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CASE REPORT

Third Root (Radix Entomolaris) In Permanent Mandibular First Molars in Pediatric Patients – An Endodontic Challenge

NB Nagaveni[1], KV Umashankar[2], NB Radhika[3], TS Satisha TS[4]

ABSTRACT

The study of root and root canal anatomy of molars in children is important for pediatric practice successfull. Normally the permanent mandibular first molar has two roots, one mesial and the other distal. Rarely an additional third root is seen, which is found distolingually and called as Radix Entomolaris. This extra root is typically smaller than the distobuccal root and is usually curved, requiring special attention when root canal treatment is being considered for such a tooth. The aim of the present paper is to present two cases of permanent mandibular first molars with an additional third root.

Keywords: Distolingual root; Radix Entomolaris; Three-rooted mandibular first molar; Anatomic variations

[1]MDS
Senior Lecturer,
Department of Pedodontics & Preventive Dentistry,
D.J. College of Dental Sciences and Research
Modinagar – 201204, Uttar Pradesh,
India

[2]MDS
Associate Professor
Department of Oral and Maxillofacial Surgery
D. J. College of Dental Sciences and Research
Modinagar – 201204, Uttar Pradesh,
India

[3]MDS
Department of Orthodontics and Dentofacial Orthopedics
Krishna Institute of Dental Health Sciences,
Karad, Maharashtra,
India

[4]MDS
Resident
Department of Periodontics
Armed Forces Medical College,
Pune, Maharashtra,
India

Contact Author

Dr. NB Nagaveni
E-mail: nagavenianurag@gmail.com

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INTRODUCTION

A thorough understanding of root canal anatomy and morphology is required for achieving high level of success in endodontic treatment. Failure to recognize variations in root or root canal anatomy can result in unsuccessful endodontic treatment. Hence, it is imperative that the clinician be well informed and alerted to the commonest possible variations. The majority of mandibular first molars are two-rooted with one mesial and one distal root with two mesial and one distal canal. The major variant in this tooth type is the presence of an additional third root: a supernumerary root is found lingually (referred as distolingual root). This rare macrostructure, which is first mentioned in the literature by Carabelli (1), is called Radix Entomolaris. One of the main reasons for failure of root canal treatment and even tooth loss of molars in young pediatric clients is because of incomplete removal of pulp tissue and microorganisms from all the root canals(2).

Radix Entomolaris appears to be commonly present in races of Mongoloid origin, including Malay (3), Japanese (4), Eskimo (5), American and Canadian Indians (6, 7), and Chinese (8) in various countries. The prevalence varies in different races and populations, and can range from about 3% in the Caucasians (9), to about 20% in the Mongoloid groups (6).

CASE REPORT NO. 1

A 13-year-old male patient reported to the Department of Pediatric Dentistry, College of Dental Sciences, Davangere, complaining of pain in the left lower back tooth. On clinical examination, secondary carious lesion and temporary filling in the permanent mandibular left first molar was found. The tooth was sensitive to percussion, but there was no referred pain. Periapical radiograph was taken from mesial angulation, which revealed presence of an additional distolingual root, which was curved and shorter than the main distal root (Figure 1). Based on the literature evidence this supernumerary distolingual root was diagnosed as Radix Entomolaris. The tooth was anesthetized. The pulp chamber was opened. When the floor of the pulp chamber was reached, three canals orifices were initially identified. On further exploration, a second distal and more lingually located canal was found. The four canals were coronally enlarged with Gates Glidden drills. To have proper location of orifice, and straight line access of this third

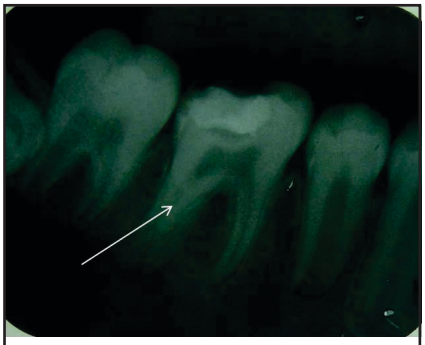

Figure 1: Preoperative radiograph taken with mesial (30⁰) angulation showing additional distolingual root (Arrow)

root, access cavity was modified from conventional triangular to trapezoidal form with more extension to lingual side. Initial negotiation of the root canals was performed with a K-file ISO 15. Although the coronal enlargement and relocation of the canal orifices allowed straight-line access in three (2 mesial, 1 distal) canals, insertion of the file in the fourth, distolingual canal showed a more lingually oriented access inclination. Radiographic length measurement was performed (Figure 2). All canals were prepared in crown – down method. After canal preparation, root canals were irrigated with 2.5% sodium hypochlorite solution. The gutta-percha cone fit, with radiographical exposure 30 degrees from the mesial, confirmed the presence of third root (RE) (Figure 3). The root canals were filled with gutta-percha and opening cavity was sealed with amalgam restoration (Figure 4). After one year follow up, there was no change in the

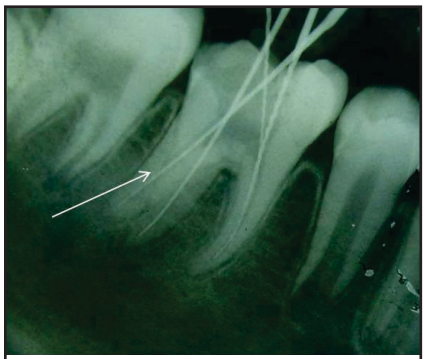

Figure 2: Photograph of working length determination. Two separate distal roots can be distinguished when a radiograph is exposed 30⁰ from mesial arrow

Figure 3: Radiograph of gutta-percha cone fit

root canal treated 36 both clinically and radiographically.

