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Retrospective Cohort Study

Is it possible to adopt the same oncological approach in urgent surgery for colon cancer?

Bruno Yuki Yoshida, Raphael L C Araujo, José Francisco M Farah, Alberto Goldenberg

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Locoregional complications may occur in up to 30% of patients with colon cancer. As they are frequent events in the natural history of this disease, there should be a concern in offering an oncologically adequate surgical treatment to these patients.

AIM

To compare the oncological radicality of surgery for colon cancer between urgent and elective cases.

METHODS

One-hundred and eighty-nine consecutive patients with non-metastatic colon adenocarcinoma were studied over two years in a single institution, who underwent surgical resection as the first therapeutic approach, with 123 elective and 66 urgent cases. The assessment of oncological radicality was performed by analyzing the extension of the longitudinal margins of resection, the number of resected lymph nodes, and the percentage of surgeries with 12 or more resected lymph nodes. Other clinicopathological variables were compared between the two groups in terms of sex, age, tumor location, type of urgency, surgical access, staging, compromised lymph nodes rate, differentiation grade, angiolymphatic and perineural invasion, and early mortality.

RESULTS

There was no difference between the elective and urgency group concerning the longitudinal margin of resection (average of 6.1 in elective vs 7.3 cm in urgency, $P = 0.144$), number of resected lymph nodes (average of 17.7 in elective vs 16.6 in urgency, $P = 0.355$) and percentage of surgeries with 12 or more resected lymph

nodes (75.6% in elective vs 77.3% in urgency, $P = 0.798$). It was observed that the percentage of patients aged 80 and over was higher in the urgency group (13.0% in elective vs 25.8% in urgency, $P = 0.028$), and the early mortality was 4.9% in elective vs 15.2% in urgency ($P = 0.016$, OR: 3.48, 95% CI: 1.21–10.06). Tumor location ($P = 0.004$), surgery performed ($P = 0.016$) and surgical access ($P < 0.001$) were also different between the two groups. There was no difference in other clinicopathological variables studied.

CONCLUSION

Oncological radicality of colon cancer surgery may be achieved in both emergency and elective procedures.

Key Words: Colorectal cancer; Intestinal obstruction; Intestinal perforation; Surgical oncology; Lymph node excision

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Core Tip: The oncological radicality was compared between patients undergoing elective and urgent surgery for colon cancer. A total of 189 patients with nonmetastatic colorectal cancer who underwent surgical resection as the first therapeutic approach were included over two years in a single institution. The analysis of the oncological principles of the surgery, including the longitudinal margins of resection and the number of resected lymph nodes, revealed no statistical difference between elective and urgent surgeries. Therefore, the oncological principles of colorectal surgery should be followed in urgency as well as in elective cases.

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INTRODUCTION

Colorectal cancer (CRC) is a leading cause of cancer worldwide, representing 1 148 515 new cases a year [1]. Although many signs of progress in early detection and systemic treatment have been achieved, surgical resection remains the only curative-intent treatment for localized colon cancer [2]. Therefore, the basic principles of surgery should be oncologically adequate [3]. Considering the inherent difficulty of urgent cases, mostly presenting with obstruction or bleeding, and surgical morbidity, the achievement of good oncological outcomes seems to be challenging. Thus, this study aimed to compare oncological radicality and surgical outcomes between patients who underwent colectomy for colon cancer in urgent or elective procedures.

MATERIALS AND METHODS

One hundred and eighty-nine consecutive patients with non-metastatic colon adenocarcinoma who underwent surgery with curative intent as the first therapeutic approach were selected, with or without colostomy, operated using urgent (66) or elective (123) procedures, from May 2016 to April 2018. All cases were operated at the General and Oncological Surgery Service of Hospital do Servidor Público Estadual de São Paulo (HSPE/SP), Brazil. The project was approved by the Universidade Federal de São Paulo Ethics Committee (CEP/UNIFESP: 0498/2019; approval decision: 3460953). The selected patients were divided into two groups: Urgency and Elective. Those admitted to the Emergency Room with a locoregional complication of colon cancer, whether obstruction or perforation, requiring a prompt surgical approach, were classified as “Urgency”. In this study, no patient required urgent surgery for incoercible bleeding. Conversely, those who, despite the admission to the hospital *via* the Emergency Room, had their initial emergency controlled, making it possible to perform complete staging, preoperative examinations and assessments, and colon preparation according to the institution's routine, were classified as Electives, along with the cases scheduled on an outpatient basis. This study excluded patients with rectal cancer, metastatic disease, diagnosed before or during surgery, those who underwent other therapeutic interventions before surgical resection (colonic prosthesis, derivative surgery, neoadjuvant), histological types other than adenocarcinoma, as well as patients with

