

# REVIEW

By: Prof. Dr. Krasimir Ivanov, DSc, PhD

Chairman of the Scientific Jury

According to the Order No. P-109-157/07.05.2024  
of the Rector of MU - Varna

Subject: Dissertation work for the award of the scientific degree "Doctor of Sciences" in the field of Higher Education: 7. Health and sports; Professional direction 7.1. Medicine; Specialty General Surgery;

"Efficacy and safety of laparoscopic colorectal resections. Comparative analysis of results with open surgery. Risk assessment and methods to reduce perioperative complications"

Author: Assoc prof. Dr. Veselin Marinov, PhD

## **Biographical data**

Assoc. prof. Veselin Marinov was born in 1973 in Sofia. In 1997 he graduated from the Medical University - Sofia with excellent grades. Immediately after graduation he won a competition for specialization and started working at the III Surgical Clinic of the University Hospital "Pirogov". He became a specialist in General Surgery in 2003.

From 2003 to 2005 he worked at the University Hospital "Lozenets". In 2005 he had a one-year specialization at the University Clinic in Lozenetz. During the first year of his training he specialized in liver, pancreatic and transplant surgery. Since 2006 he has been working at the Clinic of Hepatobiliary, Pancreatic and General Surgery of Ajibadem City Clinic of Tokuda University Hospital.

In 2012 he defended his dissertation entitled: "Study on the surgical treatment of chronic pancreatitis and its complications".

Since 2014 he has been working as the Head of the Department of Minimally Invasive and Laparoscopic Surgery.

The same year she graduated as a Master of Public Administration - Health Management from the UNWE - Sofia.

Since 2016 she has held the position of "Senior Assistant Professor"

Since 2018 he has been elected and holds the position of "Associate Professor" at the Department of General and Operative Surgery of Medical University - Varna.

The same year he was certified as a Console Surgeon to work with the Da Vinci robotic system.

Since 2019, he has been holding the administrative position of Deputy Medical Director of ASC Tokuda University Hospital.

He has completed numerous postgraduate and certification courses to date.

Assoc. Marinov has published a monographic work on "Chronic pancreatitis", Author

The dissertation submitted to me by Assoc. Prof. Dr. Veselin Marinov Marinov, PhD with the title "Effectiveness and Safety of Laparoscopic Colorectal Resections. Comparative analysis of results with open surgery. Risk assessment and methods to reduce perioperative complications" is written in 205 standard pages, divided into five parts, bibliography and two annexes. It contains 34 tables and 77 figures. The literature review is based on 280 references, of which 30 in Cyrillic and 250 in Latin. They are arranged in alphabetical order with leading headings in Cyrillic. 10 publications related to the dissertation work after holding the position of Associate Professor are presented in accordance with the Law on the Development of Academic Staff of the Republic of Bulgaria and its regulations for application to MU - Varna.

### **Chapter I. Literature review.**

The literature review is organized in 18 sections. The main indications for performing colorectal resections, etiology, incidence of colorectal diseases are discussed. Topics related to the diagnosis of the diseases and their informativeness regarding the local status of colorectal cancer, complicated diverticulosis are covered. Recommendations for performing preoperative preparation of patients for elective colorectal surgery are cited. In section 5, laparoscopic versus open colorectal surgery, emblematic studies are reported in the specialty literature, discussing the advantages and disadvantages of both methodologies. Emphasis is placed on the feasibility of the minimally invasive approach in obese patients, elderly patients, comorbid patients, and associated risks. Recommendations regarding minimally invasive surgical approaches for different colorectal cancer sites are reviewed and discussed, including approaches for performing right colectomy, transversum resection, left hemicolectomy, and sigmoid resection. Evidence-based recommendations for performing different volumes of lymphadenectomies depending on the localization of the disease are discussed. Surgical approaches for rectal cancer are systematically reviewed separately. Attention is focused on the approach to the inferior mesenteric vessels, mobilization of the left flexure, performance of tumor-specific and total mesorectal excision in different localizations of rectal cancer, and the need for a protective stoma.

