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Colorectal cancer surgery in Serbia 2010–2014: An evaluation of a multicenter registry

Hirurško lečenje kolorektalnog karcinoma u Srbiji od 2010. do 2014. godine: procena registara više centara

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Abstract

Background/Aim. Surgical registries and databases are especially valuable in monitoring the performances in cancer treatment and detecting potential problems. For Serbian patients with colorectal cancer (CRC), data regarding the treatment received, the factors that may impact the outcome, and whether or not treatment is successful and appropriate are not currently captured. The aim of this study was to establish a collection of a consensus dataset capturing surgical treatment of CRC at multiple public hospitals across Serbia and estimate outcome in CRC patients subjected to surgical treatment in the period 2010–2014. **Methods.** The study encompassed all 52 public CRC surgical units in Serbia. Numerical data on all patients who underwent operative CRC resection were included. An electronic database was created and overseen by the First Surgical Clinic of the Clinical Center of Serbia, Belgrade. Data were collected independently using a specifically designed standardized questionnaire, including the number of operated patients, localization of the primary tumor, type of surgical intervention, type and urgency of surgical intervention, and postoperative mortality. **Results.** A total number of 22,037 colorectal surgical procedures was performed in Serbia in the period 2010–2014 (approximately 4,400 per year). It was shown that 78.5% of the total number of procedures were elective and 21.5% were emergency. The most common cause of emergency surgeries was ileus (3,618 cases, 76.4%), while the less common causes were perforation (899 cases, 18.9%) and bleeding (216 cases, 4.5%). Postoperative mortality during the study period expressed as a percentage of all interventions for CRC was 2.8% on average with a slight increasing tendency. At the end of the study period, 127 doctors were educated for performing colonoscopy. **Conclusion.** The main outcome of this study was the establishment of the necessary preconditions for the multicenter data collection involving large numbers of CRC patients. The study supported the premise that the development of the national database for surgical treatment of CRC is achievable and could provide valuable insight into the routine surgical management of CRC in Serbia, creating a significant resource for further research.

Key words:
colorectal neoplasms; database as topic; general surgery; mortality; serbia; surgical procedures, operative; surveys and questionnaires.

Apstrakt

Uvod/Cilj. Hirurški registri i baze podataka su posebno vredni za praćenje karakteristika lečenja i otkrivanje potencijalnih problema kod karcinoma. Za bolesnike sa kolorektalnim karcinomom (KRK) u Srbiji, podaci o primljenoj terapiji, faktorima koji mogu imati uticaja na ishod, odnosno da li je lečnje uspešno i odgovarajuće ili ne, trenutno nisu sistematizovano obrađeni. Cilj rada bio je uspostavljanje baze usaglašenih podataka o hirurškom lečenju KRK u različitim državnim bolnicama širom Srbije i procena ishoda operativnog lečenja obolelih od KRK u periodu od 2010. do 2014. godine. **Metode.** Istraživanjem su obuhvaćena 52 državna hirurška centra u Srbiji u kojima su sakupljani brojčani podaci o bolesnicima podvrgnutim hirurškoj resekciji KRK. Kreirana je elektronska baza podataka pod nadzorom Prve hirurške klinike Kliničkog centra Srbije, Beograd. Podaci su nezavisno sakupljani korišćenjem posebno sastavljenog standardizovanog upitnika koji je uključio broj operisanih bolesnika, lokalizaciju primarnog tumora, tip hirurške intervencije, urgentnost zahvata i postoperativni mortalitet. **Rezultati.** Ukupno 22 037 kolorektalnih hirurških procedura izvedeno je u Srbiji u periodu od 2010. do 2014. godine (približno 4 400 godišnje) od čega je bilo

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78,5% elektivnih, a 21,5% urgentnih operacija. Najčešći uzrok urgentnih operacija bio je ileus (3 618 bolesnika, 76,4%), dok su manje česti uzroci bili perforacija (899 bolesnika, 18,9%) i krvarenje (216 bolesnika, 4,5%). Postoperativna smrtnost tokom perioda istraživanja, izražena kao procenat svih KRK intervencija, iznosila je prosečno 2,8% sa diskretnom tendencijom rasta. Na kraju studijskog perioda, 127 lekara je bilo obučeno za obavljanje kolonoskopije. **Zaključak.** Glavni ishod istraživanja bilo je uspostavljanje neophodnih preduslova za multicentrično sakupljanje podataka koji uključuje veliki broj obolelih od KRK. Studija je podržala pretpostavku da je razvoj nacionalne baze podataka hirurškog lečenja KRK dostižan i da može obezbediti značajan uvid u rutinsko hirurško lečenje KRK u Srbiji i doprineti uvećanju resursa za buduća istraživanja.

