

Radix Entomolaris And Paramolaris – Review, Clinical Management And Case Report

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Abstract: A clinician should have complete knowledge of anatomic variation of macrostructure and internal and external root canal anatomy. A successful endodontic treatment includes locating the root canal orifice, chemico-mechanical cleaning and shaping of root canals before a dense root canal filling with a hermetic seal. It is known that mandibular first molar can display significant anatomical variations namely as number of roots, number of root canals and morphology.

The presence of an additional root located lingually (the radix entomolaris) or buccally (radix paramolaris) has been reported some times in mandibular molars. However, in such a case, an awareness and understanding of this unusual root and its root canal morphology can contribute to the successful outcome of Root Canal Treatments. This case report demonstrates an extraordinary anatomical configuration and supplements previous reports of existence of such configuration in mandibular first molar. It discusses Endodontic treatment of two mandibular molars with Radix Entomolaris or paramolaris, the prevalence, the external morphological variations, and internal anatomy of the Radix Entomolaris and Paramolaris.

Keywords: Anatomical variations, Endodontic treatment, Mandibular molar, Root canal morphology Radix Entomolaris, Radix paramolaris.

I. INTRODUCTION

The main objective of Root Canal Treatment is thorough mechanical and chemical cleaning of the entire pulp space followed by complete obturation with an inert filling material. It is known that mandibular first molar can display several anatomical variations. An awareness and understanding of the presence of unusual root canal morphology can thus contribute to the successful outcome of root canal treatment. The majority of molars are two rooted with two mesial and one distal canal. A number of anatomical variations have been described in mandibular molars. Fabra -Campos (1, 2) and Bond (3) reported the presence of three mesial canals and Stroner (4) noted the presence of three distal canals. An additional third root, first mentioned in literature by Carabelli (5) is called the Radix Entomolaris (RE). This supernumerary root is located distolingually in the mandibular first molars. An additional root at mesiobuccal side is called the Radix

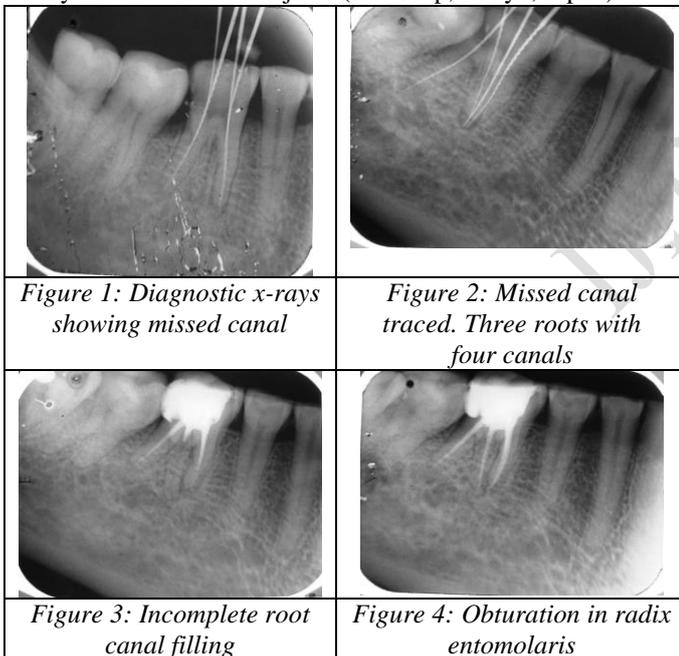
Paramolaris (RP). Skidmore and Bjrndal (6), Pineda and Kuttler (4) have all reported on the morphology of the mandibular first molar. These reports have shown that mandibular first molar have three or four canals.

In this report two such cases are presented. The prevalence, external morphological variations and internal anatomy of the radix entomolaris is described. The clinical approach to diagnosis and endodontic treatment are also discussed and illustrated.

