

REVIEW

Of the dissertation
by
Dr. Veselin Vladislavov Grigorov
PhD candidate at the Department of Orthopaedics and Traumatology, Medical University –
Varna, on the topic:

“Planning in Total Knee Arthroplasty”

By Assoc. Prof. Preslav Plamenov Penev, MD, PhD
Department of Orthopaedics and Traumatology, Medical University – Varna

Under the procedure for acquiring the educational and scientific degree “Doctor” in higher education area 7. “Health Care and Sports”, professional field 7.1 “Medicine” and scientific specialty “Orthopaedics and Traumatology” – at the Department of Orthopaedics and Traumatology, Faculty of Medicine.

By Order of the Rector of Medical University – Varna No. R-109-287/03.08.2026 and by decision of the Faculty Council (Protocol No. 62/27.07.2026), I was included in the Scientific Jury, and by decision of the Scientific Jury (Protocol No. 1/2026) I was designated to prepare a review under the procedure for acquiring the educational and scientific degree “Doctor” in the specialty “Orthopaedics and Traumatology”, professional field 7.1 Medicine, higher education area 7. Health Care and Sports, at the Faculty of Medicine, Department of Orthopaedics and Traumatology, Medical University “Prof. Dr. Paraskev Stoyanov” – Varna.

This review has been prepared in accordance with the Act on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Implementation of this Act, the Regulations on the Development of the Academic Staff at Medical University – Varna (amended 27.05.2025), Appendix No. 1 to these Regulations, and Order No. R 109-371/21.08.2023 of the Rector of Medical University – Varna.

Dr. Grigorov is 33 years old. He graduated in medicine from Medical University – Varna in 2018 (Diploma No. 005870 of 2018). He obtained his specialty in “Orthopaedics and Traumatology” in 2024 (Certificate No. 5150 of 01.06.2024).

Dr. Veselin Grigorov's entire professional experience has been as an orthopaedic and trauma surgeon, from 2018 to the present at University Multiprofile Hospital for Active Treatment "St. Marina" – Varna. Dr. Grigorov's total length of service is 7 years and 10 months, including service in the specialty. Since September 2019, Dr. Grigorov has been a member of the teaching staff of Medical University – Varna as an Assistant Professor.

Dr. Grigorov has undertaken specialist training in orthopaedic and trauma surgery in Bulgaria and Germany. He holds recognised certificates of competence in "Joint Arthroplasty" and "Arthroscopy". He has completed: AO Recon Course – Principles of Total Hip and Knee Arthroplasty; AO Recon Course – Complex Total Hip and Knee Arthroplasty; MEET THE MASTERS Knee and Shoulder Arthroscopy Solutions Conference; MEET THE MASTERS Knee and Shoulder Arthroscopy Solutions Workshop; ESSKA – EKA All About Partial Knee Arthroplasty Course; Hip Expert Product Training –Metha®, CoreHip® & Excia® T Meet Direct; Anterior Approach.

Dr. Grigorov is a member of prestigious professional organisations: BOTA, BAAST, ESSKA.

1. Scientific output

In the present procedure, Dr. Veselin Grigorov has submitted: a list and available copies of the abstract (autoreferat) "PLANNING IN TOTAL KNEE ARTHROPLASTY", scientific publications in specialised journals, and presentations and communications from participation in international and national conferences, symposia and congresses.

2. Relevance and significance of the topic

Total knee arthroplasty (TKA) is one of the most common and successful orthopaedic interventions worldwide. With the advent of digital technologies, artificial intelligence and personalised medicine in the 21st century, the debate on the optimal method of preoperative planning and intraoperative execution has become extremely topical. The present dissertation by Dr. Veselin Grigorov addresses the fundamental question of alignment accuracy and early functional outcomes, comparing two cutting-edge approaches: 3D CT-based planning with individualised implants versus computer-navigated TKA with restricted kinematic alignment. The study is extremely timely and important for Bulgarian clinical practice, where access to navigation and robotic systems is still economically and logistically limited.

3. General characteristics and structure of the dissertation

The dissertation is structured in the classical manner for scientific works and comprises 101 standard typewritten pages. It is excellently illustrated with 12 tables and 23 figures. The structure includes: summary, list of abbreviations, table of contents, literature review (Chapter 1), aim and objectives (Chapter 2), materials and methods (Chapter 3), results (Chapter 4), discussion (Chapter 5), conclusions and recommendations (Chapter 6), bibliography and appendices. The bibliography comprises 212 references, 2 in Cyrillic and 210 in Latin script, which attests to the PhD candidate's excellent knowledge of the foreign scientific literature.