insufficient medical record data. Clinicopathological variables were selected to compare the “elective” and “urgency” groups. Histopathological analysis was performed by the Pathology Service of Hospital do Servidor Público Estadual, and no slide review was necessary to carry out in this study. All variables were collected by the chief researcher, retrospectively, through reviewing electronic medical records. The clinicopathological variables evaluated were longitudinal margin (cm), number of resected lymph nodes, percentage of surgeries with 12 or more resected lymph nodes, sex, age (years), tumor location, surgery performed, type of urgency, access route used, staging according to the AJCC UICC 8th edition (2017), rate of compromised lymph nodes, degree of differentiation, angiolymphatic and perineural invasion, and early mortality (up to 30 days). The oncological radicality for colectomies was assessed by the minimal longitudinal margin of resection of 5 cm and the harvesting of at least 12 lymph nodes (representing proximal ligation of colic vessels). Inferential analysis was performed using the R program version 3.5.2 R Core Team (2016). Pearson's Chi-square test or Fisher's exact test was applied when comparing groups for categorical variables. For numerical variables, the *t* test or Mann-Whitney test was applied in independent samples, and the Shapiro-Wilk test was used to determine the normality of numerical variables. In all conclusions obtained through inferential analyzes, an alpha significance level of 5% ($P < 0.05$) was used.

RESULTS

Of the 189 patients, 66 (34.9%) were in the urgency group and 123 in the elective group (65.1%). There was no difference between the two groups in terms of distribution by sex ($P = 0.632$). Higher mean age was observed in the urgency group (71.8 years) vs 68.1 years in the elective group, $P = 0.031$, with 25.8% of patients aged 80 years or older in the urgency group, against 13.0% in the elective group ($P = 0.028$). Regarding the type of urgency that led to surgery in the emergency room, 47 (71.2%) were due to obstruction and 19 (28.8%) to perforation, with no patient being operated on for bleeding. These general characteristics are summarized in **Table 1**. Urgency group had a higher early mortality (up to 30 d) than the elective group (15.2% vs 4.9%, $P = 0.016$, OR: 3.48, 95%CI: 1.21-10.06) and there was no difference in the interval for starting systemic chemotherapy when indicated (average of 75.2 vs 71.8 d, $P = 0.535$). There was a difference between the two groups directly related to the location of the tumor (**Table 2**). In both groups, there was a predominance of location in the sigmoid, followed by the ascending colon. The surgical access also differed between the two groups, with a higher frequency of surgeries performed by laparoscopy in the elective group (43.1%) vs 0% in urgency group ($P < 0.001$).

Pathological characteristics are summarized in **Table 3**. It was observed that there was no statistical difference between the groups concerning the T and N classification, staging, degree of differentiation, and presence of angiolymphatic and perineural invasion. It was noted that, in both groups, more than 80% of patients had advanced stages (II or III). The rate of compromised lymph nodes was also found to be similar between the two groups (8.1% vs 7.9%, $P = 0.785$). Regarding the variables referring to the oncological principles for colon cancer surgery, there was also no statistically significant difference in the urgency group when compared to the elective group (**Table 4**). The stratified analysis by the location of the tumor is summarized in **Table 5**. Tumors located in the cecum, ascending colon, and transversus (3 cases) were considered to be in the right colon; and those located at the splenic, descending colon, sigmoid, and transversus (2 cases) as in the left colon. Four cases of transverse tumors (2 in the elective group and 2 in the urgency group) were excluded from this stratification as they underwent transverse colectomy, and it was not able to assign them to the right or left colon. There was a difference in the longitudinal margin in the analysis of the left colon (4.8 in the elective vs 7.6 cm in urgency, $P = 0.003$), with all other variables being similar between the groups. Early mortality was analyzed (up to 30 d) in patients who underwent emergency surgery. It was observed that the mean age was significantly higher in patients who died (84.0 vs 69.6 years, $P < 0.001$, 95%CI: 7.2-21.6). Of the 10 patients who died, 8 (80.0%) were 80 years old or older, in contrast to the 56 patients who survived, in which only 9 (16.1%) were in this age group ($P < 0.001$). There was no statistically significant difference regarding early mortality between the two groups, as shown in **Table 6**.

