

REVIEW

by

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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, and Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria, and 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 of the Scientific Jury for the review writing procedure, regarding: The thesis of Dr Yasen Svetlomirov Getsov, doctoral student from ICU at the Cardiovascular Centre - "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".

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 anesthesiologists at Tokuda Hospital Sofia.

Currently, Dr Yassen Getsov holds the position of physician-anaesthesiologist in the OAIL of "Acibadem City Clinic UMBAL" - cardiovascular centre. 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. Dr Getsov holds certificate for Adult transoesophageal Echocardiography issued by European Association of Cardiovascular imaging and European Association of Cardiothoracic Anesthesiologists and performs intraoperative and interventional procedure echocardiography since 2013. Latter has given the opportunity to develop the above mentioned doctoral thesis.

INTRODUCTION The thesis of Dr Yassen Getsov, submitted for defence, consists of 167pages, bibliographic reference and some addenda. It is well structured, contains all necessary parts and meets all legal requirements.

The topic of the thesis i.e. intraoperative echocardiography is up to date. This method has been introduced back in 1980 and is routinely applied in cardiac surgical theatres since. It offers opportunity to precise the preoperative echo findings and helps with taking final decision for surgical plan. Newly found structural lesions of valves and myocardium and staging of abnormalities can lead to change in operative technique. Intraoperative cardiac echo gives the opportunity to improve and objectify of the immediate surgical results, to diagnose of postoperative complications, improving of post CPB heart deairing. The goal of the thesis presented by Dr Getsov is to reveal the opportunity of intraoperative echocardiography to be used in anaesthesiologist's practice and its influence on the operative plan as well.

LITERATURE REVIEW

Literature review is exposed in 88 pages, 55 pages are own studies and 17 pages are the attached bibliography. Ten 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. All information included is contemporary and mature. Literature review consists of comprehensive information about the present state of scientific knowledge of the possibilities intraoperative transoesophageal echo offers. Of the topics that are discussed most important are:

- Assessing of valvular structure and function
- Diagnostic of intracavitary thrombus and tumour
- Intracardiac shunts
- Evaluation of pericardial/ pleural effusions
- Deairing of heart chambers
- Assessing of systolic and diastolic function

The most important of all is clarifying of pathology and changing of operative plan based on findings of intraoperative TOE.

As a general rule nationwide is performing of transthoracic echo and relatively rarer pre and intraoperative TOE. No scientific research on the topic of intraoperative TOE can be found in Bulgaria.

GOAL, TASKS, MATERIAL AND METHODS

The goal of the dissertation work, is set to determine the potential of intraoperative TOE to clarify of diagnosis and to help with surgical planning in patients operated under CPB. The goal follows the concluded and unresolved problems in this field. For this purpose seven tasks are set with most important being to determine the differences between initially planned surgical procedure and actual operation performed based on intraoperative TOE conclusions.

The material covers totally 335 patients divided in two groups as follows- 183 in a group with intraoperative TOE performed for a period 2021-2022 and with echo reports in their notes. Control group consists of 152 patients operated in 2017 with no intraoperative

TOE. Thus the material is sufficient to accomplish the tasks set and to achieve credible results.

Methods used are clinical, laboratory, intraoperative TOE, surgical and statistical. The most contemporary methods are applied to accomplish the tasks and to achieve results. The most important of methods is intraoperative TOE. The way the latter is performed and its indications are described in details.

The doctoral student precisely and clearly defines the goal of the dissertation work, namely: "To determine how intraoperative TOE affects the operative technique in cardiac surgical patients operated in the conditions of CPB". The tasks, 9 in number, are composed specifically and correspond to the set goal. Tasks №1 and 2, referring to the determination of the basic data of the included patients and the division of the obtained information into essential, supplementary, informative and non-essential can be combined into one respectively.

The statistical package of various methods is used for data systematization and processing allowing to obtain reliable results.

RESULT ANALYTICS

An analysis is performed concerning the results of surgical interventions and optimisation by the means of TOE performed before, during and post- CPB.

Findings after performing intraoperative TOE are as follows:

In 21% of patients in TOE group essential information was found, in 61% the information was supplemental and in 14% notifying.

In patients with mitral valve surgery:

- In 9 patient new information was found
- In 9 patients planned mitral surgery was abandoned
- In 15 planned mitral valve replacement was swapped to repair and in 8 plan to repair has been changed to replacement

- In 18 there were various minor changes in the initial plan

Four aortic valve procedures and 7 in patients with planned tricuspid surgery were omitted. Four newly found PFO were surgically closed.

Postoperative delirium was found to be twice as less in patients with TOE assisted deairing of heart before coming off by-pass.

Complications were reported in 5% of the TOE group.

