



COVID-19 AND COLORECTAL CANCER – SIGNS OF A TOXIC RELATIONSHIP AND HOW TO BREAK THE CYCLE: A SINGLE INSTITUTION, TERTIARY CENTRE EXPERIENCE

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Summary

Colorectal cancer (CRC) is one of the most prevalent oncological diseases globally, taking 3rd place in incidence in the general population. High in mortality, it is also a form of cancer whose outcome is highly dependable on its stage at diagnosis. Therefore, many countries have adopted a more or less successful screening process to ensure early diagnosis and, in turn, higher survival rates and better results overall. The COVID-19 pandemic has altered the established medical routines worldwide, with massively postponing diagnostic procedures and elective surgeries. This study aims to measure the effect the pandemic has had on colorectal cancer treatment in our Institution. Variables such as deferral time from diagnosis to commencement of treatment, lapse of time between different phases of the treatment process, time of presentation (elective versus emergent surgery), the physical status of the patient at the time of surgery (ASA classification) and metastatic index (positive lymph node ratio), were taken into account. We juxtaposed data from patients treated at the Surgical Department of Clinical Hospital Center in Zagreb in 2019 and 2020, the latter being heavily affected by the pandemic. In 2019 and 2020, 347 and 314 patients, respectively, with C18-C20 diagnoses (*International Statistical Classification of Diseases and Related Health Problems ICD-10*), have been treated at our Hospital. With exclusion criteria applied, the patient count falls to 173 for 2019 and 157 for 2020. These numbers include operated cases with or without an anastomosis formation and with or without neoadjuvant chemotherapy applied. From the analysis we excluded patients with recurrent colorectal tumors, synchronous and metachronous tumors, and patients treated palliatively. Furthermore, colorectal adenomas were also excluded from the study. Our data shows significant difference between observed variables in the two patient groups, attributed to the COVID-19 pandemic. Since there is still no reliable way to predict the duration of this global health crisis, it is imperative to implement strategies to lessen the damaging effect the pandemic has had on favourable oncosurgical treatment outcomes in colorectal cancer patients.

KEYWORDS: *Colorectal cancer, COVID-19, screening, surgery, oncology*

INTRODUCTION

The COVID-19 pandemic was announced in March 2020, and it is safe to say that since then everyday life of health professionals and that of

patients has changed drastically. Most of the resources worldwide have been channelled towards combating the ever more challenging health crisis. Screening programs and elective procedures have been put on the back burner, with numbers of medical staff simply unable to rise to the demands of the new disadvantageous situation. Many national studies have reported a significant decrease in diagnostic procedures and a halt in national

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screening programmes for CRC (1–6). A Additional issues of concern are the impact of COVID-19 infection on the oncological patients (7), as availability and adequate use of personal protection equipment (8). The latter has an obvious effect on elective surgery and employment of minimally invasive methods. One study showed a significant increase in 30-day mortality in patients with a perioperative (7 days before surgery and 30 days after surgery) SARS-Cov-2 infection. Nearly half of these patients had postoperative pulmonary complications with an overall mortality of 23,5%, which was even higher in persons over 70 years of age (9). Gastrointestinal complications in critically ill COVID patients have also been observed (10) which could alter the treatment outcome in CRC patients. Our study aims to understand the repercussions the pandemic has had on

the oncosurgical treatment process for CRC patients. This report is a single institution, tertiary centre experience from Croatia. Colorectal cancer seemed like the sensible choice since it has one of the highest incidences among cancers worldwide. When mortality in the general population is evaluated, it is second only to lung cancer, with a toll of over 900 000 lives annually (11–14). In the year 2020, CRC was the most frequently diagnosed cancer in Croatia, with 3 706 new cases, similar to the prior years (15,16). Mirroring global trends, data from the Croatian National Cancer registry recognise it as the second most often identified cause of death in the Croatian population. With oncological patients being in the high-risk immunosuppressed subgroup, the balance between the dangers of the infection and the steady advancement of the malignant disease is fragile (17). International societies such as the American College of Surgeons (ACS), Society for Surgical Oncology (SSO), European Society for Medical Oncology (ESMO), Association of Coloproctology of Great Britain and Ireland (ACPGBI), have formed guidelines to facilitate decision making and triage process (18–21). Early on in the COVID-19 crisis, it was evident that losses regarding oncological care are to be expected. The absolute and final scope of

Table 1
Patients with CRC (C18-C20) treated at Clinical Hospital Centre Zagreb in 2019. versus 2020.