4. Analysis of the literature review (Chapter 1)

The literature review (pages 6–57) demonstrates the PhD candidate's in-depth theoretical understanding of the topic. Dr. Grigorov skilfully systematises the knowledge along the clinical pathway of TKA – from the detailed anatomy and complex biomechanics of the knee joint, through the pathophysiology of gonarthrosis, to the evolution of the concepts of mechanical, anatomical and kinematic alignment. Particular attention is paid to the contemporary classifications of constitutional alignment (Hirschmann and CPAK). The review concludes with a logical definition of the unresolved questions in the literature, which justifies the need for the present study.

5. Aim, objectives and methodology of the study (Chapters 2 and 3)

The aim of the work is clearly defined – a comparative analysis of the accuracy and early clinical outcomes between individualised TKA (Symbios Origin® implant and KNEE-PLAN® software) and computer-navigated TKA (BBraun Columbus® system and OrthoPilot® platform). To achieve it, 8 specific objectives have been formulated.

The study is retrospective–prospective in nature and includes a total of 60 knees (30 in each group) operated on at the Clinic of Orthopaedics and Traumatology, University Multiprofile Hospital for Active Treatment “St. Marina” – Varna, in the period 2019–2024. The inclusion and exclusion criteria are precisely selected. The statistical methods used (Shapiro–Wilk, t-test, Mann–Whitney, Fisher, CUSUM analysis) are contemporary and guarantee the reliability of the results obtained. The study was approved by the Research Ethics Committee of Medical University – Varna (Protocol No. 12).

6. Analysis of the results and the discussion (Chapters 4 and 5)

The results are presented systematically and are based on objective data. The important scientific findings include:

- Axial alignment: The postoperative HKA angle and residual deformity are fully comparable between the two groups, with an extremely low rate of outliers (0/30 in the individualised vs. 1/30 in the navigated cases).

- Alignment philosophy: Using correlation coefficients, the PhD candidate convincingly demonstrates that comparability is achieved through different mechanisms: with the individualised approach, the axis follows the patient's native constitution ($r = +0.94$), whereas with navigation it is corrected towards the neutral axis ($r = +0.39$).

- Operative time and learning curve: Operative time is significantly shorter in the individualised group (77.5 ± 16.0 min) than in the navigated group (98.3 ± 31.5 min). In the navigated group, however, a pronounced learning curve was recorded, with a 29.4% reduction in operative time between the first and the last third of cases and an inflection point around the 10th case.

- Functional outcomes: For the OKS and VAS scales and range of motion (ROM), a dramatic and clinically significant within-group improvement is observed, with no substantial statistical difference in the final outcome between the two methods.

- Complications: No perioperative complications or revisions were recorded in either group.

In the "Discussion" section, the PhD candidate critically analyses his data against the background of the world literature, correctly pointing out the limitations of the study as well (different follow-up periods, retrospective collection of the preoperative OKS status).

7. Scientific and practical contributions of the dissertation

The dissertation contains a total of 13 contributions, classified as original (5), confirmatory (4) and practical and applied (4):

- Original contributions: For the first time in Bulgaria, a direct comparison is made between 3D planning with individualised implants and computer navigation within a single centre and team. The difference in the preservation of the constitutional axis has been demonstrated quantitatively and statistically. A clinically meaningful definition of an outlier in kinematic alignment has been introduced.

- Practical and applied contributions: Navigated TKA with a conventional implant is substantiated as a high-quality and resource-efficient alternative that avoids CT radiation exposure and reduces financial costs. Bulgarian-language questionnaires for OKS and VAS have been developed and implemented.

8. Abstract (Autoreferat) and publications

The abstract reflects the content, structure, results and contributions of the dissertation fully, correctly and accurately. The texts and graphic materials correspond to the submitted work. Dr. Grigorov presents three publications on the topic of the dissertation in the journals “Meditsina i Sport” (Medicine and Sport) and “Journal of IMAB - Annual Proceeding (Scientific Papers) Supplement 3”:

- FUNCTIONAL OUTCOMES FROM THE EARLY POSTOPERATIVE PERIOD IN PATIENTS UNDERGOING 3D PREOPERATIVELY PLANNED AND COMPUTERNavigated TOTAL KNEE ARTHROPLASTY
- ROLE OF SONICATION IN PJI
- Functional phenotypes of knee joints in young patients with osteoarthritis

CONCLUSION

The dissertation of Dr. Veselin Vladislavov Grigorov entitled “Planning in Total Knee Arthroplasty” is a complete, in-depth and topical scientific study. It fully meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and the Regulations for its implementation at Medical University – Varna. The study makes indisputable scientific, scientific-practical and economic contributions to the field of knee arthroplasty.

Taking into account the high quality of the submitted work, its scientific value and its practical significance, I give my unequivocally positive assessment.

I confidently propose that the esteemed Scientific Jury award Dr. Veselin Vladislavov Grigorov the educational and scientific degree “Doctor” (PhD) in higher education area 7. Health Care and Sports, professional field 7.1. Medicine, scientific specialty “Orthopaedics and Traumatology”.

06.10.2026

Varna

Reviewer:

/Assoc. Prof. Preslav Tenev, MD, PhD/

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