

**To the Chairman of the Scientific Jury,  
determined by Order № RD-26-2086/05.10.2022  
By Executive Director of UMHATEM „N. I. Pirogov“, Sofia**

**REVIEW**

**by Associate Professor Dochka Tzoneva Tobova, M.D., Ph.D.**

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**With reference to:** dissertation work for the acquisition of educational and scientific degree "Doctor" (Ph.D) of doctor Elena Toncheva Ivanova, free doctoral student in UMHATEM „N. I. Pirogov“, Sofia, on topic: „Application of popliteal nerve block in lower leg injuries in pediatric patients“, in professional direction 7.1. Medicine, scientific specialty „Anesthesia and Intensive Care Medicine“ with scientific supervisor associate professor Rumyana Andonova, M.D., Ph.D.

**I. Regarding the procedure:**

With Order № RD-26-2086/05.10.2022 by Executive Director of UMHATEM „N. I. Pirogov“, Sofia and decision of the Scientific Jury with protocol № ND-01-3/21.09.2022, I am appointed as an external member of the Scientific Jury.

The Review is composed following the Regulations for development of the academic members in Republic of Bulgaria and chapter II, section I from the protocol for the Regulation for development of academic members in Republic of Bulgaria. As a member of the Scientific Jury of this current procedure,

I declare that I have no publications in common with the author and there is no conflict of interests, subject to declare, according to line 4, paragraph 5 of the Regulation of development of academic members in Republic of Bulgaria.

## **II. Brief biographical information of the doctoral student:**

Doctor Elena Ivanova has a Masters Degree in Medicine from Medical Faculty of Medical University of Sofia since 2013. She's working in the Clinic of Pediatric Anesthesiology and Intensive Care Medicine in UMHATEM „N. I. Pirogov“, Sofia since 2014. Since 2019 she is a specialist in „Anesthesiology and Intensive Care Medicine“. In 2021 she has obtained second Masters Degree in Public Health and Health Management in Faculty of Public Health, Medical University of Sofia. Since 2020 she is a doctoral student in Clinic of Pediatric Anesthesiology and Intensive Care Medicine in UMHATEM „N. I. Pirogov“, Sofia. Doctor Elena Ivanova has completed numerous trainings in Bulgaria and abroad, including such in regional anesthesia and pain treatment. Since 2019 she is lecturer and presenter in Ministry of health Project- „PULS“ („Practical introduction in emergency treatment“). She is an active member of scientific societies. She speaks English, uses French, Spanish and German.

## **III. Actuality of the topic and expediency of assigned goal and tasks:**

In the past several years, regional anesthesia in pediatrics gained approval. Development of ultrasound machines, proven safety with minimal complications, benefits of regional anesthesia such as reduced opioid consumption, reduced respiratory complications, reduced nausea and vomiting, improved postoperative analgesia, support fast temps of its use in pediatric patients. US- guided popliteal nerve block provides safe and effective analgesia in lower leg injuries in children, providing enhanced recovery and fast rehabilitation rates.

Pointed data reveals the actuality of the topic, set by doctor Elena Ivanova, who assigns the goal „to follow and analyze the effectiveness of pain relief by US-guided popliteal nerve block in lower leg fractures in pediatrics and to compare those results with classical conventional intravenous analgesia“. In order to achieve the goal, there are 5 tasks appointed, that are clear and accurate.

## **IV. Characteristics and evaluation of the dissertation work:**

The dissertation work is written on 147 pages and it is well-structured upon the following sections: Title page (1 page), Content (1 page), Abbreviations (3 pages), Introduction (2 pages), Literature review (38 pages), Goal and tasks (1 page), Materials and methods (20 pages), Results (19 pages), Analysis and evaluation (21 pages), Discussion (9 pages), Conclusions (2 pages), Recommendations (1

page), Closure (2 pages), Scientific contributions (2 pages). Publications and participation in scientific forums, related to the dissertation work (2 pages). Bibliography (17 pages). Annex (6 pages). The dissertation work contains 36 tables and 32 figures.

#### **V. Knowledge about the topic:**

The literature review is well structured and presents history of anesthesiology and anesthesia types, emphasizing on origin and development of regional anesthesia; current information about bones morphology and epidemiology of lower leg fractures in pediatrics; the importance of pain control and the consequences of untreated pain in children; methods for pain evaluation in children; anatomy of the popliteal fossa and techniques for popliteal nerve blocks in pediatric patients; the role of nerve-stimulator and ultrasound machine in regional anesthesia; specifications of regional blocks in pediatric patients and current experience in Bulgaria.

According to the available literature review, doctoral student resumes the benefits of regional techniques in children, analyses disputable problems and presents the advantages of US- guided regional anesthesia (popliteal nerve block) in children with lower leg injuries as an effective, safe and reliable method. There are 202 literature sources used (30.2% of which are published in the last 10 years), predominantly foreign authors and 14 Bulgarian sources.

The doctoral student is aware of the current state of the problem and presents creative assessment for analyzing literary material.

#### **VI. Methodology of the study:**

This current dissertation work includes prospective study of 108 pediatric patients, aged between 7y and 17y, scheduled for surgical treatment of lower leg injuries. The research is conducted in the period September 2018-September 2020 in the Clinic of Pediatric Anesthesiology and Intensive Care Medicine in UMHATEM „N. I. Pirogov“, Sofia. All patients, who are appropriate for US-guided popliteal nerve block according to the including criteria are assigned in group A (n=35). All other patients who fits in one or more excluding criteria are assigned in group B- general anesthesia and conventional intravenous postoperative analgesia with NSADs and opioids (n=73).