	2019.	2020.
Total number of CRC patients	347	314
Exclusion criteria applied	173	157

Table 2.
Descriptive statistics by gender, age and surgical procedures

Year	2019				2020			
	N	%			N	%		
Gender								
Male	96	55,5			98	62,4		
Female	77	44,5			59	37,6		
	Min	Max	Median	Std Dev	Min	Max	Median	Std Dev
Age	34	89	67	11,189	27	90	69	11,307
Surgical procedure	N	%			N	%		
Left colectomy	9	5,2			6	3,8		
Total colectomy	5	2,9			1	0,6		
Hartmann procedure	23	13,3			34	21,7		
Right hemicolectomy	46	26,6			52	33,1		
Subtotal colectomy	2	1,2			1	0,6		
Rectal resection	51	29,5			35	22,3		
Sigmoid resection	19	11			12	7,6		
Abdominoperineal excision	14	8,1			14	8,9		
Trasversal colon resection	3	1,7			2	1,4		
Transanal excision	1	0,5			0	0		

the problem will significantly depend on the duration of the pandemic.

MATERIALS AND METHODS

This study is a single institution, tertiary centre experience, from Croatia. The data were collected retrospectively and included CRC patients with ICD-10 (*International Statistical Classification of Diseases and Related Health Problems*) diagnoses C18-C20, treated at the Surgical Department of Clinical Hospital Centre Zagreb, comparing one-year periods of 2019 and 2020. Apart from the diagnoses mentioned above, inclusion criteria demanded that treatment was of curative surgical nature where tumour resection was performed (whether or not an anastomosis was constructed). The study also did not differentiate between patients who have received neoadjuvant oncological treatment from those who have not. Both electively operated and emergently treated patients were included. From the further analysis, we excluded patients with recurrent tumors, synchronous and metachronous tumors, patients treated palliatively without curative intent, patients with the pathohistological diagnosis of colorectal adenoma, and patients operated due to metastatic disease or late postoperative complications.

At our Institution we treated 347 patients with a diagnosis of CRC in 2019., and 314 in 2020. When exclusion criteria are applied, the figures fall to 173 and 157, respectively. (Table 1)

We analysed various parameters between the two groups. Percentage of emergent operations from the total number of treated individuals, deferral time from diagnosis to commencement of treatment, further detailed with a lapse of time between different phases of the treatment process, physical status of the patient at the time of surgery (ASA classification), TNM stage of cancer confirmed by pathohistology and finally the lymph node (LN) count as a metastatic index (positive lymph node ratio, LNR) as an important prognostic factor in TNM stage 3 cancer (22–27).

Statistical analysis

All analyses were performed using SPSS for Windows version 25 (SPSS Inc, USA). The descriptive statistic was used for the comparison of two groups by year. The difference between groups was assessed using the independent t-test procedure for comparing mean values. Significance was determined by a probability value <0.05 , with all p values two-sided.

RESULTS

In 2019. a total of 173 colorectal carcinoma patients were treated at our Institution (exclusion criteria applied). 96 (55,5%) of the individuals were men, and 77 (44,5%) were women. Median age for all patients was 67 years. The three most often performed operations were an anterior colorectal resection with a colorectal anastomosis