Ključne reči:
kolorektalne neoplazme; baze podataka; hirurgija, opšta; mortalitet; srbija; hirurgija, operativne procedure; ankete i upitnici.

Introduction

Colorectal cancer (CRC) is the third commonest malignancy and a common cause of cancer death worldwide [1, 2]. The incidence of CRC in Serbia is approximately 40/100,000 in men and 20/100,000 in women [3].

Radical surgery with curative intent is the treatment of choice in the majority of colorectal cancer patients [4, 5]. The fundamental surgical principles are removal of the major vascular pedicle feeding the tumor along with its lymphatics, making a tumor-free margin, and *en bloc* resection of any surrounding organs or structures in direct contact with the tumor. To date, the primary modality of treatment for colon cancer is surgery with postoperative chemotherapy in selected cases, even though preoperative chemotherapy in advanced colon cancer patients is undergoing investigation [6]. In rectal cancer, there are several treatment strategies, depending on the tumor stage regarding the depth of penetration and lymph node involvement [7]. In early-stage rectal cancer, a less invasive technique such as local excision may be sufficient as opposed to the majority of cases where radical surgical resection is the treatment of choice. With the increase of the tumor stage, the probability of cure with surgery alone diminishes. In advanced-stage rectal cancers (advanced T3, T4, and N+ cases), preoperative chemoradiotherapy has been a well-established step in treatment for many years. Adjuvant chemotherapies have been shown to increase the cure and survival rates, and they are recommended for patients with lymph node metastases (stage III) and for selected metastasis-free patients (stage II) but with unpromising prognostic features, such as poorly differentiated tumors, lymphovascular or perineural invasion by tumor cells.

Cancer registries are the fundamental source of objective cancer data and are thus indispensable for the evaluation of the cancer burden and design of effective cancer control plans [8]. Surgical registries and databases are especially valuable in monitoring the performance in cancer treatment and detecting potential problems. The detailed recording of outcomes in a registry or database is a powerful tool in the analysis of surgical performance and can indicate areas that deserve further study from a clinical perspective. Data collection outside of clinical trials is beneficial, and its importance is increasingly recognized. There are a growing number of registries and databases across the spectrum of diseases. These efforts are of most value when multiple sites combine efforts maximizing patient numbers and hence increasing the statistical power of any analysis. Documenting and analyzing variations in care across different sites and treatment settings may help understand how they impact patient outcomes. For Serbian patients with colorectal cancer (CRC), data regarding the treatment received, the factors that may impact the outcome, and whether or not treatment is successful and appropriate are not currently captured.

Data that describe surgical activity and performance in CRC treatment and outcome of colorectal surgery are currently unavailable on the national level in Serbia. A nationally organized screening program for CRC was introduced in Serbia in 2013, and it was based on a previously implemented National program for CRC prevention that started in 2009, in accordance with European guidelines for quality assurance in CRC screening and diagnosis [9–11].

The aim of this study was to establish a collection of a consensus dataset capturing surgical treatment of CRC at multiple public hospitals across Serbia and estimate outcome in patients subjected to surgical treatment in the period 2010–2014.

Methods

The study has encompassed all 52 public surgical units in Serbia in which colorectal surgery is performed (Figure 1). Numerical data on all patients who underwent operative CRC resection from 2010 to 2014 were included. The electronic da-

Fig. 1 – Map representing distribution of public colorectal surgical units included in the study.

