

REVIEW

by

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Regarding: The thesis of Dr. Yasen Svetlomirov Getsov, doctoral student of independent training from OAIL at the Cardiovascular Center - "Acibadem City Clinic UMBAL" EOOD on the topic: "**Change in operative tactics based on intraoperative transesophageal echocardiography**" for the award of educational and scientific degree "Doctor"

Procedural comments

By order No. 10-07-33#5 of 26.07.2023 based on Art. 4, para. 2 of the Law on the Development of the Academic Staff in the Republic of Bulgaria, on Art. 2, para. 2 of the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria, and Art. 3, paragraph 2 in connection with Art. 32, para. 3 of the Regulations on the terms and conditions for awarding scientific degrees and holding academic positions at "Acibadem City Clinic UMBAL" EOOD and decision of the Scientific Council of "Acibadem City Clinic UMBAL" EOOD with Protocol No. 18 of 19. 07. 2023, I have been designated as an internal member and head of the Scientific Jury for the review writing procedure.

General presentation of the procedure and the PhD student

Dr. Yasen Getsov graduated from the Medical University of Sofia in 1999. From 2000 to 2007, he worked at UMBAL "St. Ekaterina" as a resident doctor and specialized in Anesthesiology and intensive care. He acquired a specialty in Anesthesiology and intensive care in 2006. From 2007 to 2013, he was an anesthesiologist at Tokuda Hospital Sofia. Currently, Dr. Yasen Getsov holds the position of physician-anesthesiologist in the department of Anesthesiology and Intensive Care of "Acibadem City Clinic UMBAL" - cardiovascular center. In 2009, he graduated with a master's degree in Health Management. From 2011 to 2012 and from 2017 to 2018, he worked at University Hospital Southampton NHS in the positions "Clinical fellow" and "Specialist registrar" respectively. Currently he is a part time teacher in Anesthesiology and Intensive care classes of medical students.

In 2012, after passing an exam, he acquired a certificate for transesophageal echocardiography (TOE) in adults at the EACVI, renewed in 2018 and 2023.

He is a member of the American Association of Cardiovascular Anesthesia - SCA.

Dr. Getsov has been a speaker at numerous Congresses on Anesthesiology and Intensive Care, Cardiology, Cardiac Surgery and Echography, as well as training seminars on transesophageal echocardiography. He is the author of a chapter in a monograph concerning the percutaneous treatment of mitral insufficiency with the Mitraclip system and of articles in Bulgarian journals on cardiology and neurosonology.

The thesis of Dr. Yassen Getsov, submitted for defence, consists of 167 standard printer pages, of which 88 pages are an introduction and literature review, 55 pages are own studies and 17 pages are the attached bibliography. 10 tables, 9 diagrams, 1 scheme, and 84 figures are included in the thesis. The bibliographic reference presents 134 sources - 11 in Cyrillic and 123 in Latin, listed in alphabetical order. The PhD student has 3 publications on the topic.

The dissertation is structured in the classical way according to the generally accepted requirements in Bulgaria. The detailed literature review is impressive, which occupies a larger than usual part though very important for further understanding of the thesis.

Relevance of the topic

The topic of the PhD thesis is very contemporary, both in theoretical and in scientific and practical aspect. The grounds for this claim are as follows:

1. Cardiac surgery undergoes serious development from the point of view of operative technique, which would be impossible without the support of intraoperative transoesophageal echocardiography (TOE);
2. Surgical operations such as mitral valve repair, especially techniques with neochordae implantation and minimally invasive cardiac surgery, are practically impossible without intraoperative TOE;
3. The post-operative deaeration of the heart chambers cannot be verified without intraoperative ultrasound.
4. Changing the initial operative plan can lead to changes in perioperative morbidity and mortality as well as to medico-legal problems.
5. This is the first study concerning this topic that has been conducted in our country.

Knowing the problem

The author has thoroughly familiarized himself with the scientific literature on the matter which is seen from the literature review. The main conclusions are:

1. Opportunities which intraoperative TOE gives were pointed thoroughly, namely clarification of the subtle mechanisms of valve lesions, the assessment of the immediate result of the surgery, as well as the information intraoperative TOE gives in case of difficult weaning from cardio-pulmonary bypass (CPB).
2. Attention was paid to the methodology of performing the ultrasound examination and the process of certification of doctors in other European countries and USA on the one hand and Bulgaria on the other;

3. In Bulgaria, there are no recommendations for conducting an intraoperative ultrasound examination;
4. There is no evidence that such research has been done in Bulgaria.