II. CASE REPORTS

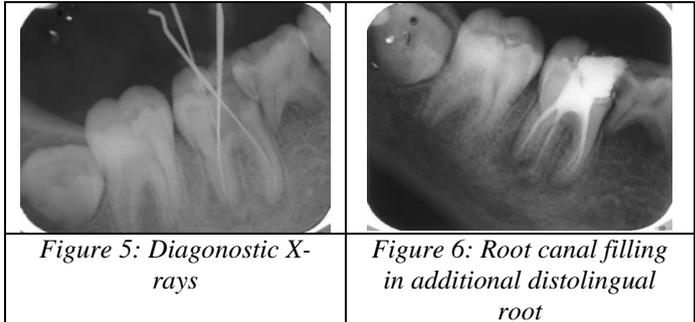
CASE I: A 40 years old male patient, reported to the Department of Conservative and Endodontics with the chief complain of pain in mandibular right first molar. Clinical examination revealed deep distal caries with mandibular right first molar. The tooth was tender to percussion. Radiographic

examination showed deep proximal caries with pulpal involvement. Root Canal Treatment was planned for mandibular right first molar. After administration of local anaesthesia caries excavation was done, followed by access opening. The conventional triangular access cavity was prepared and three canals (two mesial and one distal) were located. The coronal enlargement and location of the canal orifice allowed straight line access in three canals. Working length was determined using no.15 K files. After looking at the diagnostic X- ray, a third additional root was visible, this was missed earlier. (Fig 1 &2) Again a search for the third root was made, which was present at the extreme distolingual aspect of the pulp chamber. Hence the access was modified into a more trapezoidal cavity in order to locate the orifice of the distolingually located RE. Finally distolingually located fourth canal was traced and again a diagnostic X-ray was taken which confirmed the presence of the RE (Fig 3).The lengths of these canals were measured electronically. Irrigation was carried out using 5.25% sodium hypochlorite and EDTA. This additional canal was prepared using Protaper files up to size F2. The gutta cone fit was taken with radiographic exposure of 30 degree. After drying the canals, AH plus sealer was applied to the canals and obturation was done using Protaper gutta percha points (Fig 4). The access cavity was sealed with Fuji IX (GC Corp, Tokyo, Japan).



CASE II: A 28 year old female patient reported to the department of conservative and Endodontics with the chief complaint of pain with right mandibular first molar. Clinical Examination revealed deep mesial caries of right first mandibular molar with over retained deciduous molar. The tooth was tender to percussion. Intra oral periapical radiograph was taken which showed periapical infection of right first mandibular molar with additional distolingual root (Fig 5) and Root canal treatment was planned. After administrating local anaesthesia, caries excavation was done followed by access opening. The conventional triangular access cavity was modified into trapezoidal cavity. Canal orifice was enlarged with gates glidden drill. After pulp extirpation the working length was taken using #15 K files. The lengths of the canals

were measured electronically. Irrigation was carried out using 5.25% sodium hypochlorite and EDTA (salvizol, Ravens, Konstanz, Germany), and shaped with protaper instruments. obturation was done with protaper gutta-percha points using AH plus sealer. (Fig 6). The access cavity was sealed with temporary restoration.



III. DISCUSSION

PREVALENCE OF RADIX ENTOMOLARIS AND PARAMOLARIS

The presence of separate RE in the first mandibular molar is associated with certain ethnic groups. The study carried out by Sperbergh (8) in African population showed a maximum frequency of 3%, while in Eurasian and Indian population as reported by Tratman (9) the frequency is less than 5%. Mongoloid traits (such as Chinese, Eskimo and American Indians) Curzon (10) have noted that the RE occurs with a frequency that changes from 5% to more than 30%. Ferraz (11) reported that in Caucasians the RE is not very common and with a maximum frequency of 5.4 to 4.2% is considered to be unusual and dysmorphic root morphology.

The etiology behind the formation of the RE is still unclear. In dysmorphic, supernumerary roots, its formation could be related to external factors during odontogenesis, or to penetrance of an ataxistic gene or polygenetic system (ataxism is the reappearance of a trait after several generation of absence). An RE can be found on the first, second & third molar, occurring least frequently on second molar.