Section 9 discusses the indications for performing conversions and comparative analyses of outcomes in converted patients. Recommendations for performing palliative colonic resections are discussed separately. A literature review of current recommendations in the minimally invasive approach for patients with complicated colonic diverticulosis, Crohn's disease, and malignant

appendiceal disease is presented. Results from worldwide databases regarding experience in robotic colorectal surgery are reported. The learning curve in minimally invasive colorectal surgery is discussed in the last section of the literature review.

The literature review is very comprehensive and addresses all aspects of colorectal pathology and current surgical approaches. The author highlights controversial points and unresolved issues in minimally invasive colorectal surgery.

## **Chapter II. Methodology and design of the dissertation study.**

### **The aim of this dissertation is**

to perform a comparative analysis of perioperative outcomes between groups of patients with elective laparoscopic colorectal resections, open colorectal resections, and converted patients, evaluating the effectiveness and safety of the laparoscopic approach, defining personalized criteria for the surgical approach, creating a model to predict the risk of complications and conversion, and defining methods to reduce perioperative complications.

To achieve this goal, the author defined 6 objectives.

### **Material and method**

This dissertation is based on a retrospective study of the results in 285 patients treated by him and divided into 3 groups:

- Laparoscopic resection group - 152 patients
- Open resection group - 102 patients
- Conversion group - 31 patients

The study groups were large enough to obtain statistical significance of the results.

13 methods of statistical analysis were used.

Patients were analyzed on 24 indicators.

The structural distribution of patients according to sex, age, BMI index, type of colorectal pathology, surgery performed, and comorbidities was presented.

The author describes in detail the stepwise dissection approach in different localizations of colorectal pathology. Differences in dissection approaches with those described in the literature are substantiated. The operative techniques themselves are illustrated with multiple photographs. The description of surgical techniques focuses on methods to reduce perioperative complications, such as a hybrid approach for lymph node dissection in the 222r,i region, a lateral approach for left colectomies and complicated diverticulosis, a selective approach to the inferior mesenteric vessels, and different volumes of lymph node dissection for rectosigmoid carcinoma, mobilization of the left colonic flexure in rectal carcinoma, securing the anastomosis in high rectal resections, performing tumor-specific and total mesorectal excision in different localizations of rectal carcinoma,

standard protective ileostomy in low anterior resections with TME. Initial experience in robotic colorectal resections is shared.

The dissertator presents a set of measures aimed at accelerated recovery after laparoscopic colorectal resections.

### **Chapter III. Results.**

Statistical analysis of the results by patient group studied showed the following: there were significantly fewer complications in the laparoscopic resection group compared to the open surgery and converted groups, with no difference in perioperative lethality. Only 3 patients with anastomosis insufficiency in laparoscopic resections were reported. There was a significant advantage in almost all perioperative parameters for laparoscopic operations compared with the other two study groups. The higher number of extracted lymph nodes in laparoscopies compared to open surgeries is noteworthy. In the conversion group, the worst perioperative outcomes were reported. The author demonstrates that the mean operative time in laparoscopic resections is shorter compared to open resections. In order to be able to create a model to assess the risk of complications in the perioperative period or conversion, the author searched for a correlation and subjected preoperative data to statistical analysis - gender, age, BMI index, comorbidities, T4 local status. He investigated the sensitivity and specificity of contrast-enhanced CT for preoperative assessment of colon cancer local status. Analyzes the intrinsic learning curve in laparoscopic colorectal resection surgery. The data showed that male gender, comorbidities, tumor size, and conversions were associated with a significantly higher incidence of perioperative complications. Higher risk of conversion was associated with male sex, tumor size, and comorbidities. Low informativeness of contrast-enhanced CT regarding local colon cancer status has been reported. The parameters set to study the learning curve over time were as follows: perioperative complications, operative time, hospital stay, intraoperative blood loss, number of lymph nodes extracted. The analysis showed that at least 38 independent laparoscopic colorectal resections were required before the author reached expertise.

The findings are incorporated into a model for perioperative assessment of the risk of complications and conversion in laparoscopic colorectal resections and recommendations are justified.

The dissertator presents perioperative outcomes in a subgroup of 17 palliative laparoscopic resections where perioperative complications and lethality were recorded with a mean hospital stay of 5.35 days. Based on this, it recommends laparoscopic resections as routine in cases of disseminated CRC to prevent complications related to the underlying tumor.

