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Prologue: Tooth Anatomy and Morphology

Zühre Akarşlan

1. Introduction

Knowledge of tooth morphology and anatomy is important in dentistry. Crown morphology is essential in restorative treatment and prosthodontic treatment. External root morphology influences the success of oral surgery, periodontal treatment, orthodontic treatment, and prosthodontic treatment. The knowledge of root canal anatomy is important in endodontics. There can be various root canal configurations affecting the success of root canal treatment [1–3]. The size of teeth crowns, number of roots, and morphology of occlusal surfaces, including cusps, interconnecting depressions, grooves, or pits, may differ among populations and genders [4–9].

There are two sets of teeth during lifetime, the deciduous teeth and the permanent teeth. The deciduous teeth are present in childhood and replaced with the permanent teeth. There are 20 deciduous teeth. Ten of these are located at the maxillae, and 10 of them are located at the mandible. They are consisted of incisors, canines, and molars. There are 32 permanent teeth. Sixteen of these teeth are located in the maxillae, and 16 are located in the mandible. They are consisted of incisors, canines, premolars, and molars. The main difference between the deciduous and permanent dentition is that the permanent dentition has the premolar teeth. There are four premolars in the maxillae and four premolars in the mandible [10].

The permanent incisors are placed in front of the oral cavity. There are total eight incisors, four at the maxillae, and four at the mandible. The function of these teeth is cutting food. Their crowns are flattened and they usually have a single root. The incisors are consisted of the central and lateral teeth. The mandibular central incisor is the smallest tooth in the mouth, but the buccolingual dimension of its root is very large [11–13].

The permanent canines are placed after the lateral incisors. There are two canines in the maxillae and two canines in the mandible. The canines tear and shred food. The canine has a single root and root canal. Its root is longer compared to the incisors [12].

The premolar teeth are located between the canines and the molars. There are four premolars in the maxillae and four premolars in the mandible. The premolars are the transitional teeth. They are only present in the permanent dentition. They guide food from the front of the mouth back to the molars. They can have two or more cusps on their crown [10]. The second maxillary premolar tooth in the maxillae and the first and second premolar tooth in the mandible have one root and root canal. Different from these, the first maxillary premolar tooth has two roots and root canals, one located in the buccal and the other in the palatal area. In some cases there can be extra roots and root canals in these teeth [3].

The permanent molars are located in the posterior region in the oral cavity. The molars are placed after the premolars in the permanent dentition. There are six molars

in the maxillae and six molars in the mandible. The functions of these teeth are to crush and grind food. They have multiple cusps on their crown [10]. The root configuration and number differ among these teeth. The maxillary molars usually have three separate roots; mesiobuccal, distobuccal, and palatal. Sometimes there can be one, two, or four roots [14]. On the other hand, the mandibular molars usually have two roots: mesial and distal. However, rarely these teeth can have one or three roots [15].

The teeth may be affected from various anomalies. These anomalies can change the structure, color, shape, and form of the teeth. The anomalies are named as concrescence, fusion, germination, taurodontism, dilaceration, enamel pearls, dens invaginatus, dens in dente, dilated odontoma, dens evaginatus, talon cusp, amelogenesis imperfecta, dentinogenesis imperfecta, osteogenesis imperfecta, dentin dysplasia, regional odontodysplasia, and Turner's hypoplasia. Dentists should have knowledge about these anomalies and the possible complications they can lead during dental treatment [16].

The aim of this book is to provide the readers information about dental morphology, anatomy, and anomalies.

2. Overview of the chapters of this book

Second chapter: "Tooth Morphology Overview" written by Abeer Alshami, Shatha Alharthi, Munirah bin Shabeeb, and Monika Wahi. The authors start with the nomenclature and continue with tooth numbering systems in this chapter. They give details about the Fédération Dentaire Internationale (FDI) system, tooth morphology and anatomy, and stages of tooth formation. They end the chapter with the hypotheses accepted nowadays about formation of the tooth. The authors provide useful information and rich illustrations for the readers.

Third chapter: "Root Canal Morphology and Anatomy" written by Esra Güven Pamukçu. This chapter gives the readers beneficial information about root canal anatomy and morphology of maxillary and mandibular incisors, canines, premolars, and molars. A novel tooth morphology classification respecting tooth number, number of roots, and root canal configuration types is presented. A summary of dental anomalies can be found at the end of the chapter.

Fourth chapter: "External and Internal Anatomy of Mandibular Permanent Incisors" written by Mohammed A. Aldawla, Abdulbaset A. Mufadhal, and Ahmed A. Madfa. In this chapter detailed information is given about the external root morphology, the internal root anatomy, and the dental anomalies which can be seen in permanent mandibular incisor teeth. The chapter is written according to a rich literature review which is particularly informative.

Fifth chapter: "External and Internal Anatomy of Maxillary Permanent First Molars" written by Abdulbaset A. Mufadhal, Mohammed A. Aldawla, and Ahmed A. Madfa. This chapter provides the readers useful information about external root morphology, internal root anatomy, variations, and anatomical anomalies of permanent maxillary first molars. The chapter is written according to a rich literature review in an elucidative manner.

