Review

by Prof. Dr. Stefan Ivanov Siromashki, MD

on the dissertation for awarding the educational and scientific degree "Doctor", on the topic:

„ Speciality in the application of fibrous composite splints made by CAD/CAM technology in the treatment of periodontally compromised teeth"

Dr. Yanko Dimitrov Zhekov

for awarding the educational and scientific degree "Doctor"

Scientific specialty: Prosthetic dentistry-Plovdiv.

Academic supervisors:

Prof. Dr. Hristo Kisov, MD

Assoc. Prof. Dr. Elena Firkova, MD

Plovdiv, 2021

Dr. Zhekov presents all the necessary administrative documents according to the rules for awarding educational and scientific degrees "Doctor", doctoral program "Prosthetic Dentistry".

The review was prepared in accordance with the requirements of the Law on the Development of the Academic Staff of the Republic of Bulgaria and the Regulations for the Development of the Academic Staff of the Medical University - Plovdiv.

Dr. Zhekov presents a dissertation of 186 pages as follows;

Contents - 3 pages

Abbreviations used in the text - 1 page

Introduction-1 page

Literary review-36 pages

Analysis of lit. overview-1 page

Aim and tasks-1 page

Material and methodology - 32 pages

Results and discussion - 70 pages

Recommendations - LDM and Dental Technicions - 3 pages

Conclusion - 1 page

Contributions-5 p.

Inferences-2 pages

Bibliography-24 pages

Appendices-5 pages

Publications and participations-2 pages

The dissertation is illustrated with 72 figures and 54 tables. Bibliography contains 229 sources from them in Cyrillic-68 and in Latin -161.

Autobiographical data: Dr. Yanko Dimitrov Zhekov was born on July 12, 1990 in the town of Kardzhali. He graduated from a language school 2009. In 2015 graduated from MU - Plovdiv with a degree in Dental Medicine. Since 2016 is a postgraduated in Prosthetic Dentistry at the FDM of MU-Plovdiv. In 2017 Dr. Zhekov is an assistant at the FDM - Plovdiv, Department of Prosthetic Dentistry. He is a member of the Bulgarian dental association and the Bulgarian Academy of Aesthetic Dentistry. As a graduate student, he is developing a

dissertation on "Speciality in the application of fibrous composite splints, made by CAD/CAM technology in the treatment of periodontally compromised teeth"

Literature review

Dr. Zhekov with great competence performs an in-depth historical review of the various ways to stabilize periodontally compromised front teeth from the dawn of humanity to the present day. In different epochs of human history, aesthetics in its various forms has occupied an important place in the lives of our ancestors. The first attempts to immobilize loose teeth were with floss of plant and animal origin. In later periods.

The Phoenicians and Etruscans used silver and gold wires to splint their teeth. In the second half of the 19th century, the methods of splinting were improved, which are fixed and are divided into two groups depending on the method of attachment to the teeth. According to a number of researchers, splints contribute to the distribution of load during the chewing process, which favors the healing process. Dr. Zhekov presents a classification of the various splints, dividing them into temporary, semi-permanent and permanent, and relative location to the hard dental tissues - intracoronary and extracoronary. It reviews the materials used to make the splint. Analyzes the positive and negative qualities of different types of splints. An important place in the literature review is occupied by the classification of fibrous materials for splinting:

1) Materials based on inorganic fillers (glass fibers)

2) Materials based on organic fillers (polyethylene)

The material used is of great theoretical and practical importance.

In recent years, CAD/CAM technology has been used to make the splints.

Dr. Zhekov considers various qualities of the used materials for splints, such as micro-tensile test, micro-shear test, adhesive strength and finally looks

at the most modern methods and evaluates the surface roughnes. For this purpose he uses atomic force microscopy.

Dr. Zhekov makes a critical analysis in the literature review of both the methodologies and the materials used.

Aim and tasks of the dissertation

Aim: To study the advantages of fibrous composites for the production of splinting structures using CAD/CAM technology.

To accomplish this aim, four tasks are set, with the first task having two subtasks.

The purpose and tasks for its implementation are well formulated.

Materials and methods

The methodologies and apparatuses used in the scientific research are at a high modern level, giving the opportunity to obtain aim and reliable results, as well as to obtain an adequate answer to the aim in dissertation.

The specimens are made according to the international standard ISO-29022.