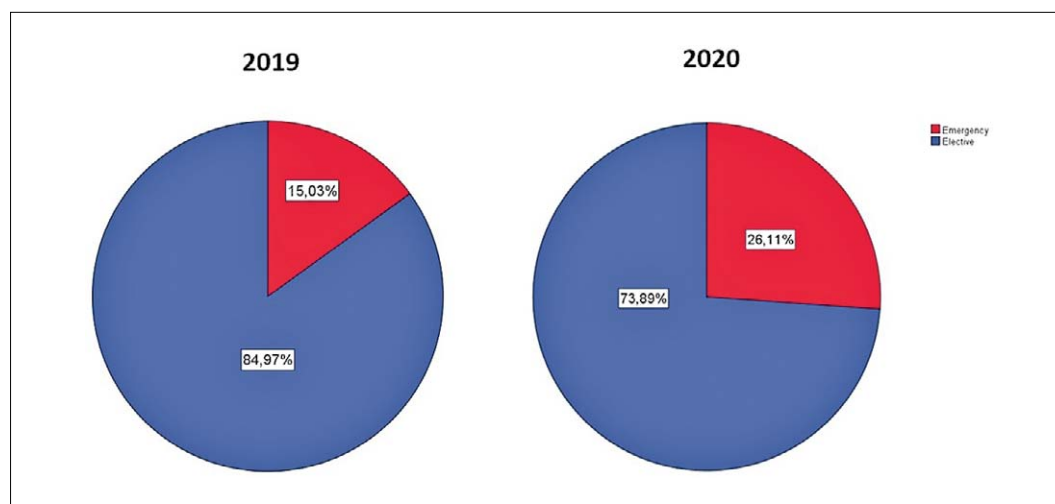


Figure 1. Percentage of emergency colorectal cases per year.

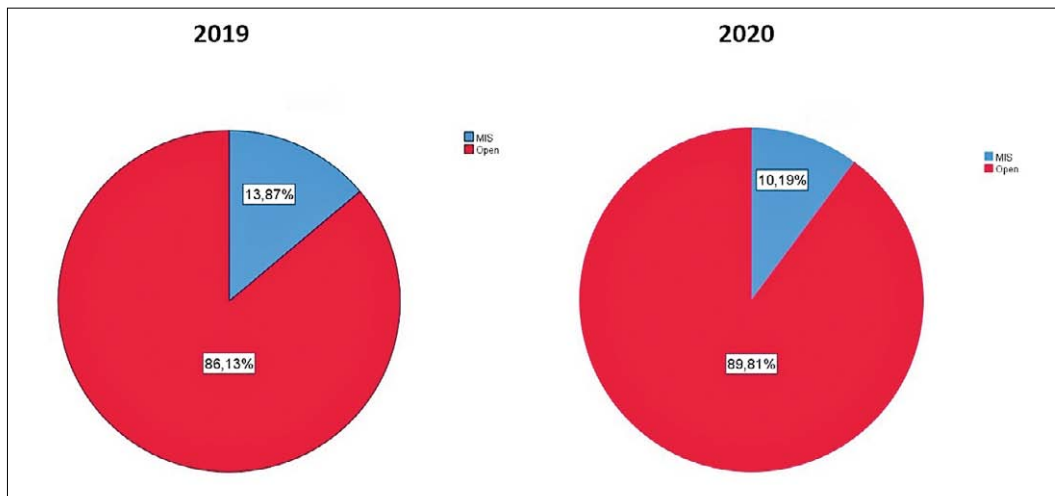


Figure 2. Percentage of cases operated via minimally invasive procedure

Table 3.

Distribution of ASA stages among operated patients (ASA 1 = patient without comorbidities; ASA 2 = a patient with mild systemic disease; ASA 3 = a patient with severe systemic disease; ASA 4 = a patient with severe systemic disease that is a constant threat to life; ASA 5 = a moribund patient who is not expected to survive without the operation) (28)

Year	2019	2020
ASA 1	2	1
ASA 2	80	55
ASA 3	77	76
ASA 4	7	4
ASA 5	1	0
Missing patient data	6	21

(29,5%), right hemicolectomie (26,6%) and Hartmann’s procedure with closure of the anorectal stump and formation of an end colostomy (13,3%). (Table 2)

A total of 157 patients (exclusion criteria applied) were treated at our Surgical Department in the year 2020, and of these patients, 98 (62,4%) were men, and 59 (35,6%) were women with an overall median age of 69 years. A right hemicolectomie was performed in 33,1% of cases, an anterior resection in 22,3% of patients and finally Hartmann’s procedure in 21,7%. (Table 2)

When the data between 2019 and 2020 are compared, a rise in procedures done in an emergent setting can be observed (15,3% versus 26,11%, respectively) (Figure 1) with a decline in minimally invasive procedures. (Figure 2)

The following variable we examined was the ASA stage at the time of surgery as a universally accepted method of evaluating a patient’s health prior to surgery (28). Data show a significant decrease in the ASA 2 subgroup in 2020 compared to 2019, the ASA 2 subgroup being patients where good treatment results are generally expected. Healthy individuals without comorbidities, treated for CRC, iare scarce. (Table 3)

The Tumor, Node, Metastasis (TNM) staging system was used as a parameter for late diagnosis with less favourable outcomes. Our analysis used the four-grade system proposed by the American Joint Committee on Cancer (AJCC)/Union for International Cancer Control (UICC) (29). Interestingly enough, fewer histologically advanced tumours (grade 3 and 4) were found in the year 2020 compared to 2019 (55,1% versus 77,7%). It remains unclear whether this finding is attributed to the overall lower number of treated patients in 2020, with perhaps more operations in the emergent setting be expected in the future. (Table 4)

