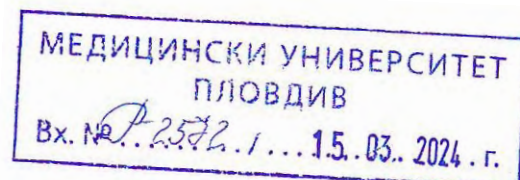


To the Chairman of the Scientific jury  
Based on the order № R-476/05.02.2024  
Of the Rector of MU - Plovdiv



## REVIEW

From Prof. Dr Rosen Gospodinov Kolarov, PhD  
Medical University – Varna, Faculty of Medicine, Department of General and  
Operative surgery  
About a dissertation for the awarding of scientific and education degree “Doctor”

**Field of higher education:**

7. Healthcare and sport

**Professional field:**

7.2. Dental medicine

**Doctoral programme:** Dental Imaging Diagnostics

**Author:** Dr Tamara Petrova Petkova

**PhD student** of FDM at MU - Plovdiv

Department of Diagnostic Imaging, Dental Allergology and  
Physiotherapy of Faculty of Dental Medicine at MU - Plovdiv

**Topic:** STUDY OF THE DIAGNOSTIC POSSIBILITIES OF MODERN  
IMAGING METHODS IN PATIENTS WITH CONGENITAL CLEFT LIPS AND  
PALATES

**Scientific supervisors:** Assoc. Prof. Nikolai Sirakov, PhD and Prof. Iliyan Doikov, PhD

### **1. General presentation of the procedure and the candidate**

The review was prepared based on the order of the Rector of MU – Plovdiv № R-476/05.02.2024, with an appointed Scientific jury under the procedure for public defense of the described dissertation work.

The set of materials on paper and electronic media are in accordance with Art. 115 (1) of the Procedure for the awarding of the scientific and education degree “Doctor” at the MU - Plovdiv; Regulations of MU – Plovdiv dated 06.11.2014 and were provided to me within the statutory period.

The candidate has attached three publications and three participations in scientific forums related to the topic of the dissertation work.

All documents are prepared and presented properly.

### **2. Brief biographical data of the candidate**

Dr. Petkova was born on February 27, 1984.

In 2009, she completed higher education as a Master of Dentistry at the Faculty of Dental Medicine at the Medical University - Plovdiv.

From 2010 to 2015, she worked as a doctor of Dental Medicine at AIPPPDM "Blaga Stoicheva".

From 2015 until now, she has been working as a doctor of Dental Medicine and is the Manager of her own practice, AIPPPDM "Tamara Petkova".

In 2018, Dr. Petkova was enrolled as a full-time PhD student at the Department of Diagnostic Imaging, Dental Allergology and Physiotherapy at the Faculty of Dental Medicine of the Medical University of Plovdiv.

From March 2022, she is a specialist in the same department.

Dr. Petkova is a member of:

- Bulgarian Dental Union (BDU)
- Bulgarian Scientific Society of Dental Medicine (BSSDM).

She has fluent written and spoken English.

### **3. Actuality of the topic and appropriateness of the set aim and tasks**

The topic of the dissertation examines a current and important problem for medical science and practice. The aim is clearly formulated, the tasks are defined correctly and are carried out using modern research methods.

### **4. Relevance of the problem**

In her dissertation, Dr. Tamara Petkova demonstrates in-depth knowledge of the topic she is developing.

Congenital clefts of the lip and palate (CLP) are among the most common craniofacial malformations and account for 15% of all congenital anomalies. In 80% of cases, they are non-syndromic isolated forms. They are epidemiologically, embryologically and etiologically unique. For the correct diagnosis and quality treatment, it is important to choose the most suitable imaging method. In this sense, cone beam computed tomography (CBCT) is an advanced imaging technology. It is based on computed tomography (CT), in this case to

visualize the facial, jaw and skull bones. One of the key advantages of CBCT over 2D radiography is its ability to provide 3D volumetric, surface, and sectional information about facial, maxillofacial, and cranial structures.

Dr. Petkova has done a thorough critical analysis of the literature and shows skills for independent conduct of scientific research. The presentation is written in good scientific language.

