



# How Does the COVID-19 Pandemic Influence Surgical Case Load and Histological Outcome for Colorectal Cancer? A Single-Centre Experience

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## Background

Twelve months ago, the Coronavirus disease 2019 (COVID-19) broke out. Delays in cancer diagnosis or therapy are a serious concern and may result in decreased survival for solid malignancies<sup>1</sup>. Previous literature is showing conflicting results regarding the survival of delayed therapy of colorectal cancer (CRC)<sup>1–3</sup>. Tumour progression caused by a delay in diagnostics has potentially dramatic consequences for patients. The aim of this study was to investigate how a delay in diagnostics due to the pandemic influences surgical CRC case load and histological outcome compared to the time before the pandemic started.

## Methods

All surgical CRC cases that underwent resection beginning on 1 January 2019 and ending on 31 December 2020 were retrieved from the electronic database at our hospital. Patients' characteristics, surgical technique, tumour location and urgency of surgery were recorded. The pathological examination included a complete histopathological staging according to TNM stage. All patients received a CT scan of the trunk before (elective cases) or

after surgery (emergency procedures) to determine the UICC stage. Statistical analysis was performed using the SPSS (IBM, New York). Continuous data are represented as average ( $\pm$ SD). Significance was set at a *p* value of  $<0.05$ .

## Results

Results are shown in Table 1 and Fig. 1. In total, 134 patients (76 male and 58 female) underwent surgery because of colorectal cancer. Comparing the halves of the year in 2019 and 2020, we observed no difference regarding patients' characteristics. We performed significantly fewer procedures during the first lockdown compared to the same period in 2019 (2019, *n* = 14 vs. 2020, *n* = 4; *p* = 0.02). Overall, the number of surgical CRC cases a year were comparable in 2019 (*n* = 71) and 2020 (*n* = 63). In 2.9% (*n* = 4), we observed a pTis, in 6.7% (*n* = 9) a pT1, in 14.9% (*n* = 20) a pT2, a pT3 in 41.0% (*n* = 55) and a pT4 tumour in 34.3% (*n* = 46). We observed a UICC stage 0 in 2.2% (*n* = 3), a UICC stage I in 18.6% (*n* = 25), a UICC stage II in 26.8% (*n* = 36), a UICC stage III in 29.8% (*n* = 40) and a UICC stage IV in 22.3% (*n* = 30). If a neoadjuvant treatment was performed, the preoperatively UICC stage was considered. We observed—not significantly—more T4 stages in the first and second half of 2020 compared to the same time one year before (*p* = 0.47). Complication rates did not differ during 2019 and 2020 (*p* = 0.58).

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## Discussion

Our study clearly showed a significant decrease of surgical CRC cases during the first lockdown from 16 March to 26