There is a detailed description of intra- and postoperative monitoring and pain scoring in both groups- regional block technique in group A, illustrated with personal photos, One „Protocol for performing popliteal nerve block“ and one „Card for peripheral nerve blocks“ are presented.

The following methods are used: chronometry, documentary, survey, objective criteria (heart rate, respiratory rate, arterial pressure), subjective criteria (patient

feedback), pain scoring scales VAS and BOPS, Post-anesthetic Discharge Criteria Scale; comparing analysis, statistic analysis, corresponding to the goals of the study, responding to the necessary requirements for their implementation.

The chosen methodology allows accomplishing of the set goal and receiving adequate answer of the tasks, assigned in the dissertation work.

## **VII. Contributions and importance of the study for the science and practice:**

The most common pathology of leg in pediatrics, that needs hospital treatment is ankle fracture due to sport trauma. Analyzing the data of the observed patients there is a correlation between age and rate of incidents with peak between 11y and 13y of age because of higher mobility and predomination of male sex. The seasonal peak is in June and decreases in cases during the autumn-winter season. Preoperative preparation and perioperative pain treatment in pediatrics have their challenges. In the last years there is an establishment of US- guided locoregional practice as analgesia technique in pediatrics.

This dissertation work analyses perioperative analgesia via US- guided popliteal nerve block under sedation in pediatric patients with lower leg injuries, proving its benefits, high efficiency and low complication rates, compared to general anesthesia and intravenous analgesia. US- guided popliteal nerve block is a reliable method for pain control in children with ankle fractures. The US guidance provides maximum precision, minimum volume of local anesthetics, minimum traumatism of the anatomical structures, minimum risk of unsuccessful regional block, minimum risk of complications, which is of enormous importance in pediatric patients. Peripheral regional nerve blocks provide maximum patients comfort with minimum needs of NSAIDs and opioids which, by themselves, consist of risk of side effects, facilitates faster recovery and shorter hospital stay. Theoretical knowledge and practical skills are conditions for safe and successful procedure.

The discussion of the received results are compared to those published in the international literature. I highly appreciate the comparison between anesthesia induction and emergence regarding time, the prove of enhanced recovery, faster rehabilitation and faster dehospitalization in group A.

The self esteem of the doctoral student, presented in the indicated contributions, formulated ad scientific- theoretical and scientific- practical, corresponding to the conclusions. Indisputable prove of the contribution of the dissertation work is the analysis of the 1year period after completing the study. This period reveals predomination of peripheral nerve blocks (popliteal nerve block) over general anesthesia in the Clinic of Pediatric Anesthesia and Intensive Care Medicine in UMHATEM „N. I. Pirogov“, Sofia.

### **VIII. Evaluation of the publications, related to the dissertation work:**

Two of the publication of the doctoral student are „under publication“ (letter 695-22/10.11.2022). Separate parts of the dissertation work are presented during 1 National and 3 International congresses. The doctoral student is leading author in all of them.

### **IX. Personal participation of doctoral student:**

According to the materials submitted, the personal participation of doctor Elena Ivanova in the development of the dissertation work is obvious. The received results, illustrated with personal clinical material and stated contributions are her personal merits.

### **X. Summery of the dissertation work:**

The Summery of the dissertation work of doctor Elena Ivanova reveals the main results, presented in the dissertation work and follows the protocol for the Regulation for development of academic members in Republic of Bulgaria.

### **XI. Critical remarks and recommendations:**

1. The literature review should end with its conclusions, based on which the goal and tasks of the dissertation work should be drawn.
2. I consider task №2 as incorrect, as indications and contraindications for performing regional blocks are well known.
3. There are some texts (paragraph 3,4 page 48, page 6, 62, 63) from literature review, included in chapter III „Materials, methods and technique “.
4. There is a description of local anesthetics doses and volumes, included in chapter „Results“ (paragraph 4, 79 page) which I consider as inappropriate because they should be included in methodology of the used technique.
5. For a more precise analysis of hemodynamics and respiration function in different age groups, the reference indicators should be presented.
6. In chapter 6 „Analysis and evaluation of results“, fig. 27, 28 and 29 contain hemodynamic and respiratory reference parameters that have no practical use in the study if they are not compared between the groups and amongst patient parameters. These figures could be placed in other section of the dissertation work if needed.
7. Some of the literature sources are listed incorrectly, lacking pages, authors (40,60), or articles, journals, atlases, books. Five of the literature sources are not mentioned in the text (32, 85, 128, 174,191).
8. The dissertation work is written in clear Bulgarian language but it is full of misspells, there are style mistakes (page 31, „BJA Article....“ ; page 39

“Literature is....“; page 111 „data from Canadian Journal of Anesthesia“...). There are some axis labels missing in some figures (fig. 18, 19, 20, 21, 31). The text format is incorrect.

## **CONCLUSION:**

Being submitted with all materials regarding the current procedure of acquiring scientific and educational degree „Doctor“, I consider that the dissertation work of doctor Elena Toncheva Ivanova is complete, up to date, well structured, with accurate and adequate formulation of goals and tasks, drawn conclusions and contributions for science and practice of locoregional analgesia in children with lower leg fractures, which topic is insufficiently developed in our country.

The dissertation work meets the Regulations for development of the academic members in Republic of Bulgaria and the protocol for the Regulation for development of academic members in Republic of Bulgaria.

Based on this, I give a positive evaluation and recommendation to the members of the honorable Scientific Jury to award doctor Elena Toncheva Ivanova with scientific and educational degree „Doctor“.

14.11.2022

Ass. Prof. Dochka Tzoneva Tobova, M.D., Ph.D.