency of 3% [4] whereas in Indian and Eurasian populations the frequency is lower than 5% [5]. Mongoloid traits like American Indians, Eskimo and Chinese, have a frequency ranging from 5-30%[4,5,6] Owing to its high rate of prevalence, RE is considered as a normal morphological variant in these populations (Eumorphic root morphology). A low frequency of 3.4-4.2% has been documented in Caucasians.[7].Maximum frequency of occurrence of RE has been observed in the first mandibular permanent molar (7.4%), followed by third molars (3.7%) with a least frequency reported on the second molar (0%) [8].The presence of RP root variant is extremely rare, hence less documented than the RE. In this case report a successful endodontic management of two cases with unusual root configuration of first mandibular permanent molars has been discussed.

CASE REPORTS

Case 1: A 13 year old female patient reported to the pedodontia out patient department with mild pain on right lower back tooth region. On clinical examination, it was found that permanent right mandibular first.

molar (tooth # 46) was pulpally exposed which was further supported by radiographic interpretation. Interestingly, on examination of the periapical radiograph it was revealed that there was presence of an additional root distally. Following the same lingual opposite buccal rule (SLOB technique), the location of the extra root was confirmed in the lingual aspect. On completion of thorough case evaluation it was planned to perform root canal treatment of affected molar followed by semi-permanent full coronal restoration. After obtaining written parental consent, endodontic intervention was started on the first day. Administration of local anesthesia was done using 2% lidocaine with1:80,000 epinephrine) followed by rubber dam isolation. After access cavity preparation of tooth # 46, a K-Flex file ISO 15 (Dentsply Malliefer) was used to locate and negotiate four distinct canal orifices .Working length determination was done by an apex locator (Root ZX) and additional confirmation was done by periapical radiograph. In the next appointment, a thorough biomechanical preparation (BMP) was done with ProTaper files (Nickel-titanium rotary instruments, Dentsply, Maillefer) .Copious irrigation with sodium hypochlorite of concentration 2.5% and saline was done from time to time and thorough lubrication with EDTA was also performed before inserting each file into the canal. Mesiobuccal and mesiolingual canals were enlarged up to F2 ProTaper files (Dentsply, Maillefer, Ballaigues, Switzerland) and the distal canal was enlarged up to F3 ProTaper file. As the radix root was narrow, curved and difficult to negotiate, it was enlarged only up to F1 ProTaper file corresponding to a tip size of ISO 20. Calcium hydroxide dressing was placed inside each canal as intracanal medicament for one week and the access cavity was temporarily sealed with a fluid impervious temporary restoration (Cavit,3M, USA).On the next appointment after 7 days, the tooth was asymptomatic and obturation was done with gutta-percha (GP) and zinc oxide eugenol (ZOE) sealer. Post operative radiograph was taken to confirm the obturation. A permanent restoration with amalgam was done after 7 days and post operative instructions were given. Follow up advised at 6 month intervals for necessary checkup. [Figure-1]

Case 2: A 10 year old female patient reported to the pedodontia outpatient department with severe throbbing pain in left lower back tooth region. The extra-oral examination revealed mild swelling in the left sub-mandibular region which was tender on palpation. Intraoral examination revealed a grossly carious left mandibular first permanent molar (Tooth # 36). Antibiotic and analgesics were prescribed after evaluation of the clinical condition. After 7 days, the swelling subsided and RE was found in intra-oral periapical radiograph of 36 as an incidental finding. There was no periapical lesion or inter-radicular radiolucency suggesting a short term treatment plan with good prognosis. The possible treatment planning was explained to the patient and parent and consent was taken. On the first appointment, working length was determined after access cavity preparation. BMP was done upto size 20 K file followed by rotary NiTi Flex and intra canal calcium hydroxide dressing was given for 7 days. On the 7th day, obturation of the four canals was done with gutta percha (GP) and ZOE sealer. On the same appointment the coronal sealing was done with amalgam and post-operative instructions with follow up advised. [Figure- 2]

