

STATEMENT

From Prof. Plamen Marinov Gatsov, MD, PhD, DSc

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Regarding the doctoral thesis

APPLICATION OF ECHOCARDIOGRAPHIC METHODS FOR FUZZY
STRATIFICATION DETERMINING THE VOLUME OF SURGERY IN
PATIENTS WITH ISCHEMIC MITRAL REGURGITATION

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For awarding the educational and scientific degree PHILOSOPHY DOCTOR in
the scientific speciality "Cardiology"

7. Healthcare and Sports – higher education area,

Professional field 7.1 Medicine

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1. Relevance of the thesis

Cardiovascular diseases are among the most prevalent in the countries of Europe and North America. In Bulgaria, they are responsible for about 2/3 of the population's mortality. Ischemic heart disease (IHD) is the leading among them. Despite major advances in the treatment of IHD through medical, interventional and surgical methods, many unresolved issues remain. One of them is whether and when to perform surgical treatment of secondary mitral insufficiency (regurgitation) in IHD patients. The question of whether to perform only surgical coronary revascularization – isolated coronary artery bypass graft (CABG) or combined treatment – CABG + MV Repair (Mitral Valve Repair) with various surgical techniques (mitral valve preservation or mitral valve prosthesis) is still debatable. The development of explicit algorithms for managing these patients would greatly facilitate decision-making by the so-called Heart team. The development of such functional and scientifically founded algorithms is the aim of Dr. Daniela Panayotova's thesis.

2. Thesis structure

a. Literature review

The literature review is presented in 53 pages. It is comprehensive and addresses all aspects of the issue from every perspective. It is based on the analysis of an extensive bibliography, including 324 scientific publications, all in English. Its conclusion and the main outstanding matters are outlined in 6 points.

b. Aim and objectives

The aim, in summary, is to present, in a more precise, digitized format, the individualized expert approach in the decision-making process of the Heart team – for standard isolated CABG surgery or combined (CABG + MV Repair or isolated CABG surgery) treatment of patients with IHD and significant chronic IMR. This decision is based on standardized echocardiographic parameters

(preoperative, early and late postoperative periods) and the patient's clinical condition. The 5 tasks that have been selected are meant to attain the stated goal.

c. Materials and methods

In this thesis, the study is based on a sample of 169 patients, divided into approximately equal size groups according to the inclusion and exclusion criteria, respectively: a combined intervention: revascularisation + MV plasty (MV Repair + CABG (group A), and 84 had isolated revascularisation (CABG – group B). They were further subdivided according to their clinical condition – relatively preserved medical status (A1 and B1) and relatively deteriorated medical status (A2 and B2). The main methods are transthoracic and transesophageal echocardiography (performed preoperatively, in the early and late postoperative periods), with detailed descriptions of the performance technique and measured parameters; a specially developed database including anamnestic and clinical parameters. The employed methods involve the created algorithms for selecting the specific type of surgical procedure. The mathematical models ascertain the level of a single patient's inclusion in a particular subgroup. The quality assessment of the individual algorithms is described in detail.

d. Results and discussion

In the Results section, the practical application of the established models is presented by a complete system of examples digitally showing the potential classification of each patient case into the 4 redefined groups. It can be seen that the main percentage of patients was correctly classified (coefficient above 0.5) by the Heart team.

e. Conclusions and Contributions

Dr. Panayotova claims 6 contributions: 3 of the contributions are related to establishing the respective algorithms determining the degree to which a particular patient belongs to one of the redefined groups. Another contribution is

the presentation of all 49 potential results of the suggested algorithms. An additional contribution is updating and broadening the existing CSC database (Cardiac Surgery Clinic at St. Marina University Hospital) of patients with IHD complicated with IMR. Last but not least among the contributions is the demonstrated positive influence of annuloplasty on the degree of mitral regurgitation and regurgitation fraction.

3. Thesis-related publications

Dr. Daniela Panayotova has submitted 4 scientific thesis-related publications published in English language journals, in which she is a co-author.

4. Some critical remarks

The "Results" section contains elements that supplement what is discussed in the "Methods" section.

5. Conclusion

Dr. Daniela Panayotova's thesis is a serious attempt to mathematically quantify and "digitize" the clinical approach in the decision-making process for conducting the surgical repair of ischemic mitral regurgitation in patients undergoing aorto-coronary bypass grafting for ischemic heart disease. This method endeavours to standardize the approach to these patients.

I believe Dr. Panayotova's thesis has the required characteristics for awarding the educational and scientific degree "Philosophy Doctor", and I vote in favour of it.

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