Table 4

Frequency of patients in various TNM stages

Year	2019	2020
TNM Stage		
I	11	22
II	27	43
III	87	57
IV	48	30

Table 5

Deferral from the initial diagnosis to start of treatment and lapse of time between different stages of the oncosurgical treatment process

	Year	N	Mean (Days)	Std. Deviation	Sig.
Colonoscopy to Surgery	2019	91	40,4725	36,70160	,115
	2020	65	45,1846	74,70649	
Surgeon referral to Surgery	2019	135	24,3111	32,83574	,005
	2020	96	32,0000	63,16645	
Surgery to Oncologist referral	2019	128	35,4766	20,99567	,004
	2020	122	44,6311	28,43877	
Surgery to Chemotherapy	2019	70	59,0286	26,64200	,005
	2020	81	76,4321	41,78724	

Deferral from the initial diagnosis to the beginning of treatment was measured in days and compared between the two groups. We noticed a prolonged time between different stages of surgical and oncological treatments, a statistically significant difference was observed at data points from Surgeon referral to Surgery, from Surgery to Oncologist referral and from Surgery to Chemotherapy initiation. (Table 5)

The final variable measured was lymph node count (LN), the positivity of examined LNs to tumour cells (pLN), and Metastatic Index (positive lymph nodes ratio, LNR). It is a standing surgical practice to target having at least 12 mesenteric lymph nodes in the resected colorectal tumour specimen. In the group of patients from 2019, the mean number of examined LNs per patient was 17.28 (N=172, Std. Dev. = 8.409), while in 2020, it was 16.57 (N=157, Std. Dev. = 6.264) (Figure 3). Studies show that lymph node count is an important prognostic factor for overall survival in CRC, especially in more advanced disease such as TNM stage III (23,24,30-32). Lately, the Metastatic Index has been more frequently used as it represents the ratio between metastatic lymph nodes and the to-

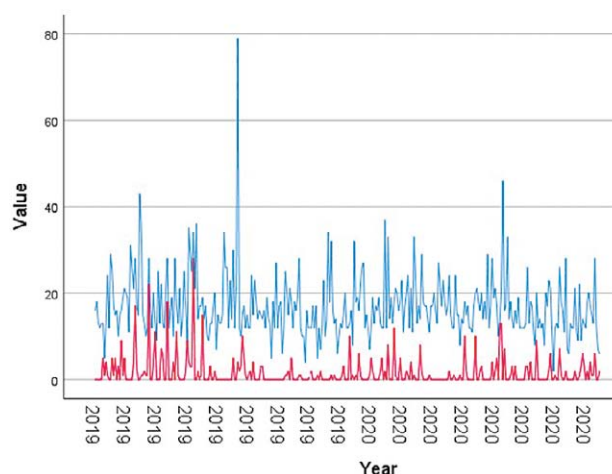


Figure 3. The blue line depicts the number of examined lymph nodes per patient through 2019/2020. The number of positive lymph nodes is marked with the red line.

tal number of dissected lymph nodes (30-32). Ranging in value from 0 to 100% predicts a less optimal outcome the closer to 100% it falls. The mean value of LNR in 2019 was 10.2983, while it was 7.9658 in 2020. (Table 6)

Table 6.

	Group Statistics				
	Year	N	Mean	Std. Deviation	Std. Error Mean
Lymph nodes ratio (LNR)	2020	157	7,9658	15,79241	1,26037
	2019	172	10,2983	19,68752	1,50116
Examined lymph nodes (LN)	2020	157	16,57	6,264	,500
	2019	172	17,28	8,409	,641
Positive lymph nodes (pLN)	2020	157	1,36	2,658	,212
	2019	172	1,80	3,975	,303

DISCUSSION AND CONCLUSION

Many factors influence the outcome of colorectal cancer treatment. It has long been known that CRC screening has excellent value in diminishing mortality rates of this malignancy. Precancerous lesions of the colon are well defined, and higher histological cancer stages upon initial diagnosis have a detrimental effect on the 5-year survival rate (16,26,33). Many national reports reveal significant declines in CRC screening during COVID times (34,35), with some of them propositioning to alter the standardised screening process, making it more attainable in pandemic times (36,37). The CRC screening program in Croatia started in 2008 and has since then been a valuable asset to national health (16,38).

