Radix Entomolaris and Paramolaris in Deciduous Dentition: A review and clinical approach in Paediatric Dentistry

1. Dr. Keyura Parakh, Associate Professor, Department of Pedodontics and Preventive Dentistry, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh. E-mail: keyuraparakh@gmail.com

2. Dr. Nagarathna PJ, Professor and Head, Department of Pedodontics and Preventive Dentistry, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh. E-mail: drsiddhu4@gmail.com

3. Dr. Anushka Deoghare, Associate Professor, Department of Pedodontics and Preventive Dentistry, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh. E-mail: dranushkadeoghare@gmail.com

4. Dr. Rashi Dubey, Assistant Professor, Department of Pedodontics and Preventive Dentistry, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh. E-mail: rashidubey0186@gmail.com

5. Dr. Neha Chhatani, Department of Pedodontics and Preventive Dentistry, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh. E-mail: nehachhatani1995@gmail.com

6. Dr. Sonal Rathi, Department of Pedodontics and Preventive Dentistry, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh. E-mail: drsonalrathi2904@gmail.com

Corresponding Author: Dr. Keyura Parakh, Email- keyuraparakh@gmail.com, Postal address: Kia’s Jain Dental Clinic, Basantpur, In front of Rathore petrol pump, Rajnandgaon, Chhattisgarh – 491441

Abstract

Paediatric dentistry, today, is not just limited to the dentition and the soft tissue structures that are easily visible but the branch has extended to discover various diversities that are not known commonly to all the clinicians. Such diversities remain undiagnosed and lead to treatment failure. A dentist can come across various such anomalies pertaining to the tooth structure during the clinical practice. Presence of an extra third root in mandibular deciduous molar is a good example of one such diversity that needs the lime light today. An additional third root can be found either mesiobuccally (Radix Paramolaris) or distolingually (Radix Entomolaris). A proper understanding and knowledge regarding the same can help a practitioner to provide...
a better quality of treatment to the child patient. In this paper we have discussed the prevalence
rate and clinical considerations in three rooted mandibular molars in Paediatric patients.

**Introduction**

The knowledge of tooth anatomy of deciduous dentition is as important as those of permanent
dentin. The deciduous molars are quite frequently affected by carious lesions. Hence, in-
order to perform a good endodontic treatment and save the tooth in the oral cavity till their
natural exfoliation time, there is a need for in-depth knowledge of the root canal anatomy and
its diversities that may complicate the endodontic procedure. If an extra root or an extra root
canal is left undiagnosed and untreated in cases of pulpectomy, it may cause severe pain and
discomfort to the child patient making them suffer functionally, aesthetically and
psychologically, and finally treatment failure. Hence, it is mandatory for each paediatric dentist
to have a thorough knowledge of the varieties of tooth morphologies that are present and can
affect the treatment outcome. Radix is one such unusual diversity that requires knowledge and
awareness in order to provide overall benefit to the child patient. In this article we have
presented two such cases reported in our clinic.