Thus, the meaning of the study is fully justified.

The formulation of the goal and tasks derives from the conclusions of the overview.

The material and methods give full reason to trust the results obtained.

A total of 338 patients divided into two groups operated- first group year 2017 consist of 152 patients and second group year 2021- 183 patients. In the first group are patients without intraoperative TOE. The second group included patients who were indicated and received intraoperative TOE according to the SCA and EACVI recommendations.

In the group with performed intraoperative TOE, patients with different pathologies were examined, including valvular diseases affecting one or more valves at the same time, as well as patients with coronary artery disease, aortic dissection and patients with congenital heart diseases patients undergoing minimally invasive cardiac surgery patients and patients with hemodynamic instability. In some patients TOE exam was on demand i.e. there weren't indications for it was requested to clarify the pathology.

The new information found is divided into essential, supplementary, informative and non-essential depending on the type of the operational plan it has led to.

Attention was paid TOE guided deaeration of the cardiac chambers before coming off bypass.

The statistical processing of the results was performed with the statistical package SPSS (Statistical Package for the Social Sciences) version 20.0

Quantitative variables are represented by summarizing statistical characteristics - arithmetic mean (Mean), standard deviation (SD); minimum and maximum value.

Categorical variables are presented by absolute (N) and relative (%) frequencies.

One-Sample Kolmogorov-Smirnov test for checking the shape of frequency distributions for quantitative variables.

Chi-square test or Fisher's exact test - when examining dependencies between descriptive (categorical) data with two or more categories.

T-test for two independent groups (Independent-Samples t-test) – with a normal distribution of the studied variable in the compared groups.

Non-parametric Mann-Whitney test (Mann-Whitney test) – when comparing two independent groups when the shape of the frequency distribution is different from the shape of the normal distribution.

The accepted level of significance is $\alpha=0.05$. Statistical significance was assumed when the p value was less than α ($p<0.05$).

Characterization of the results and discussion

The most important results, in my opinion, are:

1. A change in the operative plan occurred in 56% of the patients in the group with performed intraoperative TOE;
2. In 23%, of the patient information found led to a significant change in the original plan, i.e. it was classified as essential information. In the largest group of patients- 57% -information was complementary. It was informative in 16% and insignificant in 4%. There are no patients for whom no information was found.
3. The percentage of newly discovered pathology concerning the mitral valve is the highest - 11.5%
4. Impressive is the discovery of new information in single patients that is potentially life-saving - for example, mobile calcium plaque in a patient with aortic dissection causing dynamic obstruction of the left main stem, high gradient in LVOT, calcium in the aortomitral continuum etc.
5. Mitral chordae measurement can solely be done with intraoperative TOE.
6. After weaning from CPB in 8 patients, TOE found suboptimal result and second run of CPB needed to correct pathology.
7. In 60 patients, additional deaeration of cardiac chamber was performed potentially reducing post-operative neurology complications.
8. Complications of intraoperative TOE were analyzed and were found usually mild and transient.
9. A conclusion was made about the difference in the larger percentage of patients in which some change in the plan occurred compared to data from foreign authors.

I agree with the conclusions and described contributions according to the author.

Conclusion

1. For the first time, a similar study was conducted in Bulgaria. A large number of patients were covered - 183.
2. The study clearly shows the possibilities that intraoperative TOE has in the course of surgical interventions.
3. I fully agree with the developed algorithm for indications for intraoperative transoesophageal echocardiography.

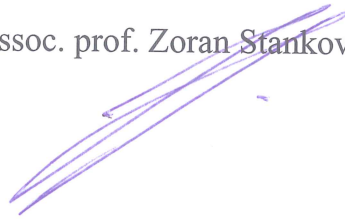
I give a positive vote for awarding educational and scientific degree "Doctor" in the doctoral program "Cardiology" to Dr. Yassen Svetlomirov Getsov, and recommend the

members of the honorable Scientific Jury to positively support the thesis submitted for defense.

15. 10. 2023

Sofia

Assoc. prof. Zoran Stankov, DM

A handwritten signature in purple ink, consisting of several overlapping, fluid strokes that form a cursive name, likely 'Zoran Stankov'.

