To

The President of the scientific jury,

determined with order №. RD-26-2089/05.10.2022

to the Executive Director of UMBALSM "N. I. Pirogov" EAD - SOFIA

REVIEW

by Assoc. Prof. Dochka Tsoneva Tobova, MD, PhD,

Department of Anesthesiology and Intensive Care,

Faculty of Medicine, Medical University - Sofia

Clinic of Anesthesiology and Intensive Care of USBALO "prof. Boycho Boychev" - EAD, Sofia

Subject: PhD for awarding the educational and scientific degree “PhD” to Albena Sashova Atanasova,MD - a free PhD student with a training base UMBALSM "N. I. Pirogov" EAD - Sofia, on the topic: "Ultrasound-guided supraclavicular brachial plexus block in children" in professional direction 7.1 "Medicine" and scientific specialty "Anesthesiology and intensive care" with scientific supervisor Assoc. Prof. Rumiana Andonova, MD PhD

By order № RD-26-2089/05.10.2022. of the Executive Director of UMBALSM "N. I. Pirogov" EAD - Sofia and decision of the Scientific Council with Protocol № ND-01-3/21.09.2022. I was appointed as an external member of the scientific jury of the procedure. 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 Chapter II, Section I of PPZRASRB. In my capacity as a member of the Scientific Jury under the present procedure, I declare that I have no common publications and no conflict of interest within the meaning of al. 4, para. 5 of ZRASRB, subject to declaration.

The presented set of materials is in accordance with the requirements of the Regulations for the development of the academic staff at UMBALSM "N. I. Pirogov" EAD - Sofia and includes all necessary documents with sufficient supporting material.

II. Brief biographical data of the PhD student

Albena Sashova Atanasova, MD has a master's degree in medicine from Medical University, Medical Faculty - Sofia since 2012 and the same year she has started working as an anesthesiologist in the Clinic of Pediatric Anesthesiology and Intensive Care of the UMBALSM "N.I.Pirogov" EAD - Sofia. In 2018 acquires the rights of a specialist in "Anesthesiology and intensive care"; from 2016 has a master's degree in "Public Health and Health Management" from the Medical University of Sofia, Bulgaria. Since 2015 is an assistant in anesthesiology and intensive care at Medical College "Yordanka Filaretova" – Sofia. Albena Atanasova, MD has participated in a number of postgraduate training courses in Bulgaria and abroad, including on the problems of regional anesthesia. She is an active member of scientific and professional organizations. She speaks English and German.

III. Actuality of the topic and appropriateness of the set goals and tasks

In recent years, regional anesthesia has been one of the fastest growing aspects of pediatric anesthesia. Regional anesthetic techniques provide superior and long-lasting analgesia without the risk of respiratory depression. Ultrasound navigation during the performance of peripheral nerve blocks significantly increased the efficiency and safety of peripheral regional techniques and provided certainty for their application, including in pediatric patients. Brachial plexus block through supraclavicular access under ultrasound control provides good analgesia in upper extremity operations (arm and forearm) with maximum safety, as well as analgesia and patient comfort in the early postoperative period with accelerated recovery and early rehabilitation.

The indicated data determine the relevance of the presented PhD thesis, in which Albena Atanasova, MD aims to study and evaluate the effectiveness of anesthesia during ultrasound-guided supraclavicular block of the brachial plexus in children undergoing surgery for an arm fracture, diaphyseal or proximal forearm. In order to achieve the goal of this PhD thesis, six specific tasks have been precisely and correctly formulated.

IV. Characteristic and evaluation of the PhD thesis

Dr. Albena Atanasova's PhD thesis is written in 136 pages, well organized in the following main sections: Title page (1 page), Table of Contents (3 pages), Abbreviations used (1 page), Introduction (3 pages), Literature review (29 pages), Aim and tasks (2 pages), Materials and methods (22 pages), Results (47 pages), Discussion (6 pages), Conclusion (2 pages), Outcomes (1

page), Scientific contributions (1 page), Publications and reports (2 pages), Refferences (12 pages) and Appendix (4 pages). PhD thesis contains 24 tables and 26 figures.

V. Knowing the problem

The literature review is very well structured and includes up-to-date information on the epidemiology of upper extremity fractures and bone morphologies in children, anatomical features and techniques for regional brachial plexus block, the role of nerve stimulator and ultrasound in regional anesthesia, the specific challenges of regional anesthesia in children and the experience in our country. The advantages of ultrasound-guided regional anesthesia (in particular brachial plexus block with supraclavicular access) for perioperative analgesia in pediatric upper extremity fractures as an effective, reliable and safe method are presented. 103 literary sources are cited (21.4% of them from the last 10 years), mostly from foreign publications, and 14 sources of Bulgarian authors are also cited.

The PhD student knows the current state of the problem and presents a creative assessment of the analyzed literary material.