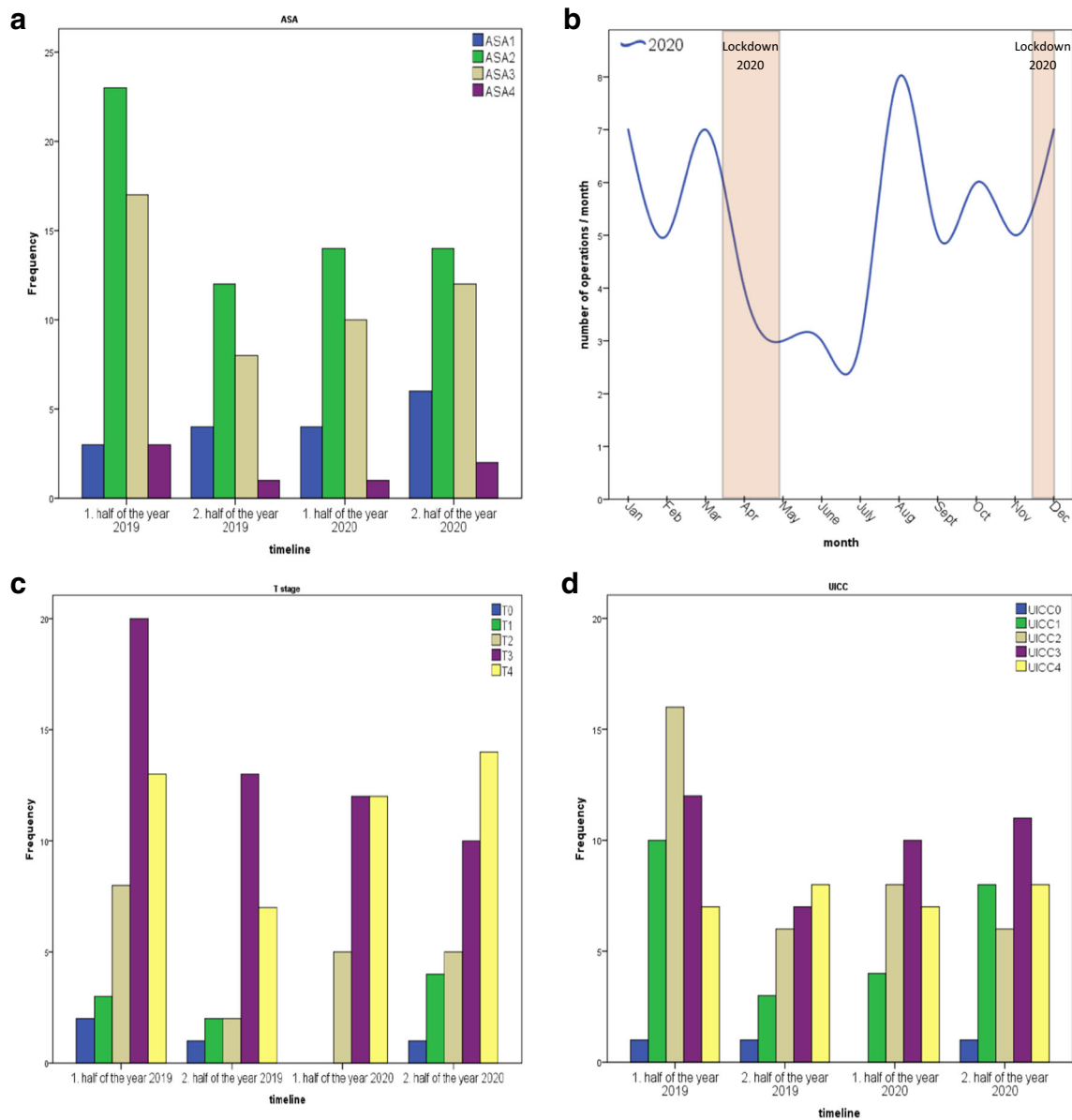
**Table 1** Patient's characteristics (A), perioperative results (B) and oncological results (C)

