

GEORGE EMIL PALADE UNIVERSITY OF MEDICINE, PHARMACY,
SCIENCE AND TECHNOLOGY OF TÎRGU MUREŞ

DOCTORAL SCHOOL OF MEDICINE AND PHARMACY

PhD THESIS SUMMARY

STUDY OF THE POSSIBILITIES OF PREVENTING EDENTATIONS IN CHILDREN AND ADOLESCENTS

PhD student *Kallos Henrietta Hilda*

Supervisor *prof. univ. dr. Mártha Ildikó Krisztina*

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UNIVERSITATEA DE MEDICINĂ,
FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE
„GEORGE EMIL PALADE”
DIN TÂRGU MUREŞ

Introduction

Edentation is a debilitating and irreversible condition. Regardless of the etiology of this pathology, edentation can directly lead to impairment of the general condition, limitation of functions, causing physical, psychological and social disability. It can be caused by tooth extraction or can occur following dental agenesis. The most common cause of tooth extraction are dental caries complications, the occurrence of which can be caused, besides poor hygiene, by the special morphology of the teeth, which makes it difficult to properly sanitize the fosses. The Carabelli tubercle is a dental morphological feature that is found on the mesio-palatinal surface of the temporary two-molar molar and the crowns of the first permanent jaw molar. Carabelli tuber tooth is susceptible to tooth decay. Hypodontics is the most common dental-facial malformation in humans. Both genetic and environmental factors have been found to contribute to the etiology of dental agenesis. Several studies have found that patients with dental agenesis have a different craniofacial pattern compared to patients with a normal number of teeth.

Aim

The purpose of the studies presented in this doctoral thesis is to determine the relations between edentations, regardless of their etiology, and occlusal and dento-alveolar changes, respectively, through clinical and paraclinical investigations, using X-rays and T-Scan measurements. We also aimed to examine the changes in the morphology of the upper first permanent molar crown, which is one of the most important components of dentition, according to the genetic changes. We chose to investigate genetic changes in genes most often reported related to non-syndromic dental agenesis.

Material and methods

In order to establish the consequences of edentation in children and adolescents, our study created an overview through multiple research. First, through standardised clinical examinations, occlusal sequelae following premature loss of permanent molars have been highlighted. The effect of occlusal changes was further enhanced, in addition to clinical data, by measurements of the masticatory force using T-Scan. Secondly, for a more accurate overview, further measurements were made on digital orthopantomograms. By conducting linear and angular measurements, dentoalveolar changes were highlighted in patients with hypodontics. Dental agenesis being an anomaly with a major impact on the quality of life, it is very important to be approached with great care, through interdisciplinary methods that can only be achieved if data from specialized literature is standardized and provides a well-established guide. Thus, our working protocol, of the analysis of radiographs, was preceded by the study of the specialized literature in order to establish the most relevant measurements for the established objectives. Thirdly, study model analyses were conducted with an emphasis on intercuspidian distances and the presence of Carabelli cusps. The appearance of the trait of Carabelli in the sample will be compared with the data of the genetic basis. The most commonly reported genes that have been associated with non-syndromic dental agenesis are PAX9, MSX1, EDA, and AXIN2. The SNPs (single nucleotides of polymorphism) of these genes impact on the patterns of agenesis, albeit in significantly different ways. For each individual, it is presented whether the trait is present, absent or not observable.

Results

Study 1: Occlusal sequelae of the loss of first permanent molars among children and adolescents.

The prevalence of the permanent primary molar shortage increases with the patients age. The early extraction of the first permanent molar and the opening of contact points following them significantly influences the occlusal stability of the dental-maxillary apparatus. Through the present study, we examined four of the ideal occlusion six keys. We obtained significant statistical results in three cases. The horizontal migration of the adjacent teeth and the vertical displacement of the antagonistic teeth are complex and involve the modification of all elements of the dento-maxillary apparatus. Tipping and losing space contributes to space deficiency. The masticatory force decreases provenly in the areas with the open contact points. Losing occurs in the static occlusion, the number of interocclusal contacts decreases and even their location differs from the usual ones.

Study 2: Study of dento-alveolar changes in patients with hypodontia

In the studied population, hypodontia occurred more often in women than in men. Based on the results of our research, we can conclude that the bone base of hypodontics patients shows a significant difference from the control group. In patients with hypodontics, in addition to the characteristic hypodivergent facial pattern, we found a more developed mandible in the transverse sense and a smaller gonion angle compared to the control group. When examining the height of the alveolar bone, among patients diagnosed with hypodontia, we found a significantly more developed alveolar bone in men than in women, in the case of absence of the lower second premolar. In the case of hypodontia of the upper lateral incisors, after the loss of the temporary incisor, the axial position of the teeth that border the edentation changes significantly. The axis of both the upper central incisors and the upper canines converges to the occlusal plane. The axial position of the permanent teeth bordering the agenesis site is affected by the moment of temporary tooth loss and the age of the patient.

Study 3: Study of morphological variations of the upper first permanent molar in association with nonsyndromic tooth agenesis

The findings of the present study show that greater forms of Carabelli cusps are significantly more common in subjects without hypodontia than in subjects with hypodontia. The variation of this trait is in association with MSX1 (rs8670 and rs12532) gene, with subjects included in this study having more likely a greater form of the Carabelli trait when the normal homozygous genotype was dominant.

Originality

The originality of the thesis lies in the fact that it is based on an interdisciplinary theme that requires permanent collaboration, as a result of which studies have been conducted using clinical and paraclinical examination methods. At the same time, during the research, the examinations were made in several regions of our country, providing a more comprehensive picture of the topics studied. The studies in this PhD thesis complement each other and make up a complex theme, which is approached from different perspectives.