DISCUSSION

One of the criteria for achieving oncological radicality involves the extension of the longitudinal margin of the colon, which must be 5 cm to 7 cm[4,5]. Regarding the radial margin, block resection of adjacent structures should be performed in case of direct invasion, given their tumoral involvement by contiguity[2,6]. Another oncological preconized principle is the complete resection of the main vascular pedicles with the corresponding lymphadenectomy[7]. The number of resected lymph nodes directly influences the prognosis of the patient with colon cancer[8,9], considering that at least 12 lymph nodes must be resected and evaluated for lymphadenectomy to be oncologically adequate[3]. A situation inherent to colon cancer is the presence of possible locoregional complications that lead to the need for urgent surgery[10], which can occur in up to 30% of cases[11]. Intestinal obstruction is the most common

Table 1 General characteristics of the patients

	Elective	Urgency	P value
Total	123 (65.1%)	66 (34.9%)	
Sex			0.632 ^a
Male	51 (41.5%)	25 (37.9%)	
Female	72 (58.5%)	41 (62.1%)	
Age (yr)			
mean ± SD	68.1 ± 11.1	71.8 ± 11.5	0.031 ^b
< 80	107 (87.0%)	49 (74.2%)	0.028 ^a
≥ 80	16 (13.0%)	17 (25.8%)	
Type of urgency			
Obstruction		47 (71.2%)	
Perforation		19 (28.8%)	

^aChi-square of Pearson test.^bt test for independent samples.**Table 2** Clinical and surgical characteristics

	Elective	Urgency	P value	OR and 95%CI
Location			0.004 ^c	
Cecum/ Ascendent	44 (35.8%)	18 (27.3%)		
Transverse	4 (3.3%)	5 (7.6%)		
Splenic Angle	0	4 (6.1%)		
Descendent	6 (4.9%)	9 (13.6%)		
Sigmoid	69 (56.1%)	30 (45.5%)		
Surgery¹			0.016 ^c	
Right colectomy	45 (36.6%)	20 (30.3%)		
Transversectomy	2 (1.6%)	2 (3.0%)		
Left colectomy	6 (4.9%)	11 (16.7%)		
Retosigmoidectomy	66 (53.7%)	27 (40.9%)		
Total colectomy	4 (3.3%)	6 (9.1%)		
Surgical access			< 0.001 ^a	
Open	70 (56.9%)	66 (100%)		
Videolaparoscopy	53 (43.1%)	0		
Early mortality	6 (4.9%)	10 (15.2%)	0.016 ^a	OR: 3.48, 95%CI: 1.21-10.06

¹With or without enterostomy.^aChi-square of Pearson's test.^bt test for independent samples.^cExact Fisher's test.^dMean and standard deviation.

locoregional complication, followed by intestinal perforation[12]. Incoercible bleeding is a less frequent cause of urgent indication for colon cancer because, in most cases, bleeding stops or reduces, either spontaneously or through endoscopic or hemodynamic therapies, allowing the elective surgery to be performed[13,14]. In the face of an emergency, whether perforation or obstruction, surgical resection should be proposed as the first therapeutic approach, provided that patients are in clinical conditions

Table 3 Pathological characteristics of the tumors

	Elective	Urgency	P value
T			0.278 ^c
Tis	2 (1.6%)	0	
T1	6 (4.9%)	0	
T2	16 (13.0%)	6 (9.1%)	
T3	88 (71.5%)	54 (81.8%)	
T4	11 (8.9%)	6 (9.1%)	
N			0.943 ^b
N0	76 (61.8%)	42 (63.6%)	
N1	32 (26.0%)	17 (25.8%)	
N2	15 (12.2%)	7 (10.6%)	
Staging			0.199 ^c
0	2 (1.6%)	0	
I	20 (16.3%)	5 (7.6%)	
II	54 (43.9%)	37 (56.1%)	
III	47 (38.2%)	24 (36.4%)	
Differentiation grade			0.938 ^c
Well	7 (6.0%)	3 (5.0%)	
Moderate	101 (87.1%)	52 (86.7%)	
Poor	8 (6.9%)	5 (8.3%)	
Compromised lymph nodes rated	8.1% ± 16.7	7.9% ± 17.1	0.785 ^c
Angiolymphatic invasion	44 (36.4%)	21 (31.8%)	0.533 ^a
Perineural invasion	19 (16.4%)	7 (11.1%)	0.339 ^a
ALI + PNI	16 (13.0%)	5 (7.6%)	0.257 ^a

^aQui-square of Pearson's test.

^bt test for independent samples.

^cExact Fisher's test.

^dMean and SD.

^eMann Whitney test.

ALI: Angiolymphatic invasion; PNI: Perineural invasion.

for this purpose[15,16].