Sixth chapter: "Can Orofacial Structures Affect Tooth Morphology?" written by Amanda Valentim, Renata Furlan, Mariana Amaral, and Fernanda Guimarães. This chapter focuses on the role of orofacial forces on the teeth. The authors give information about all factors related in detail. They emphasize the role of the orofacial muscles, oral habits, and hyperfunction of masticator muscles on the occlusion and size and shape of the teeth according to a rich literature review.

Seventh chapter: "Evolution of Dental Implant Shapes and Today's Custom Root Analogue Implants" written by Ayse Sumeyye Akay. The author provides

information about root morphology of teeth. Evolution and the fabrication procedures and clinical predictability of root-shaped dental implants are explained in the chapter. The readers can benefit from the advantages of the root-shaped implants for immediate placement.

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References

- [1] Sanson G. Cutting food in terrestrial carnivores and herbivores. *Interface Focus*. 2016;**6**:20150109. DOI: 10.1098/rsfs.2015.0109
- [2] Brook AH, Jernvall J, Smith RN, Hughes TE, Townsend GC. The dentition: The outcomes of morphogenesis leading to variations of tooth number, size and shape. *Australian Dental Journal*. 2014;**59**:131-142. DOI: 10.1111/adj.12160
- [3] Mohammadi Z, Shalavi S, Jafarzadeh H. Extra roots and root canals in premolar and molar teeth: Review of an endodontic challenge. *The Journal of Contemporary Dental Practice*. 2013;**14**:980-986
- [4] Felemban NH, Manjunatha BS. Prevalence of the number of cusps and occlusal groove patterns of the mandibular molars in a Saudi Arabian population. *Journal of Forensic and Legal Medicine*. 2017;**49**:54-58. DOI: 10.1016/j.jflm.2017.05.013
- [5] Dholia B, Manjunatha BS. Occlusal morphology of permanent mandibular first and second molars in Gujarati population. *Journal of Forensic Dental Sciences*. 2015;**7**:137-141. DOI: 10.4103/0975-1475.146368
- [6] Mallineni SK, Panampally GK, Chen Y, Tian T. Mandibular talon cusps: A systematic review and data analysis. *Journal of Clinical and Experimental Dentistry*. 2014;**6**:e408-e413. DOI: 10.4317/jced.51476
- [7] Khraisat A, Taha ST, Jung RE, Hattar S, Smadi L, Al-Omari IK, et al. Prevalence, association, and sexual dimorphism of Carabelli's molar and shovel incisor traits amongst Jordanian population. *Odonto-Stomatologie Tropicale*. 2007;**30**:17-21
- [8] Filipovic G, Kanjevac T, Cetenovic B, Ajdukovic Z, Petrovic N. Sexual dimorphism in the dimensions of teeth in Serbian population. *Collegium Antropologicum*. 2016;**40**:23-28
- [9] Martins JNR, Marques D, Francisco H, Caramês J. Gender influence on the number of roots and root canal system configuration in human permanent teeth of a Portuguese subpopulation. *Quintessence International*. 2018;**49**:103-111. DOI: 10.3290/j.qi.a39508.
- [10] Yavuzylmaz H. *Diş Morfolojisi ve Anatomisi*. [Tooth Morphology and Anatomy]. 6th ed. Beşevler Ankara Türkiye: Gazi Kitapevi; 2013. pp. 27-191
- [11] Ozaki T, Satake T, Kanazama E. Morphological significance of root length variability in comparison with other crown dimensions. *The Journal of Nihon University School of Dentistry*. 1987;**29**:233-240
- [12] Yamanaka A, Iwai H, Uemura M, Goto T. Patterning of mammalian heterodont dentition within the upper and lower jaws. *Evolution and Development*. 2015;**17**:127-138. DOI: 10.1111/ede.12116
- [13] McGowan S. Characteristics of teeth: A review of size, shape, composition, and appearance of maxillary anterior teeth. *The Compendium of Continuing Education in Dentistry*. 2016;**37**:164-171
- [14] Alrahabi M, Sohail Zafar M. Evaluation of root canal morphology of maxillary molars using cone beam computed tomography. *Pakistan Journal of Medical Sciences*. 2015;**31**:426-430. DOI: 10.12669/pjms.312.6753
- [15] Akpınar KE, Ay S, Er K, Köşger HH. Türk toplumunda alt molar dişlerin kök ve kanal sayıları [The number of roots and canals in mandibular molars of a Turkish sub-population]. *Ondokuz Mayıs Üniversitesi Dis Hekimliği Fakültesi Dergisi*. 2004;**5**:123-127

[16] Lam EWN. Dental anomalies. In: White SC, Pharoah MJ, editors. *Oral Radiology Principles and Interpretation*. 6th ed. St. Louis, Missouri: Mosby, Elsevier; 2009. pp. 295-323

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