A: Patients' characteristics	1st half of the year 2019		2nd half of the year 2019		1st half of the year 2020		2nd half of the year 2020		
	<i>n</i> (=134)	46		25		29		34	0.06
Sex (m/w)	27/19		15/10		12/17		22/12	0.28	
Age (years)	67.5 (±11.7)		64.0 (±15.7)		69.5 (±13.1)		68.1 (±13.2)	0.63	
*BMI (kg/m <sup>2</sup> )	25.2 (±4.7)		25.2 (±4.8)		24.3 (±3.5)		27.3 (±5.3)	0.11	
**ASA [], <i>n</i> (%)								0.95	
I	3	6.5%	4	16.0%	4	13.8%	6	17.6%	0.39
II	23	50.0%	12	48.0%	14	48.3%	14	41.2%	0.89
III	17	37.0%	8	32.0%	10	34.5%	12	35.3%	0.99
IV	3	6.5%	1	4.0%	1	3.4%	2	5.9%	1.00
<b>B: Perioperative results</b>									
Duration of hospital stay (days)	13.6 (±9.1)		14.9 (±17.2)		12.2 (±7.8)		15.0 (±13.5)	0.91	
Emergency cases, <i>n</i> (%)	2	4.3%	7	28.0%	5	17.2%	7	20.6%	0.03
Laparoscopy, <i>n</i> (%)	24	52.2%	12	48.0%	11	37.9%	17	50.0%	0.59
Open, <i>n</i> (%)	22	47.8%	13	52.0%	18	62.1%	17	50.0%	0.40
Localisation, <i>n</i> (%)									
Right colon + flexure	16	34.8%	9	36.0%	9	31.0%	16	47.1%	0.58
Transverse colon	1	2.2%	2	8.0%	5	17.2%	1	2.9%	0.07
Left colon + flexure	5	10.9%	2	8.0%	1	3.4%	1	2.9%	0.52
Sigmoid colon	7	15.2%	8	32.0%	8	27.6%	7	20.6%	0.34
Rectum	17	37.0%	4	16.0%	6	20.7%	9	26.5%	0.24
Complications:	9	19.6%	5	20.0%	3	10.3%	8	23.5%	0.58
Leakage	6	13.0%	4	16.0%		0.0%	3	8.8%	0.13
Fascial dehiscence	2	4.3%		0.0%	2	6.9%	2	5.9%	0.73
Bleeding		0.0%		0.0%		0.0%	2	5.9%	0.14
Stoma dehiscence		0.0%	1	4.0%		0.0%		0.0%	0.19
Aspiration		0.0%		0.0%		0.0%	1	2.9%	0.66
Peritonitis	1	2.2%		0.0%		0.0%		0.0%	1.00
Influenza pneumonia		0.0%		0.0%	1	3.4%		0.0%	0.40
COVID-19 pneumonia		0.0%		0.0%		0.0%	1	2.9%	0.66
<b>C: Oncological results</b> (*in case of neoadjuvant therapy, preoperatively measured UICC stage was considered)									
*UICC [], <i>n</i> (%)								0.79	
0	1	2.2%	1	4.0%	0	0.0%	1	2.9%	0.88
1	10	21.7%	3	12.0%	4	13.8%	8	23.5%	0.61
2	16	34.8%	6	24.0%	8	27.6%	6	17.6%	0.43
3	12	26.1%	7	28.0%	10	34.5%	11	32.4%	0.85
4	7	15.2%	8	32.0%	7	24.1%	8	23.5%	0.42
T [], <i>n</i> (%)								0.65	
0	2	4.3%	1	4.0%	0	0.0%	1	2.9%	0.83
1	3	6.5%	2	8.0%	0	0.0%	4	11.8%	0.31
2	8	17.4%	2	8.0%	5	17.2%	5	14.7%	0.76
3	20	43.5%	13	52.0%	12	41.4%	10	29.4%	0.36
4	13	28.3%	7	28.0%	12	41.4%	14	41.2%	0.47
N [], <i>n</i> (%)								0.77	
0	30	65.2%	12	48.0%	18	62.1%	20	58.8%	0.56
1	8	17.4%	4	16.0%	5	17.2%	6	17.6%	1.00
2	8	17.4%	9	36.0%	6	20.7%	8	23.5%	0.36
Resected lymph nodes, <i>n</i>	17.63 (±5.18)	18.56 (±9.01)	17.55 (±6.17)	15.89 (±6.87)	0.72				

m, men; w, women; UICC, Union Internationale Contre le Cancer; BMI, body mass index; ASA, American Society of Anaesthesiologists Classification

April 2020, compared to the same period in 2019. This may be caused by the complete absence of routine diagnostic during the first lockdown and because of a reduction of operation room resources<sup>4</sup>. The second lockdown was more selective and routine diagnostic tools were available. Comparing the periods in 2019 and 2020, we did not observe a difference regarding patients' characteristics, type of procedure and urgency of surgery compared to the time before the pandemic started. Oncological outcomes were comparable in the

analysed periods. A change of the management in rectal cancer therapy was not necessary because of COVID-19. Interestingly, we observed a non-significant increase of T4 stages in the first and second half of 2020 compared to the same time in 2019. This study is limited by its retrospective character and single institution experience. To rule out statistical difficulties due to the relatively small number of cases in this study, a multicentre trial and register data would be helpful.



**Fig. 1** **A** ASA Classification (American Society of Anaesthesiology Classification): Horizontal axis shows the timeline, the ordinate is showing the frequency of procedures. **B** Timeline and number of procedures per month in 2020. The two lockdowns are highlighted. Number of cases decreased during the first lockdown. **C** Local tumor

stage (pT): Horizontal axis shows the timeline, the ordinate is showing the frequency of procedures. **D** UICC-Classification (Union internationale contre le cancer): Horizontal axis shows the timeline, the ordinate is showing the frequency of procedures

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**Author Contributions** P.T., P.G., D.L., S.A., B.F., P.S. and I.K. designed the study. Collection of data was done by P.T. P.T. wrote the manuscript, P.T. and P.S. prepared the tables. P.S. did the statistical analysis. All authors contributed towards data acquisition, data interpretation and critical revision of the content of the manuscript and approved the final version of the manuscript.

**Data Availability** The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

**Declarations**

**Ethics Approval** This study was presented to the Ethics Committee of the Province of Vorarlberg and does not require any referral or vote by this committee (EK-0.04-340).

**Consent of Participate** n/a

**Consent of Publication** n/a

**Conflict of Interest** P.T., P.N.C.G., D.L., S.A., B.F., P.S., and I.K. have no conflict of interest or financial ties to disclose.

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