#### **5. Research methodology**

On the basis of the analysis of the scientific research carried out on the problem, the aim of the scientific development was deduced, as follows:

**“To evaluate the possibilities of cone beam computed tomography in patients with congenital cleft lip and palate as an optimal imaging method for preoperative monitoring and postoperative follow-up“.**

The realization of the aim was achieved through the implementation of six main tasks, namely:

1. To investigate the diagnostic possibilities of CBCT in congenital cleft lip and palate and to analyze the factors influencing its application for preoperative evaluation.
2. To determine whether there are gender differences and dependencies with indicators associated with congenital clefts of the lip and palate.
3. To analyze the relationships between indicators characterizing the clinic of congenital clefts and variables associated with bone grafting.
4. To investigate the prevalence of cone beam computed tomography as a method for immediate assessment of congenital clefts of the lip and palate.
5. To establish parents' awareness of the advantages and disadvantages of the method and its popularity among them.
6. To develop a diagnostic-therapeutic algorithm for congenital clefts of the lips and palate, including the application of CBCT.

#### **Study design**

Scientific methods and approaches are applied in the dissertation, such as:

- Medical-sociological methods (documentary method, survey, interview, etc.);
- Medical-statistical methods (descriptive, variational, non-parametric, etc. analyses);
- Clinical research methods (anamnesis, status, paraclinical studies, imaging with CBCT scan, OPG, etc.);
- Methods from ethnology - to establish the attitude of Bulgarian patients towards cone beam computed tomography, etc.

#### **Study location:**

The study was conducted at the UMBAL "St. Georgi" in the city of Plovdiv, the Faculty of Dental Medicine of the Medical University of Plovdiv and the Faculty of Dental Medicine of the Medical University of Sofia.

**Study time:**

The study was conducted from 06.2020 to 06.2022. The results are recorded in a clinical statistical card compiled for the project.

**6. Material**

In the first part of the study, 222 patients with anomalies of the upper lip and palate were included, to whom the cone-beam computed tomography method was applied. The study was conducted with Planmeca Pro Max 3D; image size  $\varnothing$  8.0 x 5.0 cm (401 x 401 x 251); voxel size ( $\mu\text{m}$ ) 200; kV 90; mA 6; DAP ( $\text{mGy} \times \text{cm}^2$ ) 407,7; slice thickness 0,6 mm.

Among the main indicators we studied were:

- accompanying abnormalities/syndromes;
- prevalence of the anomaly - unilateral/bilateral;
- symmetry of the anomaly-bilateral asymmetric/bilateral symmetric;
- volume of the anomaly - complete/incomplete;
- position of the anomaly - right/left;
- extent of abnormality - affects lip/alveolar ridge/palate;
- displacement of the alveolar fragments - yes/no;
- presence of nasal deformities - small/large;
- arch shape (AF);
- nasal cavity communication (OAC);
- teeth adjacent to the cleft (number and shape) (D);
- missing teeth;
- misshapen teeth;
- right cleft volume  $\text{cm}^3$  (CA);
- left cleft volume  $\text{cm}^3$  (CA).

In the second part of the dissertation, a "case-control study" was conducted on a part (90 patients) of the main sample (222 cases).

The "cases" are those with bone grafting - 54 patients.

The "controls" were without bone grafting and were age-matched - 36 patients. A criterion for inclusion in this part of the study is that additional ones have been performed - measurement with CBCT of the exact volume of the congenital cleft, the presence of osteosclerotic tissue around the cleft, data on hypertrophy of the mucous membrane of the maxillary sinus, etc.

To collect the information about the "cases" and for its processing and analysis, a registration method was used, in which the primary data for each examined patient was collected through a Research Protocol. Similarly to the created database of cases, a database of controls with the same information was also developed.

**Research bodies:**

The study was conducted with the personal participation and control of the doctoral student.

The number of logical units is sufficient for the formulation of conclusions of good scientific value.

The signs by which the studied contingent is observed are divided into two groups:

**1. Resultant signs:**

- number of congenital cleft lips and palate, type of congenital cleft lips and palate, type of

the performed diagnostics. type of treatment performed;

- accompanying anomalies; prevalence of anomaly;
- symmetry of the anomaly-bilateral asymmetric/bilateral symmetric;
- volume of the anomaly;
- position of the anomaly;
- extent of the anomaly;
- displacement of alveolar fragments;
- presence of nasal deformities;
- dental arch shape;
- communication with the nasal cavity;
- teeth adjacent to cleft;
- missing teeth;
- misshapen teeth, etc.