The differences in total numbers of CRC patients registered at our Institution (347 in 2019 versus 314 in 2020) can at least partially be attributed to the postponement of routine diagnostics. One study investigated CRC treatment outcomes in younger individuals that were not included in the screening process. On average, these patients presented with more advanced disease and poorly differentiated histology (higher TNM grade) (39). One could argue that early-onset CRC has a more aggressive clinical presentation. But when histological stages were compared, the younger patients had better outcomes than older individuals troubled with comorbidities. The contrast can therefore be fairly attributed to failure of early recognition of the disease. To assume that one could entirely mitigate the current and future effect of COVID-19 on routine diagnostic and oncological services is not realistic. Societies, such as the American College of Surgeons (ACS), Society for Surgical Oncology (SSO), European Society for Medical Oncology (ESMO), Association of Coloproctology of Great Britain and Ireland (ACPGBI), have formed guidelines to facilitate the decision making and triage process and thereby alleviate the burden the pandemic has put on oncological shoulders (18,20,21,40). The ESMO guidelines propose a priority ranking where patients with signs of mechanical obstruction, bowel perforation and postoperative complications take precedence, while diagnostic endoscopy and radiological staging are considered a medium priority. Re-staging without the intent of curative surgery stands lowest in priority (18).

ESMO guidelines suggest considering short-course neoadjuvant chemotherapy with a possible *watch and wait* approach in patients with a complete response (18). The latter recommendations are supported by many studies which have investigated the relations between neoadjuvant chemotherapy (short- and long-course) and timing of surgery. They mostly found that delay to surgery of 4 to 8 weeks (56 to 60 days being the cut-off in some studies) is safe and feasible, while a too-short interval between neoadjuvant chemotherapy and surgery (1 week and less) can even have detrimental effects on the final outcomes (25,41-45).

In conclusion, the ramifications COVID-19 pandemic has had on CRC patients at our Institution are evident. With fewer total cases discovered, more advanced disease is expected in the future. Patients were more frequently of poorer physical status at the time of operation, which is a negative outcome predictor. The drop in minimally invasive surgery is partially owned to diminished hospital and equipment capacities, and consequences of prolonged deferral between oncological treatment phases are yet to be established. From the presented results, a prolongation of crucial stages for treating CRC patients in 2020 is visible. Proportion of TNM stage III patients, with a better metastatic index, increased in 2020, while the waiting time for chemotherapy, from which this subgroup of patients would benefit the most, was extended, which is particularly striking. Trying at the moment to implement the latest recommendations of relevant Institutions concerning CRC treatment and diagnosis, new data gathering will be needed to estimate if COVID-19 effects have been successfully minimised.

REFERENCES

1. Dinmohamed AG, Cellamare M, Visser O, et al. The impact of the temporary suspension of national cancer screening programmes due to the COVID-19 epidemic on the diagnosis of breast and colorectal cancer in the Netherlands. *Journal of Hematology and Oncology*. 2020;13(1). doi:10.1186/s13045-020-00984-1
2. Burns EM, Boyle K, Mirnezami A, Jenkins JT. The impact of COVID-19 on advanced colorectal cancer. *Colorectal Disease*. 2020;22(7):737-738. doi:10.1111/codi.15185
3. Santoro GA, Grossi U, Murad-Regadas S, et al. Delayed ColoRectal cancer care during COVID-19 Pandemic (DECOR-19): Global perspective from an inter-

