

Review

on the Dissertation work "Traumatic lesions of the blood vessels of the extremities. Diagnostic and surgical problems" for the acquisition of the scientific and educational degree "Doctor", presented by Dr. Sultana Bozhidarova Karamanova - Piperkova, a doctoral student at the Department of Surgery of UMHATEM "N.I. Pirogov" - Sofia.

Reviewer: Prof. Andrey Andreev, MD, vascular surgeon.

Born in 1987 in Burgas, Dr. Karamanova graduated from the English language high school "Geo Milev" in Burgas in 2006. In 2012, she completed her medical education at Medical School in Sofia, and in 2018 she completed her master's degree in Public Health and health management at the Faculty of Public Health at Sofia University. In 2019, Dr. Karamanova acquired a specialty in Vascular Surgery.

Dr. Karamanova received training in: Technologies in ultrasound diagnostics in Sofia in 2016; A regional approach to the treatment of chronic venous disease in Belgrade, Serbia in 2021; Thrombosis management in practice in Sofia. in 2015 She has more than 10 years of work experience as a doctor and has been working since the beginning and permanently in the Department of Vascular Surgery of UMHATEM "N.I. Pirogov". Dr. Karamanova has professional interests primarily in the field of vascular surgery and especially in vascular trauma. In 2012, conducted individual training at the Clinic for Vascular Surgery at Krankenhaus Albstadt, 72458 Albstadt, Deutschland.

Dr. Karamanova participated in National and International Congresses with presentations as follows: in 6 National Conferences of BNSVES A, in 4 of which the reports were related to vascular trauma, 1 on DVT as a symptom of malignant diseases and 1 on vascular reconstructions in tumors. Dr. Karamanova presented a report on compression therapy at the 5th Balkan Venous Forum, as well as one on vascular trauma at the 1st National Trauma Symposium in 2014. She also participated in the EUCLID clinical trials in 2014-2016. and Voyager PAD in 2016-2019.

She is a member of the Bulgarian Medical Union and the National Society of Vascular and Endovascular Surgery and Angiology since 2013.

The topic of the dissertation work "Traumatic lesions of the blood vessels of the extremities. Diagnostic and surgical problems" was successfully chosen, and it is no coincidence that "Pirogov" is the place for its implementation, because the largest number of cases with vascular trauma are concentrated here. The extreme increase in road accidents, the use of dangerous machines in production and everyday life, and iatrogenic vascular damage due to the increased number of invasive procedures and operative interventions, significantly increases the number of patients with vascular trauma. From there come the severe complications of vascular trauma causing the increase in amputations. All this necessitates a modern and in-depth study of the problem of vascular trauma in our country. Individual publications on the issue do not give a clear picture of the importance of the problem, given its consequences - severe disability and huge economic losses.

In the literature review of the dissertation, the discussion problems in diagnostics, the indications for the application of vascular reconstructions as well as and their type are considered. From them derive the set aim and tasks of the dissertation work. The bibliographic reference contains 307 titles, 59 of which are in Cyrillic and 248 in Latin, most of which are by contemporary Bulgarian and foreign authors, and half of them are from the last ten years. The inclusion of almost all Bulgarian authors, as well as the messages of the founder of the development of the problem of vascular trauma, the American professor Norman Rich, is commendable.

The study itself is partly retrospective and mostly prospective. It was carried out in the Clinics of Orthopedics and Traumatology and Hand Surgery, as well as in the Department of Vascular Surgery of UMHATEM N.I. Pirogov, Sofia.

The study included 124 patients with traumatic lesions of the main vessels of the upper and lower extremities, where the individual affected blood vessel was considered as a statistical unit. In this aspect, the dissertation is based on the data for 187 damaged blood vessels, in which vascular reconstructions were performed in the period April 2010 - December 2019. The clinical material is impressive and allows reliable statistical processing and respectable results.

The dissertation is presented on 166 standard typewritten pages, contains 29 tables and 48 figures, of which 21 are photographic material, well illustrating the text.

Dr. Karamanova's paper contains the following parts: introduction, literature review, aim and objectives, material and methods, results and discussion, and conclusion. Two algorithms for diagnosis and treatment of vascular trauma are presented. 15 conclusions are drawn and 4 contributions are indicated according to the author.

