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The Incidence of Radix Entomolaris in Mandibular First Permanent Molars in a Saudi Arabian Sub-Population

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Abstract. The aim of this study was to investigate the incidence of radix entomolaris in mandibular first permanent molars in Saudi Arabian sub-population. A total of 280 extracted mandibular first permanent molar were included in the study. The teeth were examined visually and the number of roots was recorded. The results showed that the majority of cases had two roots 93.9% (263 teeth), whereas the remaining 6.07% (17 teeth) had three roots. It is apparent from the previously reported studies and the findings of this study, that a higher frequency of occurrence of radix entomolaris in mandibular first molars in Saudi Arabian population than in other populations in west Asia. In addition to a higher frequency of occurrence in the East Asian population than in the West.

Keywords: Anatomical variations, Endodontic treatment, Mandibular first molar, Radix entomolaris.

Introduction

The main objective of root canal treatment is the thorough chemomechanical cleansing of the entire root canal system, and its complete obturation with an inert filling material and a coronal filling preventing ingress of microorganisms. One of the main reasons for

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failure of root canal treatment in molars is the lack of complete removal of all pulp tissue and microorganisms from the root canal system[1]. It is of utmost importance that the clinician needs to be familiar with root and root canal anatomy. The majority of Caucasian's mandibular first molars are two-rooted with two mesial and one distal canals[2,3]. The major variant in this tooth type is the presence of an additional third root; a supernumerary root which can be found lingually[4]. This macrostructure, which was first mentioned in the literature by Carabelli[5] is called radix entomolaris (RE)[6]. In the European populations it has been reported that a separate RE is present in the mandibular first molar with a maximum frequency of 0.7-4.2%[7-13]. In African populations (Bantu, Bushmen, Senegalese) a maximum of 3% is found[14-16]. In Eurasian and Indian populations, the frequency is less than 5%[17]. In populations with Mongoloid traits, such as Chinese, Eskimo and American Indians, randix entomolaris occurs with a frequency of 5% to more than 40%[8,11,17-35]. The high degree of RE in these Mongoloid populations had provoked more specific analyses of the heritable basis of this supernumerary radicular structure[8,17,22-23]. More specifically, only Curzon[23] suggested that certain traits such as the ‘three-rooted molar’ had a high degree of genetic penetrance, as its dominance was reflected in the fact that pure Eskimo and Eskimo/Caucasian mixes had similar prevalence of the trait. Apart from its role as a genetic marker, RE has a significance in clinical dentistry[36].

Although the incidence in different countries of RE in the mandibular first molar has been reported, there is a need to study this incidence among the Saudi Arabian population. Therefore, the purpose of this investigation was to study the incidence of RE in mandibular first permanent molar in Saudi Arabian sub-population.

Materials and Methods

A total of 280 extracted mandibular first permanent molar were included in this study. The teeth were collected from Saudi patients attending various dental clinics in Jeddah, Saudi Arabia. Dentists were provided with containers and asked to include mandibular first permanent molar teeth extracted only from Saudi patients. Dentists were informed that the collected teeth were to be used for research purposes. The teeth were collected and stored in 10% formalin solution until the beginning of the investigation. Prior examination, the teeth were washed and

immersed in 5% NaOCl for 2 h to remove any adherent soft tissue. Deposits of calculus and extrinsic stain were removed using an ultrasonic scale. The cleaned teeth were radiographed and examined visually. The numbers of roots were recorded.

Results

Results are summarized in Table 1. A total of 280 mandibular first permanent molar were examined. Two roots had been found in 93.9% of cases (263 teeth), whereas the remaining 6.07% (17 teeth) had three roots. Examples of these additional roots are illustrated in Fig. 1. These additional roots were located lingually (RE). Radiographic examination may reveal an extra distal root (Fig. 2).

Table 1. Analysis and distribution of roots per tooth.

No of Teeth	No of Roots			
	2	%	3	%
280	263	93.9	17	6.07

Fig. 1. Clinical photographs of extracted mandibular molars with radix entomolaris.