DISSCCUSION

Main results are sufficient for scientific conclusions of the PhD thesis to be made.

In the discussion the doctoral student concludes that:

The study shows high percentage in change of initial surgical plan. Only in 44% of the patients initial plan went unchanged. In contrary in 56% there was some sort of alteration in surgery due to intraoperative TOE findings. The percentage is higher than reported in international studies which the doctoral student explains with the patient population and relatively small patient group.

Intraoperative TOE gives final assessment of cardiac pathology and thus lead to change in the initial surgical plan respectively potentially improving operative results. Examples of this is performing mitral valve repair instead of replacement which lowers perioperative mortality and late complications such as prosthetic endocarditis, haemorrhage and embolism.

Doctoral thesis proves intraoperative TOE as a irreplaceable method for finding intra and perioperative complications and assisting deairing of heart, latter lowering risk of air embolism with its consequences.

CONCLUSIONS

Conclusions follow logically results. They synthesize all significant results and clearly and punctually pin down their significance for theory and practice as well as revealing the value of the PhD thesis. Conclusions give the most important results of the doctoral thesis, namely:

- The method of intraoperative TOE clarifies heart pathology

- It is a valuable instrument for finding new pathology
- It is irreplaceable method to evaluate the immediate result of the heart surgery
- It helps with deairing of the heart before coming off CPB
- It is a investigation method of choice for diagnosing new pathology in difficult weaning from CPB
- Deairing lowers postoperative delirium
- Intraoperative TOE led to change in intraoperative tactics in 56% of the patients
- An algorithm for performing intraoperative TOE is proposed

EVALUATION OF THE DOCTORAL THESIS

The examined doctoral thesis is dedicated to a substantial area of contemporary medical science- cardiology and cardiac surgery. Properly set up and constructed, scientific research realizes its intended purpose. Results obtained are clear, supported by statistical reliability, comparable, and applicable in theory and practice.

For the first time in our country a major study is conducted concerning the importance of intraoperative TOE in cardiac surgical practice.

The doctoral thesis demonstrates efficacy of intraoperative TOE for precise diagnostics of heart pathology.

The method of intraoperative TOE clarifies heart pathology and frequently reveals new undiagnosed findings.

In more than half of the patients with intraoperative TOE performed, a change in initial surgical plan has been made.

Clarifying of diagnosis and good operative tactics lead to better operative results.

Intraoperative TOE gives irreplaceable information about intra and perioperative complications and assists with deairing of heart.

An algorithm for performing intraoperative TOE is proposed with recommendations TOE to be applied in all patients with open heart surgery and those with left ventricle ejection fraction (LVEF) below 40%.

Above mentioned conclusions which arise from the doctoral thesis make it valuable work for science theory as well as for cardiac surgery and anaesthesiology practice.

CRITICAL REMARKS

On literature review:

- Some of the information provided is not related to the study
- No accent to the investigated problem is available

On the results:

- The results of the study could be presented in a more systematic and neat way.
- In the order of the conclusions- the first one should be pointed the one showing that in more than of the half of the patients there was some change in the operative plan.
- There is no proposal in which cases a preoperative TOE should be done to lower the frequency of surgical plan

These remarks however, do not diminish the merits of the thesis.

CONTRIBUTIONS

The PhD thesis as a whole possesses various positive capacities. It brings original and confirming contributions. Doctoral student gives nine contributions.

The original and confirming contributions that could be acknowledged are as follows:

- Original theoretical contribution: As such I recognise the one pointed under number five- it demonstrates the way the intraoperative TOE affects decision making in respectively the change of initial surgical plan.

This is actually the most important conclusion being the goal set for thesis defence.

- I personally accept following contributions as confirming: 1, 2, 4, 6, 7 and 9.
- I do not deem contributions under number 3 and 9 with particularly scientific value.

I would accept another three conclusions instead:

- Doctoral thesis proves efficacy of intraoperative TOE as a precise and objective diagnostic tool.
- The method of intraoperative TOE clarifies heart pathology and frequently reveals new undiagnosed findings.
- Intraoperative TOE gives valuable information about intra and early postoperative complications and allows better deairing of heart.

Publications Dr Getsov presents three publications in Bulgarian journals related to the thesis.

CONCLUSION

The thesis submitted for defence by Dr Yassen Svetlomirov Getsov on the topic: "Change in operative tactics based on intraoperative transoesophageal echocardiography" is not only up-to-date, but, with an exceptional practical orientation. The work is complete and in a scientific aspect meets the requirements for the Acquisition of the Educational and Scientific Degree "Doctor". I give my positive assessment and recommend the members of the honourable Scientific Jury to positively support the thesis submitted for defence.

30. 09. 2023

Sofia

Prof. Dr Lachezar Grozdinski