- national survey. Surgery (United States). Published online April 1, 2020. doi:10.1016/j.surg.2020.11.008
4. Raj Kumar B, Pandey D, Rohila J, deSouza A, Saklani A. An observational study of the demographic and treatment changes in a tertiary colorectal cancer center during the COVID-19 pandemic. *Journal of Surgical Oncology*. 2020;122(7):1271-1275. doi:10.1002/jso.26193
 5. Antikchi MH, Neamatzadeh H, Ghelmani Y, et al. The Risk and Prevalence of COVID-19 Infection in Colorectal Cancer Patients: a Systematic Review and Meta-analysis. *Journal of Gastrointestinal Cancer*. 2021;52(1):73-79. doi:10.1007/s12029-020-00528-3
 6. Uzzo, Kutikov, Geynisman - 2021 - COVID-19 Cancer treatment in uninfected patients during the pandemic , issues related to telemedicine-annotated.
 7. Yang K, Sheng Y, Huang C, et al. Clinical characteristics, outcomes, and risk factors for mortality in patients with cancer and COVID-19 in Hubei, China: a multicentre, retrospective, cohort study. *The Lancet Oncology*. 2020;21(7):904-913. doi:10.1016/S1470-2045(20)30310-7
 8. Wexner SD, Cortés-Guiral D, Gilshtein H, Kent I, Raymond MA. COVID-19: impact on colorectal surgery. *Colorectal Disease*. 2020;22(6):635-640. doi:10.1111/codi.15112
 9. Almaadany FS, Samadov E, Namazov I, et al. Mortality and pulmonary complications in patients undergoing surgery with perioperative sars-cov-2 infection: An international cohort study. *The Lancet*. 2020;396(10243):27-38. doi:10.1016/S0140-6736(20)31182-X
 10. Kaafarani HMA, el Moheb M, Hwabejire JO, et al. Gastrointestinal Complications in Critically Ill Patients With COVID-19. *Annals of surgery*. 2020;272(2):e61-e62. doi:10.1097/SLA.0000000000004004
 11. GLOBOCAN 2020 Globocan Cancer Observatory. Available from: <http://gco.iarc.fr/>. Accessed: April 17 2021. graphic.
 12. Ferlay J, Steliarova-Foucher E, Lortet-Tieulent J, et al. Cancer incidence and mortality patterns in Europe: Estimates for 40 countries in 2012. *European Journal of Cancer*. 2013;49(6):1374-1403. doi:10.1016/j.ejca.2012.12.027
 13. Vrdoljak E, Wojtukiewicz MZ, Pienkowski T, et al. Cancer epidemiology in Central and South Eastern European countries. *Croatian Medical Journal*. 2011;52(4):478-487. doi:10.3325/cmj.2011.52.478
 14. Simko V, Ginter E. Region-specific differences in colorectal cancer: Slovakia and Hungary have highest incidence in Europe. *Bratislava Medical Journal*. 2016;117(2):66-71. doi:10.4149/BLL_2016_013
 15. Croatian National Cancer Registry, Croatian National Institute of Public Health, Zagreb. Available from: <http://www.hzjz.hr> . Accessed: April 17, 2021.
 16. Katičić M, Antoljak N, Kujundžić M, et al. Results of National Colorectal Cancer Screening Program in Croatia (2007-2011). *World Journal of Gastroenterology*. 2012;18(32):4300-4307. doi:10.3748/wjg.v18.i32.4300
 17. Lewis MA. Between Scylla and Charybdis – Oncologic Decision Making in the Time of Covid-19. *New England Journal of Medicine*. 2020;382(24):2285-2287. doi:10.1056/nejmp2006588
 18. Vecchione L, Stintzing S, Pentheroudakis G, Douillard JY, Lordick F. ESMO management and treatment adapted recommendations in the COVID-19 era: Colorectal cancer. *ESMO Open*. 2020;5. doi:10.1136/esmoopen-2020-000826
 19. Fligor SC, Wang S, Allar BG, et al. Gastrointestinal Malignancies and the COVID-19 Pandemic: Evidence-Based Triage to Surgery. *Journal of Gastrointestinal Surgery*. 2020;24(10):2357-2373. doi:10.1007/s11605-020-04712-5
 20. Colorectal-Resource-during-COVID-19-3.23.20. Available from: <https://www.surgonc.org>. Accessed: April 17, 2021.
 21. COVID 19: Elective Case Triage Guidelines for Surgical Care. Available from: <https://www.facs.org>. Accessed: April 17, 2021.
 22. Wiggers T, Arends JW, Volovics A. Regression Analysis of Prognostic Factors in Colorectal Cancer after Curative Resections Dis Colon Rectum 1988.31:33-41.
 23. Swanson RS, Compton CC, Stewart AK, Bland KI. The prognosis of T3N0 colon cancer is dependent on the number of lymph nodes examined. *Annals of surgical oncology : the official journal of the Society of Surgical Oncology*. 2003;10(1):65-71. doi:10.1245/ASO.2003.03.058
 24. Rahbari NN, Bork U, Motschall E, et al. Molecular detection of tumor cells in regional lymph nodes is associated with disease recurrence and poor survival in node-negative colorectal cancer: A systematic review and meta-analysis. *Journal of Clinical Oncology*. 2012;30(1):60-70. doi:10.1200/JCO.2011.36.9504
 25. Ngan SY, Burmeister B, Fisher RJ, et al. Randomized trial of short-course radiotherapy versus long-course chemoradiation comparing rates of local recurrence in patients with T3 rectal cancer: Trans-Tasman Radiation Oncology Group Trial 01.04. *Journal of Clinical Oncology*. 2012;30(31):3827-3833. doi:10.1200/JCO.2012.42.9597
 26. Hogan J, Chang KH, Duff G, et al. Lymphovascular invasion: A comprehensive appraisal in colon and rectal adenocarcinoma. In: *Diseases of the Colon and Rectum*. Vol 58. Lippincott Williams and Wilkins; 2015:547-555. doi:10.1097/DCR.0000000000000361
 27. Chang GJ, Rodriguez-Bigas MA, Eng C, Skibber JM. Lymph node status after neoadjuvant radiotherapy for rectal cancer is a biologic predictor of outcome. *Cancer*. 2009;115(23):5432-5440. doi:10.1002/cncr.24622
 28. <https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system>. Accessed: April 18, 2021.
 29. AJCC Cancer Staging Manual, 8th, Amin MB (Ed), Springer, New York 2017. p.269.