CASE REPORT NO. 2

A 12-year-old boy was referred for endodontic treatment of the permanent mandibular left first molar. On periapical radiographic examination (taken without angulation), only two roots were visible; one mesial and the other distal root (Figure 5). Pulp chamber was opened, and one distal and two mesial canal orifices were located and root canals were explored with a K-file ISO 15. Working length was determined and the three root canals were enlarged by crown –down method and finally filled with gutta-percha followed by permanent restoration. Six months later, patient reported back with a complaint of severe pain in the root canal treated 36. Clinical examination revealed vestibular obliteration and tenderness in relation to the same tooth. Failure of root canal treatment was confirmed on radiographic examination. The tooth was extracted under local anesthesia. After extraction when the tooth was examined, an additional distolingual root (RE) was found, which was not evident on any one of the previous radiographs taken during root canal treatment, because conventional radiographs (radiographs taken without mesial angulation) were taken without the knowledge of possible existence of extra third root. The third root was superimposed with the main distal root and hence missed for the treatment (Figure 5). After extraction, the distolingual root was examined in detail from all aspects (Figure 6). The extra root was placed in the same transverse plane as the other two roots. It was slender, conical in section, mature, divergent and almost curved at the apical end towards the distal root and it was shorter than the two main roots (Figure 6). It was assumed that, undetected and untreated distolingual root has caused the recurrence of infection in this case.

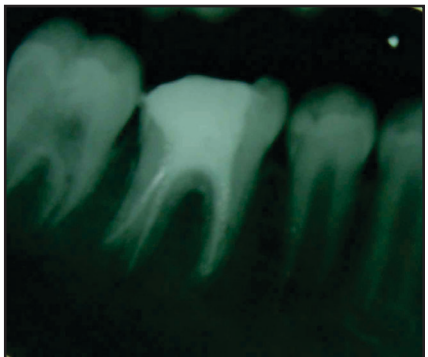

Figure 4: Postoperative radiograph of Radix Entomolaris

DISCUSSION

Anatomic variations of permanent mandibular molars are documented in the literature. Nonetheless, variations of the number and anatomy of the roots and the root canals in permanent mandibular fist molars are not appreciated by a great number of pediatric dentists compared to endodontists. The third distolingual root (RE) in mandibular molar teeth, with an incidence ranging from 0.9 to 20% is possible in some populations (3-9). Thus the pediatric dentists must be aware of this anatomic root variation when diagnosing and managing any pathology associated with the permanent mandibular first molar with a Radix Entomolaris especially during endodontic treatment.

The RE is located distolingually, with its coronal third completely or partially fixed to the distal root. The dimensions of the

Figure 5: Radiograph taken without mesial angulation showing only two roots (Case 2)

Figure 6: Photograph of extracted mandibular first molar with Radix Entomolaris (arrows) from different views.

RE can vary from a short conical extension to a 'mature' root with normal length and root canal. In apical two thirds of the RE, a moderate to severe mesially or distally oriented inclination can be present (10).

The presence of third root (RE) has clinical implications in endodontic treatment. An accurate diagnosis of this supernumerary root can avoid complications or a 'missed canal' during root canal treatment. Because the RE is mostly situated in the same buccolingual plane as the distobuccal root, a superimposition of both roots can appear on the preoperative radiograph, resulting in an inaccurate interpretation of particular marks or characteristics, such as an unclear view or outline of the distal root contour or the root canal, can indicate the presence of a 'hidden' RE. To reveal the RE, a second radiograph should be taken from a more mesial or distal angle (30 degrees) (10).

Predictably successful root canal treatment is dependent on following the basic principles: access, cleansing and shaping, and obturation of the entire root canal system. Of the three, perhaps the most important is the principle of 'straight-line' access (10). It should be emphasized that the ultimate objective of endodontics is to provide access to the apical foramen and not merely to locate the canal orifice. The location of the orifice of the root canal of the RE has implications for the opening cavity also. With the distolingually located orifice of the RE, a modification of the classical triangular opening cavity to a trapezoidal form in order to better locate and access the root canal is essential; straight line access in this respect, has to be emphasized as majority of Radices Entomolaris are curved.

Other clinical difficulties envisaged would relate to extraction and orthodontic procedures, where the extra root would render extraction difficult and possible fracture of the distolingual root, because of its curvature and movement difficult because of its presence.

CONCLUSION

Pediatric dentists should be aware of this extra root in permanent mandibular first molars in all children. The initial diagnosis of third root before root canal treatment is important, to facilitate the endodontic procedure and to avoid 'missed canals' and treatment failure. Proper angulations and interpretation of radiographs help to identify number of roots and morphology. During access opening, conventional triangular cavity must be modified to a trapezoidal form, in order to locate and access the distolingually located orifice of the additional root and the possible misinterpretation of the extra third (distolingual) root during root canal treatment by paediatric dentists, may contribute to the high molar extraction rate in children.

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