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THE STUDY OF ANATOMICAL FEATURES OF THE ROOT SYSTEM OF HUMAN TEETH

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ABOUT ARTICLE

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Abstract: A large amount of data has been accumulated in the literature on the features of the structure of the tooth crown in various ethnic groups and its variability in the process of evolution.

INTRODUCTION

The works of Russian authors have made a significant contribution to the study of the anatomy of the crown and root, the definition of safe zones for the preparation of hard tissues and the evaluation of the effectiveness of various stages of endodontic treatment. At the same time, individual, racial and age differences in the structure of the root system have not yet been sufficiently studied. A detailed study of the root system is important not only theoretically, but also practically in endodontic dental treatment. Today, due to the active migration and the spread of "medical tourism", dentists have to deal with an increasing number of patients belonging to various ethnic groups. In this regard, it is extremely important to know the ethnic characteristics of the root system in order to provide high-quality endodontic care. When studying the morphology of the root system of maxillary molars, the periodontist takes into account the following structural parameters: the length of the tooth and (or) the root, the number of roots, the curvature of the root, the presence of fused roots, the number of root canals and the type of branching of root canals. Examinations include clinical (in vivo) and laboratory (tooth extraction). Clinical examination includes direct dental radiography and panoramic imaging, as well as radiological methods such as radiography using endodontic instruments, radiobiography and the use of endodontic microscopes. Laboratory research methods include radiographic methods such

as radiography after the introduction of radiopaque substances, microtomography, transverse examination to obtain tooth slides, as well as methods of cleaning and lightening the root walls by simultaneously injecting dye into the tooth cavity and root canal. Approaches based on tooth cleaning methods with the introduction of dyes are more informative; they can show more complex root canal bifurcations than radiography. The introduction of endodontic microscopy into clinical practice has changed the general understanding of the number of root canals and the structure of root canals, since variations in the number of root canals were noted in many teeth. Microtomography is considered to be the most progressive and useful method of studying the internal structure of teeth. Unfortunately, this method has not been used in large-scale studies due to their duration and high cost. The results of the study of the root system of the upper and lower molars. Consider the characteristics of human upper and lower molars, including tooth length, number of roots, type of root canal branching and root fusion. The general data on ethnic differences in these characteristics of molars are presented below. Maxillary molars. The first maxillary molars of Caucasoids have an average length of 21-22 mm. The maxillary second molars are usually slightly smaller than the first, and in Caucasians their length is on average 21 mm. The third molars have an average length of 19 mm. Palatine roots of molars are usually longer than buccal ones. The length from the apex of the palatine root to the apex of the corresponding canine is on average 21.3 mm for the first molars and 21.1 mm for the second molars. The shortest root is the distal buccal, and the average tooth length in the area of this root is 19.6 mm for the first and second molars. These data relate mainly to teeth of the Caucasian race. Doctors who often treat representatives of the Negroid and Mongoloid races should take into account that these values do not correspond to those found in their practice. Thus, in Mongoloids, the roots of the maxillary molars are usually located close to each other, the roots tend to merge, and the average length of the teeth is slightly shorter. Therefore, further studies of the length of teeth in representatives of different races are necessary. The number of roots and root canals of maxillary molars. The first and second maxillary molars usually have three roots. According to recent studies, the first molars usually have four root canals instead of three. The buccal mesial root also has a root canal. Comparative data from various authors on the frequency of occurrence of the second root canal in the buccal mesial root are presented in Table. 1. The data presented in table 1 shows that the figures vary greatly, and the results are not unambiguous. This is mainly due to differences in the information content of the research methods, as well as differences in the morphology of the studied groups of teeth. Modern methods of endodontic microscopy determine the presence of a second channel in the middle of the buccal root in 93-96% of cases [32]. In the presence of two channels in the maxillary first molars, their morphology is usually classified as type II (2-1) according to the Vertucci classification (Fig. 1). However, the frequency of occurrence of type IV

(2) with two separate holes in the apex of the root reaches 48% [8]. The structure of the second maxillary molars is more variable (Fig. 2). They are usually three-rooted, but the branching of the roots is less, and they can merge to form two or one root. Three root canals are present in 72% of maxillary second molars, two in 6% and one in 1% [21, 29]. The structure of the third maxillary molars is very diverse. These teeth have up to five roots and up to eight channels (Fig. 3, 4). Root fusion is atypical for the first maxillary molars and is more common for the second and third molars. Root fusion was observed in 13.6% of the maxillary first molars, 24% of the second molars and 71.6% of the third molars. The frequency of buccal root fusion was high. In the third molars, all roots were fused in 17.4% of cases. According to J.D. Pecora [22, 23], the frequency of occurrence of various root mergers is shown in Table. 2. Many authors note group differences in the frequency of root fusion. In Mongoloids, the roots of the second upper molars grow together more often. In Caucasoid populations, the fusion of the roots of the second maxillary molars is 45-55%, while in Mongoloid populations it is 65-85%. In the Chinese (Taiwanese) population, fused roots were found in 6.2% of the maxillary first molars and 40.1% of the second maxillary molars, according to Z.P. Yang et al. The most common (18.1%) were fused palatal and medial buccal roots of the second molars. According to a study by A.M. Alavi et al [8], in the Thai population, all palatal and medial buccal roots of the second molars are fused. According to, the roots of all maxillary first (n=52) and second (n=65) molars were separated. The roots of the third molars (n=77) were separated in 50.0%, with complete fusion in 26.5% and fusion of the buccal roots in 10.6%. Mandibular molars. The average length of the first mandibular molars is 21 mm. The distal root is slightly shorter than the mesial root. The average distal length is 20.3 mm, and the average mesial length is 21.3 mm [26]. The average length of the second molar of the mandible is 20 mm. The distal root is also slightly shorter (20.0 mm) than the mesial root (20.87 mm). The average length of the third molar is 19 mm. The first molars usually have two roots - mesial and distal. However, mandibular first molars with three roots are quite common in Mongoloid populations. The root of this tooth is located on the distal side [11]. According to various researchers, the frequency of occurrence of excess roots ranges from 8% to 22.7% [31]. Data on the prevalence of the first lower molars with three roots in Mongoloid populations, obtained by different authors, are presented in Table 3 [11]. Root fusion was observed in 15.9% of the examined second mandibular molars in representatives of the Caucasian race. In representatives of the Mongoloid race (Chinese), fusion of the roots of the same teeth was observed in 33-52% of cases. 51.8% of the third mandibular molars had one root, 46.4% had two roots and 1.6% had three roots. The number of root canals in the mandibular molars. In the Caucasoid population, the two-rooted first molars usually have three root canals: two in the mesial and one in the distal root. However, there are usually four channels in the first mandibular molars. Another fourth channel is

located in the distal root. This channel is found in 38% of Caucasians. In the Mongoloid population, four channels are present in about half of the first lower molars; two channels were found in the distal root in 45 out of 100 teeth. Like the first molars, the second mandibular molars have three root canals: two canals are located in the mesial root and one in the distal. However, in the second molars of the mandible, the mesiobuccal canals are often connected apically and have one apical opening (type II according to the Vertucci classification). In the Mongoloid population, type C channels are found in 31.5% of cases. In Caucasoid populations, such channels are found in 7.6-9% of the second lower molars. In the third molars, two root canals were found in 69.3% of cases, three root canals in 18.4% and one root canal in 12.3% of cases.

CONCLUSION

The analysis of the literature allows us to identify ethnic features in the number, shape and root canals of molars. However, no comprehensive systematic research has been conducted in this direction. The data on this topic is mostly sketchy or obtained in small studies.

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