**Case Reports**

**Case 1:** A 4-year-old male patient came to our clinic with pain in lower left back tooth region
of the jaw. The pain was severe and intermittent in nature. The pain aggravates on chewing and
relieves on itself in some time. On clinical examination we found deep occlusal caries with 75
and deep disto-occlusal caries with 74. On radiographic examination we found a deep carious
lesion involving distal pulp horn in mandibular left first deciduous molar and deep occlusal
carious lesion involving coronal pulp in mandibular left second deciduous molar (Fig.1a). On
second look of the RVG image we noticed the presence of an extra root irt 75 in distolingual
direction. The tooth was diagnosed to be Radix Entomolaris. The treatment was started (for
only 75 on patient’s demand) with adequate local anaesthesia using inferior alveolar nerve
block, followed by access opening irt 75. The shape of the access cavity was extended in the
disto-lingual direction making it look like a trapezoid in order to gain access to the fourth canal
in the third extra root. The pulp was extirpated from all four canals using ISO No. 10 K-file
followed by biomechanical preparation using rotary NeoEndo Files (4% taper). After complete
cleaning and shaping, the canals were obturated with zinc-oxide eugenol paste. A postoperative
radiograph was taken to assess the complete filling of the canals (Fig.1b). After 1-week of
asymptomatic obturation, stainless steel crown was placed and patient was recalled for further
Case 2: A 7-year-old female patient reported to our clinic with a chief complain of pain for 3-4 days in the right lower back tooth region of the jaw. Pain was moderate and intermittent in nature. On intraoral examination we found a deep class II (disto-occlusal) carious lesion with respect to mandibular right deciduous first molar. Based on the chief complaint and history, RVG of 84 was taken (Fig.2a) and a provisional diagnosis of chronic irreversible pulpitis was given. Pulpectomy was planned for the same tooth under local anesthesia with strict sterilization protocol. We used tell-show-do technique of behaviour management for the patient. First the administration of local anesthesia using inferior alveolar nerve block was done, followed by caries removal and access opening using sterilized round bur. Canals (mesiolingual, mesiobuccal, distolingual and distobuccal) were explored using 10 no. K file. Since we found four canals, we were expecting an extra root in distolingual direction (Radix Entomolaris) but instead we found an extra root in mesiobuccal direction and hence we found that the tooth was Radix Paramolaris. Working length was taken and biomechanical preparation was done using Kedo-SH hand files. Then the canals were obturated using zinc-oxide eugenol paste (Fig.2b) followed by stainless steel crown placement.

Discussion
Mandibular molars have two roots (mesial and distal) and three canals (mesio-buccal, mesiolingual and distal) in general, but many cases have been found where there was presence of fourth canal disto-lingually. Such variations are common and important to understand for any successful endodontics treatment. One such variation is the presence of Radix Entomolaris and Paramolaris, an extra distolingual root and mesiobuccal root respectively, which has to be watched for during the pulp therapy procedures.

Radix Entomolaris (RE) was first mentioned in the literature by Carabelli in 1844, is the term used to describe the presence of an extra third root. It is also known as ‘extra third root’ or ‘distolingual root’ or ‘extra distolingual root’ depending on its position. Radix Paramolaris (RP) was first described by Bolk in 1915, and is the term used for extra ‘mesiobuccal root’. The etiology behind the formation of a supernumerary root is unknown, but the hypothesis behind this states that if during the development of a root, Herwigs epithelial sheath is folded or disrupted, it can lead to formation of an accessory/supernumerary root canal. This leads to the development of radix.

The prevalence of radix is calculated using various methods like IOPA radiographs,
extracted tooth, microcomputed tomography (CT scan) and cone-beam computed tomography (CBCT). Though the presence of an extra root in deciduous molars is not common but we have several case reports indicating the presence of radix in deciduous molars. Tratman reported that the presence of radix in deciduous mandibular first molar is rare having a frequency of less than 1% and common in the permanent dentition. He also reported that there were no cases found with radix in Indian and European children, whereas, 7.1% cases were found to have an extra root in second deciduous molars in Japanese children. Mayhall reported a case of radix in mandibular second deciduous molar in 1981, whereas, Badger mentioned a case of three rooted mandibular first deciduous molar in 1982.

Studies have shown that there is 15.2% of higher incidence rate is seen in the population of Mongolian origin (Japanese, Malaysian, Chinese, Thai, Eskimo, Aleutian, and American Indian). Gupta et al. reported 3 cases of three rooted mandibular first primary molar in Indian Population. Ramamurthy and Srinivasan reported two cases of bilateral three-rooted mandibular deciduous molars again in Indian children. Yang et al., reported the occurrence of radix with a prevalence of 27.52% in Chinese population, using cone beam computed tomography in deciduous second molars, whereas, Liu et al. reported the prevalence of radix in deciduous second molars to be 9% in Chinese population using vertical bitewing radiographs. They also found a bilateral incidence of 28% with a symmetrical distribution of radix molars. Srivaths reported two cases of three rooted deciduous mandibular molars in Indian children in 2014. Nagveni et al. reported two cases of Radix paramolaris in primary mandibular second molars in 2014 in Indian population. Rani et al. reported a case of unilateral Radix Entomolaris in primary first molar in a 6-year-old male patient. In our clinic we found one case of Radix paramolaris and one case of Radix entomolaris in deciduous first and second mandibular molars respectively.