## **2. Factorial signs:**

- age;
- sex;
- education and profession;
- data for parents of the patients.

## **Statistical methods:**

The following statistical and mathematical methods were used to objectify the results of the conducted analyses:

All statistical analyzes were performed using the statistical program SPSS ver. 21.0. Methods that have proven their suitability for analysis in epidemiological studies are applied:

- *Descriptive analysis:*
  - One-dimensional tables of the frequency distribution (determining the structure by means of relative shares) and of the variety of signs characterizing the considered phenomena;
  - Two-dimensional tables of the frequency distribution (cross-tabulation) to look for a relationship between two categorical variables.
- *Non-parametric methods* – searching for a statistical relationship between two characteristics, nominally or ordinaly scaled, by using  $\chi^2$  (chi-square method). For some signs with a different than normal distribution, it was necessary to perform an analysis in complex and combination tables and the need to prove a working hypothesis. For the evaluation of hypotheses (Pearson's agreement criterion ( $\chi^2$ -chi-square), Fisher's exact test and Likelihood ratio) were used: for the difference of related or independent samples (Wilcoxon and Mann-Whitney test).

The main objective of the statistical analysis of the case-control data from the study is to determine the magnitude of the risk of developing a given complication/condition depending on the exposure to the studied risk factor by calculating the adjusted odds ratio (OR) and its 95% confidence interval.

- *Graphical analysis* – to visualize processes and phenomena.

## 7. Characterization and evaluation of the dissertation work

The dissertation work meets the requirements of the LDASRB and the relevant rules of the MU – Plovdiv. It contains 170 standard pages. Illustrated with 63 tables, 91 figures and 38 appendices. The literature survey includes 168 sources, of which 8 are in Cyrillic.

The results of the study are comprehensively and correctly described, analyzed and interpreted.

The discussion follows the same sequence as the order of results. After each of the tasks there are logically arranged conclusions. Conclusions are specific and reflect in summary the results related to the main and most important aspects of the development.

The dissertation work was discussed and directed for the defense of an extended departmental council of the department of "Diagnostic imaging, dental allergology and physiotherapy" of FDM. MU - Plovdiv.

### Conclusions drawn after discussion of the results:

The dissertation ends with conclusions based on the results of the discussion and the

r  
e  
e ➤ Mean cleft volume in women was significantly greater than that of men in both locations, regardless of whether or not bone grafting was performed.

u  
u ➤ In cases with bone grafting, the mean volume of the cleft on the left side in women decreased nearly twice, and the volume of the cleft on the left side in men after surgery decreased nearly threefold.

i  
i ➤ Missing teeth are more typical for women, while for men cases with missing teeth and with supernumerary teeth or/and those with a changed shape predominate. Gender specificity of the specific missing teeth was established in both sexes.

➤ Males with CLP were more than three times more likely to also have misshapen teeth, OR = 3.441, than females.

e  
e ➤ In cases without bone grafting, osteosclerotic bone structure around the cleft occurs twice as often in men - 50% than in women - 25%. After bone grafting, the ratio changes, and in women the cases with osteosclerotic tissue around the cleft become almost three times more than before the surgical intervention – 66.7%. It is likely that women do not tolerate this type of surgery well.

r  
r ➤ The volume of the clefts after bone grafting decreases both on the left and on the right, but the decrease is twice as pronounced for the volume of the clefts on the left -  $r = -0.470$ ,  $p = 0.000$  than on the right -  $r = -0.229$ ,  $p = 0.087$ .

i  
i ➤ In patients with complete clefts, significantly more frequent are cases with: osteosclerotic bone structure around the cleft; missing teeth, with a nearly four times higher risk of missing teeth, OR = 3.889; presence of misshapen teeth, with the probability of being more frequent being nearly twice as high, OR = 1.607, compared to cases with an incomplete cleft; oval shape of the upper dental arch – 47.8%, followed by cases with a triangular shape – 34.8%.

n  
n ➤ The high level of education of the parents of patients with CLP is associated with a higher degree of awareness of the CBCT method, as well as with an increase in the relative share of those whose children have had it applied.

a  
a ➤ Older parents are more informed about the advantages and disadvantages of CBCT and in their children it is the most commonly used method.

e  
e ➤ Among working parents, the share of those who are familiar with the advantages and

a  
s

f  
o

disadvantages of CBCT increases and the relative share of those whose children have used it is the highest.