30. Isik A, Peker K, Firat D, et al. Importance of metastatic lymph node ratio in non-metastatic, lymph node-invaded colon cancer: A clinical trial. *Medical Science Monitor*. 2014;20:1369-1375. doi:10.12659/MSM.890804
31. Berger AC, Sigurdson ER, LeVoyer T, et al. Colon cancer survival is associated with decreasing ratio of metastatic to examined lymph nodes. *Journal of Clinical Oncology*. 2005;23(34):8706-8712. doi:10.1200/JCO.2005.02.8852
32. Ceelen W, van Nieuwenhove Y, Pattyn P. Prognostic value of the lymph node ratio in stage III colorectal cancer: A systematic review. *Annals of Surgical Oncology*. 2010;17(11):2847-2855. doi:10.1245/s10434-010-1158-1
33. Weiss JM, Pfau PR, O'Connor ES, et al. Mortality by stage for right- versus left-sided colon cancer: Analysis of surveillance, epidemiology, and end results-medicare data. *Journal of Clinical Oncology*. 2011;29(33):4401-4409. doi:10.1200/JCO.2011.36.4414
34. Patel S, Issaka RB, Chen E, Somsouk M. Colorectal Cancer Screening and COVID-19. *The American journal of gastroenterology*. 2021;116(2):433-434. doi:10.14309/ajg.0000000000000970
35. Maringe C, Spicer J, Morris M, et al. The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: a national, population-based, modelling study. *The Lancet Oncology*. 2020;21(8):1023-1034. doi:10.1016/S1470-2045(20)30388-0
36. MacLeod C, Wilson P, Watson AJM. Colon capsule endoscopy: an innovative method for detecting colorectal pathology during the COVID-19 pandemic? *Colorectal Disease*. 2020;22(6):621-624. doi:10.1111/codi.15134
37. Nunoo-Mensah JW, Giordano P, Chung-Faye G. COVID-19: An Opportunity to Reimagine Colorectal Cancer Diagnostic Testing—A New Paradigm Shift. *Clinical Colorectal Cancer*. 2020;19(4):227-230. doi:10.1016/j.clcc.2020.07.008
38. Znaor A, Brenner H, Holleczeck B, Gondos A. Has there been progress in cancer care in Croatia? Assessing outcomes in a partially complete mortality follow-up setting. *European Journal of Cancer*. 2012;48(6):921-928. doi:10.1016/j.ejca.2011.05.027
39. Griffiths CD, McKechnie T, Lee Y, et al. Presentation and survival among patients with colorectal cancer before the age of screening: a systematic review and meta-analysis. *Canadian journal of surgery Journal canadien de chirurgie*. 2021;64(1):E91-E100. doi:10.1503/cjs.013019
40. Fligor SC, Wang S, Allar BG, et al. Gastrointestinal Malignancies and the COVID-19 Pandemic: Evidence-Based Triage to Surgery. *Journal of Gastrointestinal Surgery*. 2020;24(10):2357-2373. doi:10.1007/s11605-020-04712-5
41. Ma B, Gao P, Wang H, et al. What has preoperative radio(chemo)therapy brought to localized rectal cancer patients in terms of perioperative and long-term outcomes over the past decades? A systematic review and meta-analysis based on 41,121 patients. *International Journal of Cancer*. 2017;141(5):1052-1065. doi:10.1002/ijc.30805
42. Bujko K, Nowacki MP, Nasierowska-Guttmejer A, Michalski W, Bebenek M, Kryj M. Long-term results of a randomized trial comparing preoperative short-course radiotherapy with preoperative conventionally fractionated chemoradiation for rectal cancer. *British Journal of Surgery*. 2006;93(10):1215-1223. doi:10.1002/bjs.5506
43. van der Valk MJM, Hilling DE, Bastiaannet E, et al. Long-term outcomes of clinical complete responders after neoadjuvant treatment for rectal cancer in the International Watch & Wait Database (IWWD): an international multicentre registry study. *The Lancet*. 2018;391(10139):2537-2545. doi:10.1016/S0140-6736(18)31078-X
44. Sebag-Montefiore D, Stephens RJ, Steele R, et al. Preoperative radiotherapy versus selective postoperative chemoradiotherapy in patients with rectal cancer (MRC CR07 and NCIC-CTG C016): a multicentre, randomised trial. *The Lancet*. 2009;373(9666):811-820. doi:10.1016/S0140-6736(09)60484-0
45. Boras Z, Kondza G, Sisljagic V, Busic Z, Gmajnic R, Istvanic T. Prognostic Factors of Local Recurrence and Survival after Curative Rectal Cancer Surgery: A Single Institution Experience. Vol 36.; 2012.

