

Radix Entomolaris: A Case Report

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Abstract

Introduction: During endodontic treatment the variety of mandibular sectorial in the form of an extra lingual (radix entomolaris) or buccal root (radix paramolaris) can often cause difficulties. In other words, awareness and understanding of this unusual root, and its canal morphology, are factors that can affect the outcome of root canal treatment.

Case Presentation: A 30-year-old male patient with a history of severe, throbbing, constant pain in the lower mandibular molars was referred to the department of endodontics of Hamedan Dental university. The patient's medical history was noncontributory. The buccal object rule (same-lingual opposite-buccal technique) confirmed the additional root as a distolingual root (radix entomolaris). Following the evaluation of vitality tests, we began endodontic treatment for this patient, after administration of local anesthesia using 2% lidocaine with 1:80,000 epinephrine (Daroupakhsh, Tehran, Iran) and rubber dam isolation. The working length was determined by a Root ZX apex locator (Dentaport ZX, J Morita) and later confirmed by parallel periapical radiograph. Canals were shaped in a crown down fashion with Protaper Nickel Titanium rotary instruments (Dentsply, Maillefer) under copious irrigation with 2.5% sodium hypochlorite and lubrication with RC-Prep. After drying the canals with paper points, the master gutta-percha points were fitted within the canals and confirmation radiography was taken. The root canal system was obturated with the cold lateral compaction technique.

Conclusions: This case is about a mandibular molar with radix entomolaris and the radiographic exploration and endodontic order. Clinicians should be aware of these unusual root morphologies in the mandibular molars. The initial diagnosis of a radix entomolaris or paramolaris before root canal treatment is important to facilitate the endodontic procedure.

Keywords: Mandibular Molars, Radix Entomolaris, Endodontic Management, Anatomical Variation

1. Introduction

Eradication of microbes from root canals and impeding of further reinfection is the basic support of endodontic treatment. This is gained by an overall root canal cleaning and forming, using a three-dimensional filling with a fluid-tight seal. Setting up sufficient access for cleaning and shaping is a basic and essential part of this process. Gaining these goals, the clinician is supposed to have integral knowledge of the root canal anatomy, and its anatomic varieties, including additional roots, extra canals, webs, fins, and isthmuses that may complicate the endodontic procedure (1). Many authors have reported various morphologies of the mandibular sectorial (2). A large number of mandibular sectorials are two-rooted with one mesial and one distal root, and two mesial and one distal canal. In this type of tooth, the most popular form is the presence of an additional third root; a supplementary root is found lingually, noted as a distolingual root. Radix entomolaris (RE) is found in the constant mandibular sectorial. The extra root is on the lingual side of the primary roots.

In general, this additional root is smaller than the mesial root and the distobuccal root and can be separated from, or partially fused with, the other roots. The etiology of this root formation is still unclear, but its formation could be related to external factors such as those involved in tooth development (odontogenesis) and penetrance of an atavistic gene or polygenetic system (appearance of a trait belonging to a distant ancestor that has been dormant in recent generations). The prevalence of a supernumerary root in mandibular molars varies based on race. The maximum frequency occurs in African populations and is 3% (3), however, in Eurasian and Indian populations it is less than 5% (A). Based on studies in populations with Mongoloid traits (such as the Chinese, Eskimo and American Indian), radix entomolaris occurs with a frequency that ranges from 5% to more than 30% (A - G). Therefore, this study aimed to describe the external morphological variations and internal anatomy of this additional root.

2. Case Presentation

A 30-year-old male patient was referred to the department of endodontics of Hamedan Dental University, with severe, throbbing, constant pain in the mandibular right second molar, i.e., tooth # 47, for the past seven days. The medical history was non-contributory. On clinical examination, tooth # 47 had a deep carious lesion. The tooth was severely tender on percussion. The color and surface texture of the oral soft tissue was normal and the patient had no caries lesions on the other teeth. Perioperative parallel periapical radiograph revealed the presence of an extra distal root with accompanying apical radiolucency. Acute apical periodontitis was established as a diagnosis based on the patient history and clinical examination. The buccal object rule (same-lingual opposite-buccal rule) confirmed the additional root as a distolingual root (*radix entomolaris*) (Figure 1).



Figure 1. Pre-Operative Diagnostic Radiograph Showing Additional Distolingual Root

After administration of local anesthesia using 2% lidocaine with 1:80,000 epinephrine (Daroupakhsh, Tehran, Iran) and rubber dam isolation, tooth # 47 was accessed. Four distinct canal orifices were located and negotiated using a K-Flex file ISO 15 (Dentsply Maillefer). The working length was determined by a Root ZX apex locator (Figure 2) and later confirmed by parallel periapical radiograph.