#### **Contributions and significance of the development for science and practice:**

The following contributions are outlined in the dissertation:

1. An optimally balanced algorithm is offered for diagnosis, tracking the dynamics of the disease, reporting the therapeutic result after bone grafting, analysis and description of patients with congenital clefts of the lips and palate.
2. The level of application of the cone-beam computed tomography method in patients with congenital clefts of the lips and palate is analyzed.
3. The factors affecting the application of the cone-beam computed tomography method in patients with congenital clefts of the lips and palate are analyzed.
4. The level of awareness of the parents of patients with CLP and their attitude towards the cone-beam computed tomography method are studied.
5. The types of congenital clefts of the lips and palate are systematized, the features and problems in the diagnosis of each of them are described.

#### **8. Evaluation of publications on the dissertation work:**

Three publications and three participations in scientific forums related to the dissertation have been presented, with Dr. Petkova being the lead author in them, namely:

#### **SCIENTIFIC PUBLICATIONS:**

1. T. Gateva, N. Sirakov, P. Kanazirska, I. Angelova, K. Gigov. Application of cone-beam computed tomography in patients with cleft lip and palate. Scientific works of the Union of Scientists in Bulgaria - Plovdiv, series G. Medicine, Pharmacy and Dental medicine, 2022; Vol. XXVIII: 306 -309.
2. T. Gateva, N. Sirakov. MODERN DATA ON THE FREQUENCY AND CLASSIFICATION OF CONGENITAL CLEFT LIP AND PALATE. MODERN MEDICAL SCIENCE. 2023;1:14-29.
3. T. Gateva, E. Karaslavova, N. Sirakov. GENDER CHARACTERISTICS AND DEPENDENCIES WITH INDICATORS ASSOCIATED WITH CONGENITAL CLEFT LIP AND PALATE. Journal of environmental protection and ecology, 2024; 1; vol. 25.

#### **Participation in scientific forums:**

1. T. Petkova, N. Sirakov, P. Kanazirska, I. Angelova, B. Petrova, G. Iordanov. A pilot cone-beam computed tomography study of two patients with congenital cleft lip and palate. Second scientific congress of FDM together with RK of BZS "Science and practice - hand in hand", April 12-13, 2019, Plovdiv (POSTER)
2. J. Anastasov, K. Gigov, Y. Markova, R. Hatar, P. Petrov, R. Velikova, H. Jeliakov. A. Gulev, T. Petkova, P. Tcarvulanova, K. Bojikova, N. Slaninkova, N. Pareva, M. Kazakova. Practical use by patients and specialists of the Electronic Medical Record for Facial Anomalies in Bulgaria (EMDLA): 5-year experience. 4th National Conference on Plastic-Reconstructive and Aesthetic Surgery, May 3-5, 2019, k.k. Golden Sands, Varna (session 5) ISBN:978-619-241-048-3. стр. 55-56

The dissertation shows that the PhD student, Dr. Petkova, possesses in-depth theoretical knowledge and professional skills in the specialty "Dental Image Diagnostics" by demonstrating qualities and skills for independent conduct of scientific research.

Based on everything noted here, I accept that the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Implementation of LDASRB and the relevant Regulations of the MU - Plovdiv have been met. The presented materials and dissertation results **fully correspond** to the specific requirements of the MU - Plovdiv.

**In conclusion:** I confidently give a positive vote of the dissertation work on the topic: **"STUDY OF THE DIAGNOSTIC POSSIBILITIES OF MODERN IMAGING METHODS IN PATIENTS WITH CONGENITAL CLEFT LIPS AND PALATES "** and I will vote "YES" for awarding the scientific and educational degree **"Doctor"** in the scientific specialty **"Dental Imaging Diagnostics"** of **Dr. Tamara Petrova Petkova.**

03.03.2024

Review prepared by:  .....

(Prof. Dr Rosen Gospodinov Kolarov, PhD)

Залчено на основание  
Чл.5 §1, 6. "в" Регламент (ЕС)2016/679