Sažetak

COVID-19 I KOLOREKTALNI KARCINOM – TOKSIČNE POVEZNICE I KAKO IH PREKINUTI:
KBC ZAGREB, ISKUSTVO TERCIJARNOG CENTRA

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Kolorektalni karcinom jedna je od najčešćih onkoloških bolesti u svijetu. Uz visoki mortalitet obilježena je i ovisnošću ishoda liječenja o stadiju bolesti u trenutku dijagnoze. Mnoge su države stoga usvojile više ili manje uspješne programe probira kako bi osigurale ranu dijagnozu, bolje stope preživljenja te generalno optimalnije ishode liječenja. Pandemija COVID-19 u kratkom je roku promijenila temelje medicinske svakodnevice uz nemale odgode dijagnostičkih procedura i elektivnih zahvata. Cilj ovog rada jest procijeniti utjecaj koji je pandemija imala na liječenje kolorektalnog karcinoma u našoj ustanovi. Uspoređivana su dva jednogodišnja razdoblja – 2019. i 2020. od kojih je potonja godina bila značajno pogođena COVID-19 pandemijom. Uspoređivali smo podatke pacijenta liječenih na Zavodu za Kirurgiju Kliničkog bolničkog Centra Zagreb, vođenih pod MKB dijagnozama C18-C20. U 2019. godini na našem je Zavodu liječeno 347 pacijena s kolorektalnim karcinomom, po primjeni kriterija isključenja ta brojka pada na 173. Bolesnika s operiranim karcinomom koloektuma u 2020. godini u našoj je ustanovi bilo 314, po primjeni kriterija isključenja 157. Praćeni parametri uključivali su vremensku odgodu od incijalne dijagnoze do početka liječenja, vrijeme proteklo između različitih etapa onko-kirurškog liječenja, odnos elektivnih i hitnih zahvata, fizičku spremnost pacijenata u vrijeme operacije (ASA klasifikacija) te metastatski index (udio pozitivnih metastatskih limfnih čvorova u dobivenim preparatima). U studiju su uključeni bolesnici neovisno o primjeni neoadjuvantne kemoterapije te neovisno je li intraoperacijski uspostavljen kontinuitet probavne cijevi. Recidivni tumori, metakroni i sinkroni tumori, palijativno liječeni pacijenti, reoperirani te pacijenti operirani uslijed kolorektalnog adenoma nisu uključeni u ovu studiju. Naši podaci pokazuju značajne razlike među praćenim parametrima u dva razdoblja te se iste uvelike pripisuju utjecaju COVID-19 pandemije. Kako su budućnost i trajanje ove medicinske krize još uvijek neizvjesni, potrebno je što prije usvojiti strategije kojima bi se smanjio razorni utjecaj pandemije na ishode liječenja bolesnika sa kolorektalnim karcinomom.

KLUČNE RIJEČI: *kolorektalni karcinom, COVID-19, probir, kirurgija, onkologija*