MORPHOLOGY OF RADIX ENTOMOLARIS AND PARAMOLARIS

A classification by Carlson and Alexandersen (12) describes four different types of RE, according to the location of the cervical part of RE. Type A, B, C and AC. Type A and B refer to distally located cervical part of RE, with two normal and one normal distal root components, respectively. Type C refers to a mesially located cervical part, while type AC refers to a central location, between the distal and mesial root components. This classification allows for the identification of separate and non-separate RE.

CLASSIFICATION

Carlsen & Alexandersen (1990) classified radix entomolaris (RE) into four different types based on the location of its cervical part]:

- ✓ *TYPE A*: the RE is located lingually to the distal root complex which has two cone-shaped macrostructures.
- ✓ *TYPE B*: the RE is located lingually to the distal root complex which has one cone-shaped macrostructures.
- ✓ *TYPE C*: the RE is located lingually to the mesial root complex.
- ✓ *TYPE AC*: the RE is located lingually between the mesial and distal root complexes.

De Moor et al. (2004) classified radix entomolaris based on the curvature of the root or root canal:

- ✓ *TYPE 1*: a straight root or root canal.
- ✓ *TYPE 2*: a curved coronal third which becomes straighter in the middle and apical third.
- ✓ *TYPE 3*: an initial curve in the coronal third with a second buccally oriented curve which begins in the middle or apical third.

Song JS et al. (2010) further added two more newly defined variants of RE:

- ✓ Small type: length shorter than half of the length of the distobuccal root.
- ✓ Conical type: smaller than the small type and having no root canal within it.

IV. RADIX PARAMOLARIS (ADDITIONAL ROOT LOCATED BUCCALLY)

PREVALENCE: Bolk reported the occurrence of radix paramolaris [13]. Radix paramolaris is very rare and occurs less frequently than radix entomolaris. Visser reported the prevalence of radix paramolaris to be 0% for mandibular first molars, 0.5% for second molars and 2% for third molars [14].

CLASSIFICATION: Carlsen & Alexandersen (1991) classified radix paramolaris (RP) into two different types:

- ✓ Type A: cervical part is located on the mesial root complex.
- ✓ Type B: cervical part is located centrally, between the mesial and distal root complexes.

MORPHOLOGY: The radix paramolaris (RP) is located mesiobuccally. The dimensions of RP may vary from short conical extension to a mature root which can be separate or fuse. Few observations can be made from various studies, i.e. an increased number of cusps is not necessarily related to an increased number of roots; however, an additional root is always associated with an increased number of cusps, and with an increased number of root canals.

CLINICAL APPROACH: The presence of RE or RP has clinical implications in Endodontic treatment. An accurate diagnosis of these supernumerary roots can avoid complications or a 'missed' canal during root canal treatment. Because the separate (RE) is mostly situated in the same buccolingual plane as the distolingual root, a superimposition of both roots can appear on the preoperative radiograph, resulting in an inaccurate diagnosis. To reveal the RE a second radiograph should be taken from a more mesial or distal angle (30 degrees). This way an accurate diagnosis can be made in majority of cases.

Apart from radiographical diagnosis, clinical inspection of tooth crown also helps. An extra cusps (tuberculin paramolar) or prominent occlusal distal or distolingual lobe, in

combination with a cervical prominence or convexity can indicate the presence of an additional root. If an RE or RP is diagnosed before endodontic treatment, one knows what to explore and where to look once pulp chamber has been opened.

Visual aids such as loupes, intra oral camera or dental microscope, in this respect can be very useful. A dark line on the pulp chamber floor can indicate the precise location of the RE canal orifice. The dimensions of the RE can vary from short conical extension to a mature root with normal length and root canal. In general, the RE is smaller than distobuccal and mesial roots and can be separate from or partially fused with, the other roots.

V. SUMMARY

There are numerous cases in the literature concerning the unusual anatomy of mandibular first molar. The initial diagnosis of Radix Entomolaris or Paramolaris before root canal treatment is important to facilitate the endodontic procedure and to avoid missed canals. Preoperative periapical radiographs exposed at two different horizontal angles, microscope, and loupes help in locating extra canals. The morphological variation in RE in terms of root inclination and root canal curvature demand a careful and adapted clinical approach to avoid or overcome procedural errors during endodontic therapy.

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