



Incidence of Radix Entomolaris in Mandibular First Molars in Kashmiri Population: A Clinical Investigation

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Received: September 15, 2020; Published: October 07, 2020

Abstract

Introduction: The aim of this investigation was to evaluate clinically the percentage of permanent mandibular first molar teeth with three roots amongst Kashmiri (North Indian) population.

Materials and Methods: 320 mandibular first permanent molars from 178 females and 142 males scheduled for root canal treatment at the department of conservative Dentistry and Endodontics Government Dental College and Hospital Srinagar (Jammu and Kashmir) were examined over a 2-year period. Periapical radiographs were used to detect and record the incidence of third root in mandibular first molar and to compare its occurrence between males and females and between the right and left sides of the mandible. Pearson chi-square test with significant level set at $p < 0.05$ was used for statistical analysis.

Results: 31 teeth out of 320 mandibular first molars were found to have a third root with an overall incidence being 9.68%. The incidence was 8.98% for females and 10.56% for males. There was statistically no significant difference in the prevalence of three rooted mandibular first permanent molars between males and females ($p > 0.05$). Mandibular first molars on right side showed incidence of third root more than compared to the left side. The incidence was 70.96% for unilateral whereas 29.03% for bilateral.

Conclusion: In conclusion the practicing dentists especially endodontists should be familiar with the ethnic variations in root morphology so as to reduce failures caused by missed canals and roots while treating the mandibular molars. A careful clinical and radiologic evaluation is needed to ensure high long term success of endodontic treatment of permanent molars.

Keywords: Radix Entomolaris; Kashmiri Population; Prevalence; Incidence; Three Rooted Mandibular Molars; Anatomical Variations

Introduction

The prevention or healing of endodontic pathology depends on a thorough chemomechanical cleansing and shaping of the root canals before obtaining a three dimensional filling of root canal. A thorough knowledge of the variations in root canal anatomy is absolutely imperative as diversities such as extra roots, extra canals, webs, fins, and isthmuses may complicate the endodontic procedure [1]. The mandibular first permanent molar is the ear-

liest permanent posterior tooth to erupt in the oral cavity and is considered to be the most frequently involved tooth in endodontic procedure [2]. Thus the awareness and understanding of the root canal anatomy of mandibular molars is very essential for the clinician to achieve a successful endodontic outcome. Mandibular first molars have one mesial root and one distal root under normal conditions. Anatomical variations in the number of roots as well as canal systems are present in mandibular first molars [3,4].

Radix entomolaris is an anatomical variations in which there is the presence of an additional third root distolingually in mandibular molars. If this additional root is present mesiobuccally it is called Radix Paramolaris [5,6]. This major anatomic variation was first identified by Carabelli in 1844. The term RE was coined by Michaly Lenhossek in 1922, while as RP also known as mesiobuccal root was first described by Bolk in 1915 [7]. Various external, racial as well as genetic factors during tooth formation may be related to formation of radix [8]. Frequency of radix entomolaris in populations with Mongoloid trait such as Chinese and American-Indians is 5% to more than 30% [9,10]. Incidence is less in Africans (< 3%) and Europeans [11,12]. Few studies have reported higher prevalence of RE, with a range from 2.19 - 13.3%, among the Indian population. RE can be found also on second and third mandibular molars-occurring least frequency [13].

Knowledge of occurrence, location and incidence of any tooth anatomical variation is important as it has a significant role in clinical dentistry.

Purpose of the Study

The purpose of this study was to evaluate and record the incidence of radix entomolaris in mandibular first molar in a Kashmiri population using periapical radiographs two different angles.

Methodology

320 patients comprising of 142 males and 178 females with the age group of 15 - 40 years scheduled for root canal treatment at the department of conservative Dentistry and Endodontics Government Dental College Srinagar were included in this clinical investigation. The study was approved by the Research development and sustenance committee of the college. After explaining the proposed treatment and its criteria for evaluation the written consent was taken from all the patients. The criteria for subject selection was that patient had to be from the Kashmir valley and each subject had fully erupted permanent mandibular first molar indicated for root canal. Two periapical radiographs were taken from different horizontal angles for each tooth undergoing root canal treatment on Kodak ultra-speed films (Eastman Kodak ultra-speed film, Kodak Rochester, NY, USA). The radiographs were inspected and observed separately by two endodontists.

Tooth was anesthetized, isolated with rubber dam and the access preparation was done with endoaccess (Eo 123) and Endo z bur (Dentsply Maillefer, Ballaigues Switzerland). 3% sodium hypochlorite was used for irrigation and pulp chamber was carefully examined with an endodontic probe (DG-16, Dentsply, Gloucester UK). Initial negotiation was done by using precurved K file ISO number 10. The working length was determined electronically with an apex locator and then confirmed by periapical radiographs. The canals were initially instrumented to a size no.15 K file under copious irrigation with 3% sodium hypochlorite. The root canals were then shaped with Protaper rotary instruments (Dentsply Maillefer, Switzerland). After radiographic confirmation of master cone canals were obturated using corresponding protaper gutta percha cones using Apexit Plus sealer (Ivoclar). Quality of root canal filling was assessed radiographically. Tooth was restored permanently. Figure 1-4 show an example of radix entomolaris mandibular first permanent molar and its root canal treatment.