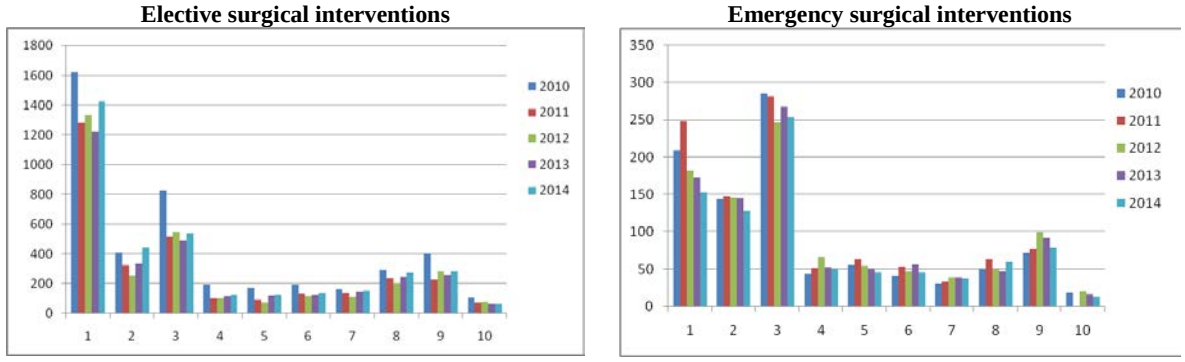
tabase was created and overseen by the First Surgical Clinic of the Clinical Center of Serbia, Belgrade. Data were collected independently using a standard questionnaire specifically designed for this purpose and completed by colorectal surgeons annually. Surgical procedures were recorded, and for each procedure, the number of patients subjected to it was entered under the predefined classification. The following dataset was included in the questionnaire: localization of the primary tumor, type of surgical intervention, type and urgency of surgical intervention, and postoperative mortality. Postoperative mortality was defined as death following colorectal surgery occurring during hospitalization or within 30 days of discharge. The total number of procedures was registered for each year and the entire five-year period.

Results

The study included all CRC cases managed operatively in 52 colorectal surgical units across Serbia during five years. Trends in standards of surgical care were recorded through data collection from each center. The dataset was tested initially on paper by participating clinicians, and feedback was obtained regarding clarity of the dataset and improvements made, after which an electronic version was created. This project relied on individual sites collecting and entering accurate data. According to the results of the database entries, 22,037 colorectal surgical procedures were performed in Serbia in the period 2010–2014 (approximately 4,400 per year). Out of the total number of surgical procedures, 78.5% were elective and 21.5% were emergency.

The distribution of procedures by tumor site is represented in Figure 2. The most common cause of emergency surgeries was ileus (3,618 cases, 76.4%), while the less common causes were perforation (899 of 18.9% cases) and bleeding (216 of 4.5% cases).

Surgical procedures were similarly distributed throughout the study period, with primary tumor resection in combination with stoma slightly more frequent (43.4%) than stoma (32.8%) and primary tumor resection in combination with anastomosis (23.8%) (Figure 3).



1 – *Ca recti*
2 – *Ca junct. coli rectosigmoidis*
3 – *Ca coli sigmoidis*
4 – *Ca coli descedentis*
5 – *Ca coli lienalis*
6 – *Ca coli transversi*
7 – *Ca flexurae coli hepaticae*
8 – *Ca coli ascedentis*
9 – *Ca caeci*
10 – *Ca* double localization

Fig. 2 – Distribution of elective and emergency surgical procedures by tumor site.
Ca – *carcinoma*.