VI. Research methodology

This PhD thesis includes a prospective study of 60 pediatric patients aged 3 to 17 years undergoing surgery for fractures of the proximal, diaphyseal or distal arm, proximal or diaphyseal forearm. The survey was conducted in January 2017 until April 2021 with a training base in the Department of Pediatric Anesthesiology and Intensive care in UMBALSM "N. I. Pirogov" EAD - Sofia. Patients were divided equally into two groups, namely group A with light or deep sedation and ultrasound-guided supraclavicular brachial plexus block (experimental group) and group B with general anesthesia with standard intravenous opioid analgesia (control group). The preoperative preparation, the execution of the supraclavicular block of the brachial plexus under ultrasound guidance in five steps, the introduction to general anesthesia, the postoperative monitoring, the assessment of pain using the generally accepted scales VAS, NRS, FLACC in the two studied groups are described in detail.

The following methods were used: clinical (anamnesis and physical examination) and statistical (descriptive statistics, Kolmogorov-Smirnov test, $\chi 2$-test, t-test for two independent groups and t-test for two related groups) corresponding to the research objectives and the necessary requirements for their implementation have been met.

The chosen methodology allows achieving the set goal and obtaining an adequate answer to the tasks solved in the PhD thesis.

VII. Contributions and significance of the development for science and practice

The most common reason for hospitalization and surgical treatment of the upper extremity in children are fractures of the distal arm and diaphyseal forearm. Analysis of upper extremity fractures in the pediatric population indicates that the incidence increases with increasing mobility in children with a peak prevalence in the age range of 10-14 years and occurs more frequently in boys compared to girls. Preoperative preparation and perioperative anesthesia in children has its specific features and challenges. In recent years, they have become established in clinical anesthesiology practice ultrasound-guided regional blocks as the preferred method of analgesia in pediatric patients.

The PhD thesis analyzes the perioperative analgesia of pediatric patients with fractures of the proximal, diaphyseal or distal arm, proximal or diaphyseal forearm using supraclavicular brachial plexus block under ultrasound guidance and sedation, demonstrating the benefits of regional anesthesia over general anesthesia with intravenous analgesia at minimal risk and proven safety. Supraclavicular block of the brachial plexus under ultrasound guidance is a reliable method of perioperative analgesia in upper extremity surgical interventions in children, and the use of ultrasound increases the effectiveness of analgesia with minimal dose and volume of local anesthetic and maximum safety. Peripheral neural blockade provides optimal analgesia and comfort in the early postoperative period, minimizes the use of NSAIDs and/or opioids, as well as their associated adverse effects, and is a prerequisite for accelerated recovery of children. Theoretical knowledge and practical skills are a condition for the success and safety of the methodology.

In the discussion, the obtained results are interpreted in depth and in comparison with the data from the studies published in the specialized scientific literature. The PhD student's self-evaluation is expressed in the formulation of contributions of a scientific-theoretical and scientific-applied nature, reflecting the data from the main conclusions.

A contribution to clinical practice is the presented in-depth analysis of the application of ultrasound-guided supraclavicular brachial plexus block in pediatric patients with fractures of the arm, proximal or diaphyseal forearm, evaluating the advantages and benefits of optimal analgesia and comfort in the early postoperative period, accelerated recovery and early rehabilitation, which makes it possible to reduce treatment costs and length of hospital stay. Supraclavicular block of the brachial plexus under ultrasound guidance replaces standard intravenous anesthesia with general anesthesia and is gradually becoming the standard for anesthesia for fractures of the arm, proximal or diaphyseal forearm in the Clinic for Pediatric Anesthesiology and Intensive Care of UMBALSM "N. I. Pirogov" EAD - Sofia.

VIII. Assessment of PhD publications

In connection with the topic of Dr. Albena Atanasova's PhD thesis, two (2) of the publications in which the PhD student is the sole author are "in print" in scientific journals (Official Note № 696-22/10.11.2022). Separate parts of Dr. Albena Atanasova's PhD thesis have been presented at 3 national and 2 international scientific forums, with the PhD student being the first author in all participations.

IX. Personal participation of the PhD student

The materials provided show the personal participation of Dr. Albena Atanasova in the research for the development of the PhD thesis. The results obtained, illustrated with her own clinical material, and the contributions formulated are her personal merit.

X. Abstract

The abstract for Dr. Albena Atanasova's PhD thesis reflects the main results obtained in the conducted research and meets the requirements of PPZRASRB.

XI. Critical remarks and recommendations

For greater precision in the analysis and comparison of hemodynamic monitoring data given the different reference values for heart rate and blood pressure in different age groups, it is appropriate to refer to normal values.

CONCLUSION

After knowing the materials presented in the present procedure for acquiring the PhD thesis, I consider that the PhD thesis of Dr. Albena Sashova Atanasova is complete, modern, well structured and shaped, with precisely formulated and fulfilled tasks, with certain conclusions and contributions to the science and practice in the field of regional anesthesia in children with fractures of the upper limb, which is relatively poorly developed in our country.

The PhD thesis meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Implementation of the RASRB.

Based on this, I give a positive assessment and recommend the members of the honorable Scientific Jury to award Albena Sashova Atanasova, MD the educational and scientific degree "PhD".

November 14, 2022 With respect

Sofia,Bulgaria Assoc. Prof. Dochka Tsoneva, MD, PhD