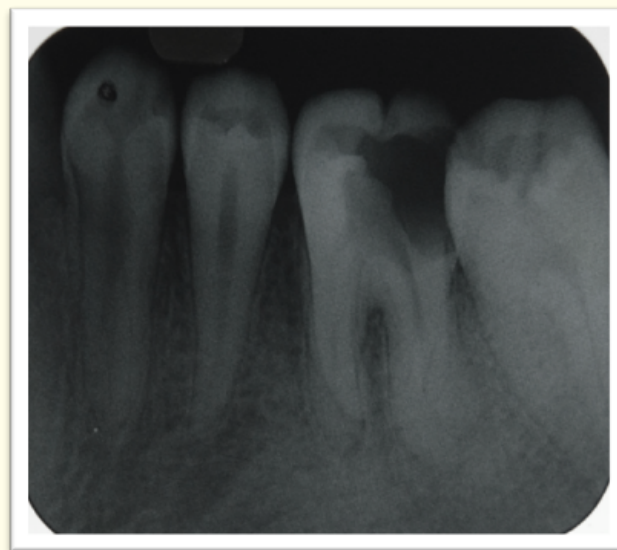


Figure 1: Diagnostic radiograph.

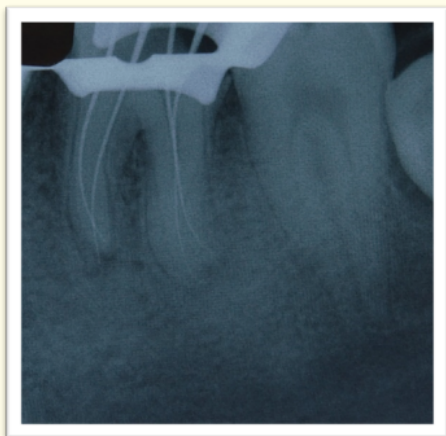


Figure 2: Working length determination



Figure 3: Master cone determination.

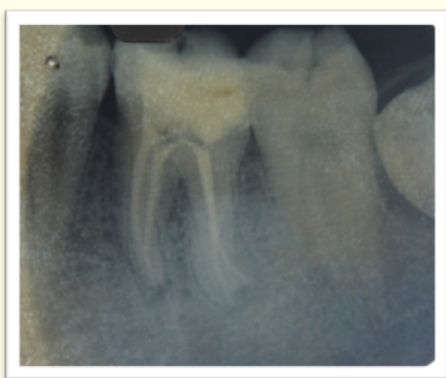


Figure 4: Obturation.

The incidence of RE was recorded. Occurrence between males and females and between the right and left sides of the mandible was also recorded. Comparison of the incidence and the correlations was done by using the Pearson chi-square test with SPSS (version 16, Chicago, IL, USA). $P < 0.05$ was considered statistically significant.

Results

31 teeth were found to have RE with an overall prevalence being 9.68% out of 320 patients examined. The incidence was 8.98% (16/178) for females and 10.56% for males (15/142). Statistically no significant difference in the prevalence of RE was present between males and females ($P > .05$) (Table 1). Among these 22 were found on right side and 9 on the left side. There was a significant difference between the right side (22/31) and the left side (9/31) ($P < 0.05$). The bilateral incidence of symmetrical distribution was 29.03% and unilateral incidence was (70.96%).

Gender	Number of first molars examined	Number of RE	%
Male	142	15	10.56
Female	178	16	8.98
Total	320	31	9.68

Table 1: Incidence of RE in subjects according to gender.

Discussion

There have been several case reports as well as epidemiological studies about the occurrence of supernumerary roots in permanent mandibular molars. Radix entomolaris has been considered more of a genetic trait than a developmental anomaly. Radix entomolaris is found more in mandibular first molar than second and third molar. It may be present as a short conical extension or a full-length root. It is detected radiographically in 90% of cases. Sometimes additional radiographs from different horizontal angles are required [14,15]. Clinicians should be well aware about this anatomical variation while conducting an endodontic treatment. De Moor, *et al.* have classified RE evaluated from extracted teeth into three types. Type I refers to straight root or canal. Type II refers to an initially curved entrance which continues as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third [16].

Radix entomolaris in Asian/Mongolian populations is present with a frequency of 30%. In our study, after interpretation of bilateral radiographs of 320 patients (142 males and 178 females), 31 patients (15 males and 16 females) had radix entomolaris. So, total prevalence of radix entomolaris in Kashmiri population. Successful endodontic treatment in a tooth with radix entomolaris requires detailed radiographic and clinical examination. Periapical radiographs should be taken at different angulations to depict detailed anatomy [17]. The access cavity preparation was modified from the classic triangular access to a more rectangular or trapezoidal outline. The orifice of RE is mainly located distomesiolingually from the main distal canal. The identification of supernumerary roots and canals can be made easier with additional aids like the DG 16 probe, micro-opener, methylene blue dye, fluorescein sodium ophthalmic dye, long shank burs, ultrasonic instruments, surgical loupes, fibre-optic illumination, dental endoscopy and oroscopy, operating microscope and visualization endogram using Ruddle's solution [7]. Computed tomography (CT) or cone beam computed tomography (CBCT) and Digital Operating Microscope (DOM) might be a more beneficial tool. However, cost and access to them is a limiting factor [18].

Conclusion

The prevalence of radix entomolaris in the population of Kashmir region of Jammu and Kashmir was observed to be 9.68% in our study. Before initiating an endodontic treatment a thorough and careful clinical and radiographic examination is essential in the diagnosis of any anatomic variation in the root canal system and for the long term success of endodontic treatment.

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Volume 3 Issue 11 November 2020

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