DISCUSSION

Endodontic treatment should aim at meticulous chemical and mechanical debridement of the pulpal tissue, followed by a fluid-impervious obturation to achieve a hermetic seal. Successful treatment of RE/RP pose a great challenge, as incomplete extirpation of the necrotic pulp tissue can lead to treatment failure. RE is often missed during diagnosis because of overlapping by the distal root with orthograde radiographs. The presence of 'invisible' RE can be assessed by thorough examination of the preoperative radiograph. Certain unique features like unclear hazy outline or view of the distal root are highly suggestive of RE. According to Ingle *et al*. (2002) a meticulous radiographic assessment of the involved tooth is recommended. Initial exposure should be from the standard buccal-to-lingual projection. The second projection is recommended at 20° angulation from the mesial, and the third one should be 20° from the distal so as to obtain every minute detail regarding the anatomical variations of the involved tooth [9]. Intraorally, an additional cusp (Tuberculum paramolare) or a cervical convexity that is detected by probing is suggestive of RE. Modern diagnostic aids such as Cone beam computed tomography (CBCT) is ideal in the management of RE as it provides a three dimensional view of the extra root, its morphology, and exact location [10].

Access cavity preparation for teeth with RE should be modified from a classical triangular shape to a trapezoidal shape. This modification helps to locate the additional canal orifice that often hidden under the overhanging dentin. Therefore complete deroofing is essential and should be done following the dentinal map. Based on the curvature of the root or root canal **De** Moor *et al*. (2004) [11] classified radix entomolaris into three types: Type 1: a straight configuration of root or root canal. Type 2: a curvature in coronal third with straighter configuration in the middle and apical third in the root. Type 3: RE with two curvatures on both coronal and middle third. A severe root inclination or canal curvature can cause procedural errors resulting in loss of working length.

Usage of flexible Ni-Ti rotary files has been recommended by Calberson *et al*. (2007) to achieve a more centered drawing up shape of the canal with minimal enlargement of the coronal one third and orifice relocation[12].Whatsoever, unexpected complications (like instrument separation) happen and are more common in RE owing to slender root canals or severe curvature . Therefore, after relocating and enlarging the canal orifice of RE, Calberson *et al*. (2007) recommended initial exploration of the root canal with small sized files (size 10 or less) prior to working length determination of the curved root. There after glide path has to be created before preparation so as to minimize the chances of procedural errors. In case of RP, the access cavity shape is modified by extending the cavity in mesiobuccal direction thereby modifying the shape from triangular to rectangular or trapezoidal form for better evaluation and negotiation of the canal of this extra root. The precautions and procedure for RP remains the same as in RE during endodontic intervention.

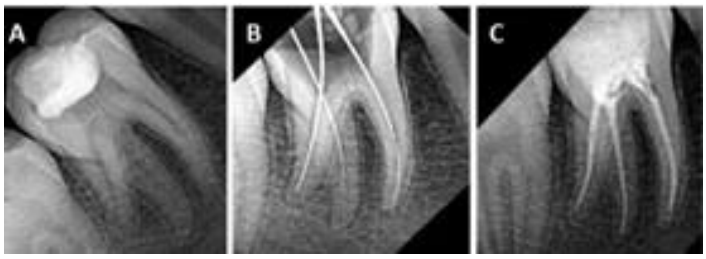

Figure 1: Endodontic treatment of 46: A. Pre-operative radiograph showing RE, B. Per-operative radiograph with diagnostic GP, C. Post-operative radiograph with three obturated canals

Figure 2: Endodontic treatment of 36: A. Pre-operative radiograph showing extra root, B. Post-operative radiograph with four obturated canals

CONCLUSION

As the saying goes, “The eyes can’t see what the mind doesn’t know”, we can never diagnose an extra root unless we have meticulous knowledge about the anatomic variants of the tooth. Therefore a basic concept about prevalence of extra root variants in both primary and permanent molars during their routine endodontic and exodontic procedures is necessary for dental surgeons for successful treatment outcome. It is necessary to locate all root canals as missed canals act as a nidus for infection and complicate the treatment outcome. Thus, for accurate diagnosis of RE/RP, supportive investigations are advisable to be aware of the existence of additional roots.

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Conflict of Interest

The authors declare no conflict of interest.

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