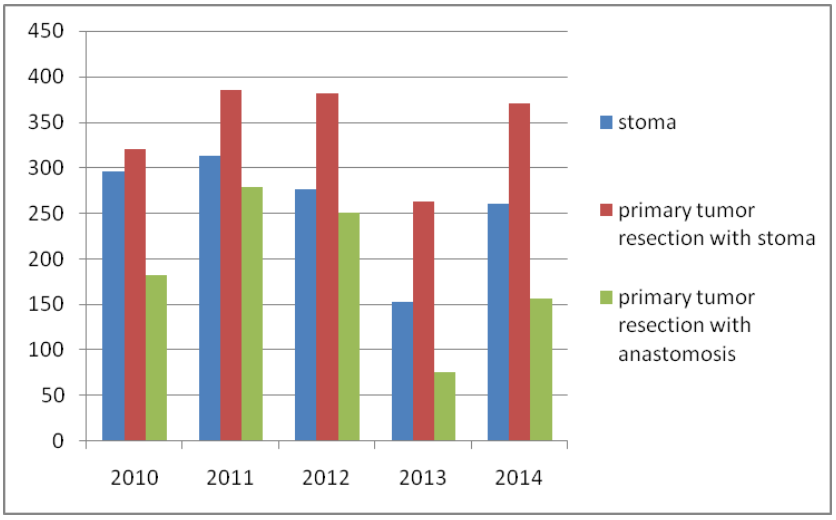
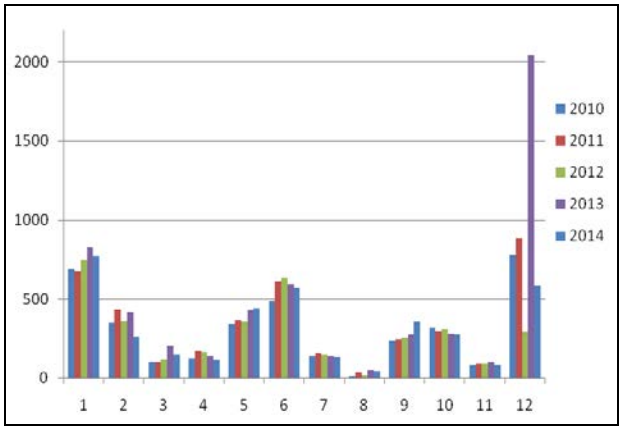


Fig. 3 – Distribution of surgical procedures by study years.

Types of radical surgical procedures were also similarly distributed over the study years, except for colonoscopic polypectomies that have shown a significant increase in 2013 (Figure 4). At the end of the study period, 127 doctors were educated for performing colonoscopy with 55 instruments available.



1 – Right hemicolectomy
2 – Left hemicolectomy
3 – Atypical colon resection
4 – Subtotal colectomy
5 – High anterior rectal resection
6 – Low anterior rectal resection with colorectal anastomosis
7 – Low anterior rectal resection with coloanal anastomosis
8 – Low anterior intersphincteric resection
9 – Hartmann procedure
10 – Miles procedure
11 – Local tumor excision
12 – Colonoscopic polypectomy

Fig. 4 – Distribution of radical surgical procedures by study years.

The distribution of types of palliative surgical procedures was also similar during the study period, with stoma lacking primary tumor resection being the most commonly used procedure (40%) (Figure 5).

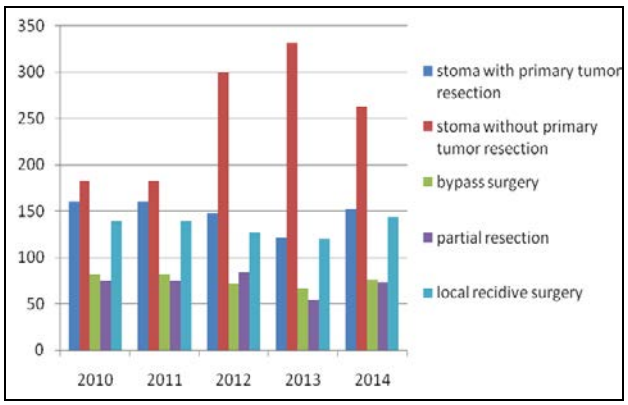


Fig. 5 – Distribution of palliative surgical procedures by study years.

Trends in chemoradiotherapy for CRC changed over the study period, with the more common use of perioperative treatment and an increase in polychemotherapy application (Figure 6).

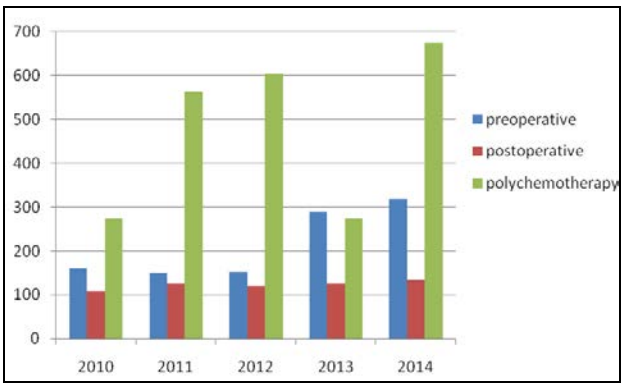


Fig. 6 – Application of chemoradiotherapy over the study period.