The results section of the dissertation is essential as it reflects the personal experience of Assoc. Marinov, as well as the fact that all patients in the study were operated by him. The results obtained are statistically reliable based on the statistical methods used. They are well illustrated with tables and graphs.

#### **Chapter IV. Discussion.**

The author discusses the results of the study with data published in the literature. The results confirm the advantage of laparoscopic colorectal surgery in terms of perioperative outcomes, faster patient recovery, and significantly lower rates of perioperative complications. In contrast to some publications, the mean operative time in the study was shorter compared to open surgery. Some differences in dissection approaches for different localizations of CRC and complicated diverticulosis are discussed and substantiated with publications and recommendations in the literature. Perioperative rates and complication rates of conversions are worse compared to those of open surgery, contradicting some current publications. The author reported anastomosis insufficiency rates after left resections of 2.46%, which is consistent with some of the best results published in the literature, and the proposed approaches of mechanical bowel preparation + prolonged intravenous antibiotic prophylaxis are likely relevant, selective approach to inferior mesenteric vessels, selective mobilization of the left cartilaginous flexure, securing the suture line in high rectal resection with TME, protective ileostomy in all cases of low rectal resection with TME.

#### **Chapter V. Conclusions and contributions.**

The dissertation presents 10 conclusions. They are clearly formulated and meet the set tasks.

Priemam bring on the dissertation work proposal from the author:

1. A retrospective, single-center study based on personal experience was performed, including 285 patients with colorectal resections, comparing perioperative parameters and outcomes in open, laparoscopic, and conversion groups..
2. The frequency distribution of the indicators related to the studied diseases by studied groups of patients and comparative analysis of clinical characteristics and outcomes in the perioperative period is presented.
3. The combination of mechanical bowel preparation and prolonged intravenous broad-spectrum antibiotic prophylaxis is established in practice as an effective method of preparing patients for laparoscopic colorectal resections.
4. Rules for accelerated recovery after laparoscopic colorectal resections are developed and validated in practice.
5. Criteria for preoperative assessment of the risk of developing complications and conversion and recommendations for management based on them are defined..
6. The sensitivity and specificity of contrast-enhanced CT for assessing the local status of colorectal diseases were investigated in order to plan the surgical approach.

7. A selective method for positioning trocars in right colon resections depending on anatomical features, localization of the pathological process and a hybrid medial approach to lymph node dissection in regions 222r, i was developed..
8. Methods for reduction of anastomosis insufficiencies after left laparoscopic resections were defined and introduced into practice - selective approach to DMA, TCME in localization of rectal carcinoma in proximal and middle third, standard anastomosis securing, protective ileostomy in cases of TME, selective mobilization of left colonic flexure..
9. Recommendations for lateral dissection approach in CRC localized in the area of distal transversum and left flexure of colon and diverticulitis in the area of sigmoid colon are defined..
10. Recommendations for a standard laparoscopic approach to palliative colon resections are introduced.
11. The influence of surgeon experience on perioperative outcomes was investigated and the number of laparoscopic resections to reach expertise was defined.

The dissertation undoubtedly has all the necessary qualities for the defense of the degree of Doctor of Science. The problems of the given topic are competently presented in the literature review. The examined material is own. Surgical competence and the use of the most up-to-date achievements and methods in modern surgical practice are evident in its presentation. The study reflects some specific features of patients in Bulgaria - a large number of patients with advanced CRC, which may lead to differences with the literature data, but reflects the realities of our daily practice.

The author presents 10 publications related to the dissertation topic.

In conclusion, i believe that the dissertation "Efficacy and Safety of Laparoscopic Colorectal Resections. A comparative analysis of outcomes with open surgery. Risk assessment and methods to reduce perioperative complications" is up-to-date, developed according to all requirements, with serious scientific and practical contributions to colorectal surgery.

I confidently recommend to the Honourable Scientific Jury to award to Assoc. Prof. Dr. Veselin Marinov Ph.D. the scientific degree "Doctor of Sciences".

Заличено на основание чл. 5,  
§1, б. „Б“ от Регламент (ЕС)  
2016/679

Varna  
15.05.2024

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