In the 45-page Literature Review, the problem of vascular trauma is explored thoroughly and comprehensively. The author has made a detailed historical review of the development of the problems of vascular traumatism from ancient times to the present day and the contribution of a whole constellation of our and foreign vascular surgeons, thanks to whose efforts today most patients with traumatic vascular lesions are successfully cured with a significant functional restoration of the limbs. The presentation of the results is presented on 96 pages, where the author pays particular attention to the assessment of the severity of the vascular trauma using the widely accepted scale of Gustilo - Anderson "MESS Score" (Mangled Extremity Severity Score) in traumatology. The accompanying diseases, which have a direct and indirect relationship to the results of the surgical treatment, have also been carefully studied. The main clinical, non-invasive and invasive diagnostic methods giving good pre-operative information in determining the vascular reconstruction plan are reviewed in detail. Clinical material is developed according to an established working classification. There is a breakdown of patients by sex, age, frequency and etiology, anatomical area, type of lesion, accompanying diseases, etc. The various diagnostic methods are discussed in detail and their diagnostic value and advantages are highlighted. All operative approaches and operative techniques used by the author are described in detail. An in-depth analysis was made of the frequency, type and cause of complications after vascular reconstructions, in cases where they were related to the operation itself and in cases where non-operative complications compromised the results. The statistical analysis of the studied material is based on five methods and in a number of tables and figures the results of the patency of the performed vascular reconstructions are shown. A good impression is made by the comparative analysis of the coincidences

between the results obtained from the instrumental studies and the intra-operative findings. Factors affecting limb preservation and patient experience after vascular reconstructions were analyzed in detail, comparing various details, such as: age, length and type of graft, level of anastomoses, presence of other accompanying vascular lesions, or other additional surgical operations, as well as accompanying diseases such as arterial and/or venous insufficiency, diabetes mellitus, etc.

105 (84.67%) of the operated patients were prospectively followed up in inpatient and outpatient settings for a period of 48 months. For this purpose, questionnaires were used including certain indicators to control the results of the revascularization and the complications that occurred. The average length of follow-up of the patients was 24.5 months, which is a sufficiently reliable period for determining the late results of the surgical intervention performed. The severity of vascular trauma, its combination with bone, joint and nerve lesions, complications and accompanying diseases were taken into account. Particularly important is the detailed analysis of the causes of early and late rethrombosis of vascular reconstruction depending on the time factor from the trauma to the revascularization, the severity of the trauma and its combination with other lesions. A significant contribution of the dissertation work is the complex and large-scale study of this difficult problem for patients and society, carried out by the author. This is very important given the exponential increase in the number of patients after road accidents and the high degree of disability. The comparison of the achieved results with those of other authors is also important. The author pays special attention to the complications that occurred after revascularization, which are important for the complete or partial functional preservation and restoration of the limb. Dr. Karamanova applies all known modern operative techniques in the treatment of patients with vascular lesions, some of which are extremely complex for technical implementation. Examining the contributions of Dr. Karamanova's dissertation work, it should be emphasized the fact that the problem of vascular traumatism is posed and examined thoroughly, comprehensively and modernly for the first time in our country. Rightfully so, this work fills a major gap in our vascular surgery. I am convinced that this work will be read with attention by vascular surgeons, orthopedic traumatologists and other specialists dealing with the problems of vascular trauma and its

complications. Dr. Karamanova's dissertation is written in a nice language and style and is a pleasure to read. There are minor stylistic and spelling errors. The author's opinion on prophylactic fasciotomy and the inclusion of sympathectomy in the treatment arsenal is debatable. The primary amputations and iatrogenic injuries have not been analyzed in detail, the possibilities for postponing the reconstructions in shock states and other problems have not been discussed. Endovascular techniques were not applied, which we recommend to be implemented in the future in the treatment of vascular injuries. The statistical analysis is detailed and presented synthetically. At the end of the thesis, two algorithms for diagnosis and treatment of vascular trauma are presented, which are useful for many specialists, outlining the correct steps in diagnosis and treatment, reducing time and resources in the treatment of this severe pathology.

In the section on invasive diagnostic methods, DSA is not mentioned, because this technique does not find a place in the diagnostic methods used by the author, due to the very frequent combination of vascular lesions with those of bones and joints. In connection with the dissertation work, Dr. Karamanova has five publications presented in Bulgarian journals, in all of which she is the lead author. The bibliographic reference correctly does not include those publications related to the dissertation work. After carefully reading the dissertation work, despite some minor spelling and stylistic errors and omissions, I believe that it has indisputable qualities, which is why I allow myself to recommend to the respected members of the scientific jury to approve it and award Dr. Sultana Karamanova-Piperkova the educational and scientific degree "Doctor". Of course, I recommend the author to continue her scientific pursuits even more diligently and to expand her participation in our and especially foreign scientific journals and forums.

Sofia, 12/11/2022

Reviewer: Prof. Andrey Andreev, PhD