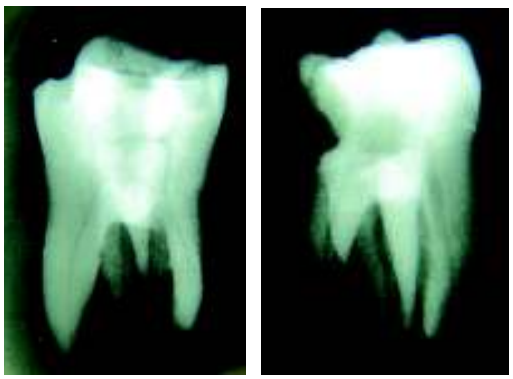

Fig. 2. Periapical radiographs of extracted mandibular molars showing radix entomolaris.

Discussion

Anatomical variations of mandibular molars are documented in the literature. Nonetheless, variations of the anatomy of the root canal system in molars are not appreciated by a great number of general practitioners[37-38]. The variability of root canal anatomy in the distal root of mandibular molars may not be a common knowledge[39]. Next to the second distolingual canal, RE in mandibular molar teeth, with an incidence ranging from 0.9 to 40% is possible in some populations.

Knowledge of RE occurrence is important for endodontic treatment and its outcome. This variation in the distal root anatomy may be identified through careful reading of angled radiographs. Slowley[40] has demonstrated how difficult it is to detect extra roots. On the contrary, completing a thorough radiographic study of the involved tooth with exposure from three different horizontal projections; the standard buccal-to-lingual projection, 20 from the mesial, and 20 from the distal reveals the basic information regarding the anatomy of the tooth in order to perform endodontic treatment[41]. However, using the buccal object rule with two radiographs with different horizontal angulations may suffice to determine the position of a lingual root[42-43]. One of these radiographs is taken in the orthoradial position and the other taken either 30 mesially or distally[41].

The prevalence of RE in mandibular first molars in the Middle East was reported to be very low when it is compared to eastern Asian population[44]. In Kuwaiti population, Zaatar *et al.*[45] reported that 2.7% (4 out of 147) of teeth had three rooted mandibular molar. Later, Pattanshetti *et al.*[46] reported that 4% of the molars had three roots. Also, Al-Qudah and Awawdeh[47] reported that the incidence was 4% (13 out of 330) in the Jordanian population. In Saudi Arabia, it has been reported to range from 2.3%[48] to 5.97%[44]. The results of the present study indicate a frequency of occurrence that is higher than that reported by Younes *et al.*[48] and in comparison with the results of Alnazhan's study[44].

It is apparent from the previously reported studies and the findings of this study that there is a higher frequency of occurrence of RE in mandibular first permanent molars in the East Asian population than in the west. The differences seen in the present study compared with those of previous studies indicate that there may be genetically determined

differences related to racial background. Furthermore, in order to reveal radix entomolaris occurrence, the operator should use shifted radiographic techniques.

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مدى انتشار الأضراس الدائمة الأولى ذات الثلاثة جذور في الفك السفلي في المملكة العربية السعودية

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المستخلص. كان الغرض من هذا التحقيق، دراسة انتشار الأضراس الدائمة الأولى ذات الثلاثة جذور في المملكة العربية السعودية (الفئات السكانية الفرعية)، ودراسة مقارنة مع البحوث السابقة لمعرفة مدى انتشار حدوث هذه الميزة التشريحية. فقد أدرجت في الدراسة ٢٨٠ سنًا مخلوعة من الأضراس الدائمة الأولى من الفك السفلي من مرضى سعوديين. تم فحص الأسنان بصريا وسجلت أعداد جذور الأسنان. كانت غالبية الحالات تحوي اثنين من الجذور ٩٣,٩٪ (٢٦٣ سنًا) في حين أن ٦,٠٧٪ المتبقية (١٧سنًا) كانت تحوي ثلاثة جذور. يتضح من الدراسات التي ذكرت سابقا ونتائج هذه الدراسة أن ارتفاع وتيرة حدوث الأضراس الدائمة الأولى، ذات الثلاثة جذور في الفك السفلي، في سكان المملكة العربية السعودية يعد مرتفعا مقارنةً بالشعوب الأخرى في منطقة غرب آسيا، وارتفاع وتيرة وقوعه في سكان شرق آسيا أكثر من غربها.