Radix Entomolaris can be seen in all mandibular molars, with fewer occurrences in deciduous second molars. Frequency of radix on right side is common as compared to the left side with no gender variations. Falk and Bower in 1983 reported a case of bilateral radix in mandibular first deciduous molar. 50% to 67% of radix cases are seen bilaterally. Yadav et al. reported the presence of bilateral radix in mandibular deciduous first molar in a 14-year-old male Indian patient, where both the teeth were extracted due to over-retention of deciduous molars and delayed eruption of their succedaneous teeth.

Since now we know that the occurrence of radix is not uncommon, accurate diagnosis and treatment of such cases becomes our utmost priority. Hence, good clinical and radiographic examination should be performed before starting any pulp therapy procedure.
Changing the angulation while taking the radiograph (RVG) helps in revealing the presence of an extra root/the hidden third root in mandibular molars. Radiovisiograph was used in our clinic which helped in the identification of both Radix Entomolaris and Paramolaris cases. The technique of RVG is non-invasive and inexpensive.

When the occurrence of radix was confirmed on the radiovisiograph, the shape of the access opening was modified from the classic triangular shape to a more rectangular outline in case of Radix Entomolaris. We found two distal canals, distobuccal (main distal canal) and distolingual (radix canal), and the orifice of radix canal was found distal to mesiolingual canal. Hence a thorough inspection of the distolingual area in the pulp chamber is important to gain access to the extra third root and its canal. This helps in performing a successful endodontic procedure.

In case of Radix Paramolaris, the shape of the access cavity need not require much modification as the third root is located in the mesio-buccal direction. A standardized triangular shaped cavity was prepared and the radix canal orifice was found buccal to mesiolingual canal orifice. We found two distal canals (distobuccal and distolingual) in this case too but both the canals were present in a single distal root. In mesial root we found only one canal (mesiolingual canal) whereas, the mesiobuccal canal was present in the extra third root (RP). Though in cases of Radix Paramolaris presence of five canals is a common finding (two canals in mesial root and two canals in distal root and one radix canal), but in our case we found only four canals. Hence the presence of two distal canals and one extra root canal mesially in deciduous molars with RP can be expected and at times need to be cautiously examined for a successful endodontic therapy.

Also, the complicated morphology of deciduous molar roots along with this extra root makes the extraction procedure very difficult. Moreover, the developing premolar tooth is placed in the interradicular area of the primary molar. Therefore, during extraction procedure, we should make sure to save the developing tooth bud of the premolar carefully. Also, the clinician must examine the extracted tooth to ensure the removal of all the three roots.

Conclusion

General practitioners as well as Pedodontist should always be aware about the possibility of Radix Entomolaris and Radix Paramolaris while planning for any treatment. The presence of bilateral radix in deciduous molars, does present a clinical challenge to the dentist and should always be evaluated critically, especially during endodontics or extraction procedures for deciduous mandibular molars. A thorough knowledge of all the tooth
diversities, accurate radiographic interpretation, required access cavity preparation and a detailed exploration of the pulp chamber floor for an extra root canal is important for successful management of teeth.

Fig. 1a. Pre-operative radiograph irt 75  
Fig.1b. Post-operative radiograph irt 75 (RE)

Fig. 2a. Pre-operative radiograph irt 84  
Fig.2b. Obturation irt 84 (RP)

Conflicting Interest (If present, give more details): No conflict of interest

References