After debriding pulp tissues, Gates Glidden drills (Dentsply, Maillefer) were used in a crown down fashion to enlarge the orifices with a brushing motion, and the canals were shaped with ProTaper Nickel-titanium rotary instruments (Dentsply, Maillefer) under copious irrigation with 2.5% sodium hypochlorite and lubrication with RC-Prep. After drying the canals with paper points, the master gutta-percha points were fitted within the canals and a confirmation radiograph was taken (Figure 3). The root canal sys-

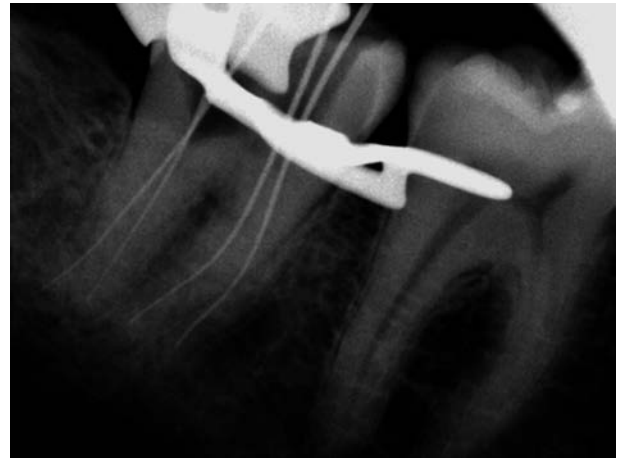


Figure 2. Working Length Determination Radiograph

tem was obturated with cold lateral compaction of gutta-percha with accessory points and AH26 sealer (Figure 4).



Figure 3. Master Gutta-Percha Points Radiography

The access cavity was filled with Cavit, and the patient was referred to the restorative department.

3. Discussion

Partition RE of the mandibular sectorial is related to a specific national group. Though the reason for the formation of the RE is uncertain, the highest frequency of 3% occurs in African people (3). How the RE is formed is still an unknown. Because the extra root is dysmorphic, its formation could be due to external elements during odontogenesis or the influence of an atavistic gene or polygenetic



Figure 4. Periapical Radiograph After Obturation

system. The more noticeable phenotypic expression is because of the effect of racial genetic elements on the deeper setting of certain genes in eumorphic roots. In Curzon idea, since the dominance of the 'three-rooted molar' feature was reflected in the spread of the feature, and was similar in both pure Eskimo and Eskimo/Caucasian mixes (4), it has a high degree of genetic permeability. In most samples, pulpal extension is radiographically obvious. Commonly, distobuccal and mesial roots are bigger than RE and can be apart from, or partly blended with, the other roots. In a categorization by Carlsen and Alexandersen, conforming to the location of the cervical section, there are four varieties of RE types: A, B, C and AC. Types A and B deal with the distally situated cervical part of the RE with two and one regular distal elements, respectively. Type AC refers to a central location between the distal and mesial root elements, while part C refers to a mesially located cervical part. The assortment leads to recognition of separate and non-separate RE. In the two thirds of the RE that is on the top, a medium to severe mesially or distally-orientated tendency can be visible. The root also can be straight or curved to the lingual in this tendency (5).

Following De Moor et al.'s classification, as the flexion of the separate RE differs in buccolingual orientation, three types can be distinguished. The first type is a straight root/root spiracle, and the second type refers to an early curved entrance that continues as a straight root/ root spiracle. The third type shows a primary curve in the coronal third of the root spiracle and a second curve starting in the middle and going on to the apical third (6).

The existence of 'invisible' RE can be illustrated by the entire examination of the preoperative radiograph explanation of specific features, such as unclear view or outline

of the distal root shape or the root spiracle. A second radiograph should be taken from a more mesial or distal angle in order to reveal the RE (7, 8).

After recognizing the RE form on the preoperative radiograph, to place the distolingual RE, following previous studies in mandibular first molars, the access cavity was revised into a trapezoidal outline (9). More rectangular or trapezoidal outline forms are made by the spread of the triangular opening cavity to the lingual. Visual supports like a loupe, intra-oral camera or dental microscope are beneficial.

A dark line on the pulp chamber floor shows the accurate place on the RE canal aperture.

A separate root tendency or spiracle curvature, especially in the apical third of the root, can lead to the forming of deviations like adjusting the root canal or an edge, with root spiracle moving and loos of working length out coming. Applying bendable nickel-titanium orbital files leads to a more centered drawing up shape with limited enlargement of the coronal canal third and orifice replacement.

An initial root spiracle survey with small files with radiographical root canal length and curvature resolution, and the creation of a glide path before preparation, are actions that should be done gradually to prevent procedural errors, after replacing and enlarging the orifice of the RE (3, 6, 10).

Clinicians should be aware of these unusual root morphologies in the mandibular molars. The initial diagnosis of a 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 are required to identify these additional roots. Knowledge of the location of the additional root and its root canal orifice will result in a modified cavity opening with extension to the distolingual. The morphological variations of the 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.

Footnotes

Authors' Contribution: Study concept, design and acquisition of data: Zeinab Movassagh; analysis and interpretation of data: Zeinab Movassagh, Parastoo Ghahari and Narges Heidari; drafting of the manuscript: Parastoo Ghahari and Narges Heidari; critical revision of the manuscript for important intellectual content: Zeinab Movassagh; study supervision: Zeinab Movassagh.

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