Dr. Zhekov used the following materials in the study;

Fibrous composite, thermoplastic high-tech polymer based on REEK, hybrid ceramics and ceramics based on zirconium dioxide.

Results and discussions

The tested samples are made of four different materials, which are subjected to treatment with diamond drill, sandblasting and laser treatment. During processing, a different behavior is found for each sample. The same roughness is observed after processing with a diamond file and sandblasting for the Trilor sample. The largest difference in roughness after these two treatments

was observed with BioHPP, where after sandblasting it was three times rougher compared to diamond file treatment.

The treatment affects the mechanical strength of the connection by improving it.

In the case of fibrous composite material, the bond strength is increased 1.4 times after laser treatment. The largest change in bond strength occurs during sandblasting (more than twice).

In the case of BioHHP material, the bond strengths have the lowest values and although this has an improvement in bond strength.

Vita Enamic bond improvement after laser treatment is 34%. In the diamond drill the bond strength reaches the highest values - 57%.

ZrO_2-based ceramics have a good mechanical bond without pre-treatment. After laser treatment, the bond strength increases by 48%.

From the tested samples of the four used materials, subjected to polishing, glazing and nanophilic coating, different behavior was observed for each sample. In addition to the polishing process, glazing on the surface of a structure is used as a coating as a finishing procedure. Glazing is a procedure that reduces the surface roughness of the material and improves the aesthetic appearance in the form of aesthetic brilliance. With each nanophilic coating, leveling of the surface is observed due to the application of the additional layer on the polished surface. The application of the nanophilic coating improves the smoothness of all samples except zirconium ceramics. The smoothest surface is observed after polishing.

The manufactured braces are characterized by high accuracy of fitting to the hard tooth tissues. With the use of CAD/CAM technology it is possible to accurately reproduce all the planned parameters of the future splint: Thickness, shape, distance to the marginal edge of the gum and the cutting edge of the

tooth. In this way the human factor is reduced to a minimum, which in most cases negatively affects the accuracy of the construction.

Contributions

Dr. Zhekov presents 6 scientific and applied contributions, 5 of which were first developed and applied in Prosthetic Dentistry.

Contributions of a confirmatory nature are 7 pieces, which enrich the scientific knowledge of LDM and dental technicians. With their introduction in everyday practice, the healing process in making splints will be improved.

Abstract

The content and quality of the abstract meets all the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria. The abstract is presented with great precision and high scientific competence, which is duplicated in an abbreviated form of the dissertation.

Critical notes:

The dissertation is saturated with photos and tables, while the commentary is minimal and somewhere missing.

There is incorrectly placed material in the literature review, its place is in the section "Results and discussions". These critical remarks are capable of lowering the scientific merits of the dissertation.

Publications and participations related to the dissertation.

Full-text publications: 3 issues, Participations: 3 issues

In all publications Dr. Zhekov takes the first position.

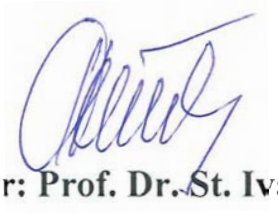
Completed intra-university project-11/2018 MU Plovdiv

Conclusion

The dissertation is an original contribution to science and meets all the requirements of the law for the development of the academic staff in the Republic of Bulgaria. In the dissertation Dr. Zhekov considers for the first time in our country the application of fibrous composite splints made by CAD/CAM technology. He was the first dentist to reveal the little-known and used aesthetic materials for splinting loose teeth. In addition, the dissertation creates scientifically differentiated methods using state-of-the-art instruments and microscopes.

Dr. Zhekov presents recommendations to dentists and dental technicians when splinting periodontally compromised teeth with fibrous composite splints made by CAD/CAM technology. These recommendations are important contributions to clinical practice and theory. It is understandable that Dr. Zhekov undoubtedly has in-depth theoretical knowledge and skills for independent research. The conclusions he presents have scientific and applied significance for dental practice and theory. The dissertation is mostly a personal work. The dissertation meets all the mandatory conditions of the scientometric criteria for awarding the title "DOCTOR". Due to the above, I confidently give my positive assessment of the research and scientific contributions in the field of dental medicine.

As a member of the scientific jury, I will vote confidently with "YES" for the award of educational and scientific degree "DOCTOR" to Dr. Yanko Dimitrov Zhekov



15.10.2021 **Reviewer: Prof. Dr. St. Ivanov. Dm**

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