Postoperative mortality during the study period was expressed as a percentage of all interventions for colorectal malignancies, with a mean value of 2.8% and a slight increasing tendency (Figure 7).

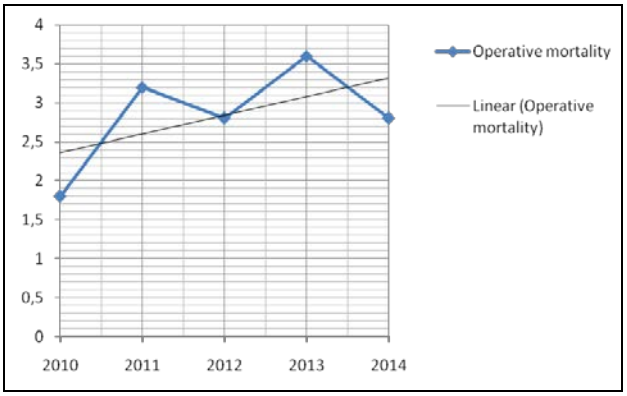


Fig. 7 – Postoperative mortality observed over the study period.

Discussion

The total number of patients who underwent operative CRC resection in Serbia from 2010 to 2014 was included, as well as several other numerical data regarding the surgical treatment of CRC (type of procedure, tumor localization, and applied chemoradiotherapy). The database was established, enabling each of the participating centers to contribute by entering the previously defined dataset. In order to avoid variations in the nomenclature, categories of required data were also predefined. The dataset was limited to the information regarding surgical care of CRC, and neither demographic data nor clinical information were included. The study was designed in such a way because this survey was focused only on gaining basic information on colorectal surgical procedures. The main problem in the data collection process was the fact that the data were collected retrospectively, at the end of the calendar year by a single surgeon per center who performed this task on a volunteer basis. This probably led to minor errors in the registered number of procedures. However, the obtained distribution of the certain surgical procedures did not vary significantly from the expected, neither

did it vary significantly between the centers included in the study.

Recorded trends in standards of surgical care showed the expected distribution, except for colonoscopic polypectomies that have shown a significant increase in 2013 (Figures 2–5). This fact was due to the significant improvements in infrastructure and the training of professionals. In the year 2013, 55 colonoscopes were introduced in the practice in different surgical units across Serbia, while 127 doctors were educated for performing colonoscopy. The distribution of tumor localization and types of surgical procedures were similar during the study period. Trends in treatment changed, with the more common use of perioperative treatment and increase in polychemotherapy application. The growing trend of polychemotherapy application in CRC patients over the analyzed period was a direct consequence of the increased availability of different conventional and targeted chemotherapeutic agents (Figure 6). These improvements, in combination with the introduction of the screening program, represent an excellent basis for further development of colorectal surgical care in Serbia.

Postoperative mortality during the study period showed a tendency to increase, but with the mean value of 2.8%, it remains within the range of values observed for other populations [12–14]. Postoperative mortality might have escalated in the analyzed period because the number of centers and surgeons performing surgical interventions in colorectal cancer in Serbia, who have not yet been provided with extensive training and practice, significantly increased. The future improvement in colorectal surgical care in Serbia will mostly rely on the education and training of professionals. Hence, the postoperative mortality rate is expected to decrease in the next period. It should also be noted that operative mortality may quite often be the direct result of preexisting comorbidity and not always the direct result of the surgical procedure.

The purpose of this study was to describe surgical activity and performance in CRC treatment in Serbia through a national registry and investigate the outcome of colorectal surgery on a national level. The main benefit of the study was the establishment of the system for data collection and preliminary information based on which future database can be developed. Considering the large number of CRC cases in Serbia and the fact that patients are often referred to different centers for repeated surgical interventions, there is a growing need for creating an online national database with the possibility of entering individual information for each surgical case.

Conclusion

The main benefit of this study was the establishment of the necessary preconditions for the multicenter data collection involving large numbers of CRC patients. The study supported the premise that developing the national database for surgical treatment of CRC is achievable and should be established in Serbia. It can provide valuable insight into the routine surgical management of CRC and create a significant resource for further research.

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