

## Review

of a dissertation for the award of the academic degree of “DOCTOR” in the field of higher education 7. Health Care and Sports, professional field 7.1. Medicine, doctoral program “CARDIOVASCULAR SURGERY”

**Topic: “THE ROLE OF MECHANICAL-CHEMICAL ABLATION IN THE CURRENT ALGORITHM FOR THE TREATMENT OF PATIENTS WITH CHRONIC VENOUS DISEASE”**

**Doctoral Candidate: Dr. NIKOLAY DIMITROV VULCHEV, independent doctoral candidate at the Department of Vascular Surgery, Acibadem CityClinic Tokuda University Hospital – Sofia**

**Reviewer:** Assoc. Prof. Dr. Angel Borisov Angelov, MD, Associate Professor of Vascular Surgery at the Department of Cardiovascular Surgery and Angiology, Medical University – Varna.

I have known Dr. Nikolay Dimitrov Valchev since 2017, when he first participated as a co-author of several scientific papers during the National Conference on Angiology and Vascular Surgery. He worked as a resident in vascular surgery after winning a competitive selection process in 2016 at the Clinic of Vascular Surgery at Tokuda University Hospital – Sofia. He completed his residency in vascular surgery in 2021 and is currently a doctoral candidate in vascular surgery.

Dr. Nikolay Dimitrov Valchev has chosen as the topic of his dissertation a current issue that had not been addressed in Bulgaria as of the end of 2023. The issue is also relevant on a global scale, as the introduction and application of minimally invasive methods for treating chronic venous insufficiency in Europe began only after 2002. Modern new technologies are being developed, such as radiofrequency ablation with various catheters, endovenous laser ablation, cryoablation, mechanochemical ablation, and the endovascular application of cyanoacrylate glue; forms of pure chemical ablation are also being refined.

Each of the minimally invasive treatment methods listed above uses different types of catheters, which are constantly being improved. This has sparked a global debate in the scientific literature regarding which of the currently known minimally invasive techniques will achieve better and more lasting results in the endovascular treatment of varicose veins.

In terms of structure, the dissertation comprises 167 standard pages. The bibliography cites a total of 117 titles, of which 2 are in Cyrillic and 115 in Latin script—the majority from the last 10 years, and 54 from the last five years. Three appendices are also included, containing the full text of patient-completed questionnaires regarding quality of life, documentation of potential complications and side effects, as well as forms for follow-up examinations.

The structural components of the dissertation meet the requirements for a scientific study as defined by the academic institution to which the candidate is applying for the degree of “Doctor.” The dissertation includes 49 figures and 53 tables illustrating the statistical results of the study.

The “Introduction” chapter spans 33 pages and begins with a historical overview of modern endovascular treatment methods. Following a brief overview of anatomical, physiological, and pathophysiological data, there is an exceptionally detailed description of the sequence of initial patient diagnosis. The author presents the indications and contraindications in great detail, drawing on international best practices. Based on his own experience accumulated over the years and the large number of patients successfully treated, Dr. Valchev develops and presents, over 15 pages, his own working algorithm for using the Clarivein catheter.

The “Literature Review” chapter spans 16 pages. In the literature review, Dr. Valchev emphasizes the internationally recognized classification of chronic venous insufficiency and the relevance of its treatment due to its extremely widespread prevalence among the working-age population. A special subsection is devoted to the comments of certain authors who have already published similar comparative analyses of early and late outcomes, comparing treatment with MOSA to thermal methods.

Current discussions on the issue are summarized based on an extensive literature review covering established international authors and schools of thought. The rationale for the dissertation is derived from the data in the literature review.

Chapter “**Aims and Objectives**” The author clearly formulates the aim of the dissertation and sets **six** objectives to achieve it.

The chapter “**Materials and Methods**” presents over **400 clinical cases**, with all venous procedures performed by the author. The patients are divided into two main groups: those treated using the standard method and those treated using the modified method. In several consecutive tables, the patients are presented in detail and classified by gender, age, clinical stage of CHD, diameter and length of

the treated vein, depth of the vein in the subcutaneous tissue of the limb, type of vein (SAP or SPV), and location on the left or right side. The type of sclerosant used and its concentration are also discussed.

The results obtained for all patients are compared based on 13 criteria. This is followed by an extremely detailed statistical analysis using four methods: descriptive statistics, descriptive statistical analysis, Student's t-test, and analysis of variance, presented over 28 pages, along with the immediate conclusions drawn.

The early results for the 220 patients followed up—divided into two groups of 110—are presented in detail immediately after treatment, at the end of the first, third, and twelfth months, and after three years. Particular emphasis is placed on issues related to surgical complications and the likelihood of recurrence. The patients' condition was assessed using both subjective and objective criteria.

The “**Discussion**” chapter presents a number of published studies on high success rates worldwide and patient satisfaction. Emphasis is placed on the conclusion that endovascular procedures for the treatment of varicose veins of the lower extremities are not inferior to radical surgical treatment; moreover, they surpass it in many respects, which are presented in detail in the dissertation.

The conclusions drawn at the end of the dissertation are entirely in favor of the modified protocol. A higher rate of anatomical success and a lower rate of recurrence and retreatment were recorded. Furthermore, the author draws our attention to the fact that the modified method of mechanochemical ablation causes fewer complications compared to thermal methods, such as pain, hyperpigmentation, necrosis, and thermal damage to surrounding tissues. The main conclusion is that the high safety profile, combined with efficacy, justifies considering the modified method of mechanochemical ablation with the Clarivein catheter as the method of choice in modern phlebological practice.

Based on the logical presentation and the results achieved, I can acknowledge the contributions of the dissertation author. I particularly appreciate his willingness to share the experience gained to date.

I would also like to make the following **COMMENTS** on the dissertation:

1. The abstract includes sections, primarily tables and graphs, that illustrate the results very well. However, the abstract is too lengthy, and some tables and graphs could be shortened.
2. The other methods for minimally invasive treatment of varicose veins, such as laser and radiofrequency ablation, should be covered more extensively;

a better comparison should be made between them, and the advantages or disadvantages of the method under discussion—"Mechanochemical Ablation"—should be clearly highlighted.

3. As a further recommendation, I would suggest that the bibliography in the literature review could include additional publications in Bulgarian to allow for a more comprehensive comparison with other Bulgarian research groups.
4. It would be desirable to include more contemporary authors from the last three years, since it is well known that the method is relatively new, publications are numerous, and the treatment method itself undergoes constant annual changes regarding the consumables used.

Notwithstanding the few comments made, I can state that the dissertation is distinguished by solid internal logic, is written in the appropriate scientific style, and demonstrates depth and comprehensiveness in the conducted research. The dissertation meets all scientific criteria in the field; therefore, **I propose that the esteemed Scientific Jury vote in favor** of awarding the educational and scientific degree of "DOCTOR" to Dr. Nikolay Dimitrov Valchev.

Sofia, March 24, 2026

Reviewer .....  
Assoc. Prof. Angelov, M.D./