In emergency surgeries, however, it is observed that the oncological principles described above cannot always be contemplated, considering that locoregional complications can lead to abdominal sepsis, and patients may be complicated with pre-existing underlying diseases[17]. Thus, the surgeon must choose a less aggressive procedure to save the patient's life, avoiding any complications associated with more extensive surgeries[18]. In contrast, it is known that, despite the urgency, many patients are still able to undergo surgery with all the necessary oncological radical approaches.[19] As it is a frequent situation in the natural history of colon cancer, it is essential to be concerned regarding the oncological principles also in urgent surgeries. Teixeira *et al*[19] and Enciu *et al*[20] showed that it was possible to follow the oncological principles for colon cancer surgery even in emergency cases. In both studies there was no control group and, therefore, did not allow inferential analyzes to be carried out related to elective cases. Weixler *et al*[21] studied clinical and pathological data of patients with colorectal cancer who underwent emergency surgery, and included elective patients as a control group. In their study, 747 patients were selected over 24 years, with 663 (88.8%) elective and 84 (11.2%) urgent cases. The percentage of patients who underwent emergency surgery was lower than that reported in other studies (about 30%), and the period of capturing patients was longer than most studies in this field[12,19,20]. The study showed that there was a statistically significant difference in relation to the percentage of surgeries with 12 or more resected lymph nodes ($P = 0.016$) and the presence of compromised margins ($P = 0.014$), showing a difference in the pattern of elective and urgent surgery. Despite these differences,

Table 4 Variables referring to oncological principles for colon cancer surgery

	Elective	Urgency	P value
Longitudinal margin (cm)			0.144 ^a
mean ± SD	6.1 ± 4.7	7.3 ± 5.6	
Median	5.0	6.5	
Q1 e Q3	3.0 e 8.0	3.1 e 10.0	
Number of resected lymph nodes			0.355 ^a
mean ± SD	17.7 ± 8.7	16.6 ± 8.3	
Median	16.0	14.0	
Q1 e Q3	12.0 e 22.0	12.0 e 20.0	
≥ 12 resected lymph nodes	93 (75.6%)	51 (77.3%)	0.798 ^b

^aMann Whitney test.^bQui-square of Pearson's test.

Q1: Quartil 1; Q3: Quartil 3.

Table 5 Variables referring to oncological principles for colon cancer surgery according to tumor location

	Right			Left		
	Elective	Urgency	P value	Elective	Urgency	P value
Total	45 (69.2%)	20 (30.8%)		76 (63.3%)	44 (36.7%)	
Longitudinal margin (cm) ¹	7.0 (5.0 - 10.0)	6.5 (2.8 - 10.3)	0.270 ^a	4.0 (2.0 - 5.9)	6.5 (4.0 - 9.3)	0.002 ^a
Number of resected lymph nodes ¹	19.0 (13.0 - 23.0)	19.5 (13.0 - 26.3)	0.446 ^a	15.0 (11.0 - 19.3)	13.0 (11.0 - 17.3)	0.223 ^a
≥12 resected lymph nodes	35 (77.8%)	19 (95.0%)	0.151 ^b	56 (73.7%)	31 (70.5%)	0.832 ^c

¹p25 - p75.^aMann Whitney test.^bExact Fisher's test.^cQui-square of Pearson's test.

the study demonstrated that the overall and disease-free survivals were not affected by emergency surgery[21].

Data available in the literature, therefore, are not able to show whether the emergency surgery for colon cancer is being performed with the same technical standard as the elective ones. The strength of the present study is based on the collected data from emergency and elective patients, in the same period of over two years in a single institution, which allowed the homogenization of the group of surgeons and pathologists. Elective patients constituted the ideal control group for the analysis of oncological radicality in the emergency surgery, which is the object of this investigation. In the hospital where the study was carried out, the same service is offered for elective and emergency oncological surgeries. Thus, in both situations, surgeons are duly qualified for coloncancer surgeries, ensuring the technical standard approach. It is known that the surgeon's experience and the volume of surgery at the institution have an impact on the short- and long-term prognosis of patients with colon cancer[22]. Although some patients underwent therapeutic interventions before surgical resection, such as colonic prosthesis or derivative surgery, they represented a small number of patients and there was a difficulty in allocating them between the elective and urgency groups. Thus, they were excluded from this study population. In the two main variables of the study, longitudinal margin and the number of resected lymph nodes, there was no statistically significant difference between the two groups. Thus, it was observed that, even in an emergency, it is feasible to perform an oncologically adequate surgery. Also, the percentage of surgeries with 12 or more resected lymph nodes was also similar between the groups, showing the same technical pattern of oncological radicality in urgency and elective approaches. The percentage values observed in this study are compatible with previous literature data[19,20]. The analysis of demographic characteristics revealed a statistically significant difference related to age. It was observed that urgency patients were older than elective ones. This data can be explained by the fact that elderly patients receive fewer screening tests for colon cancer, which increases the chance of presenting with symptomatic or complicated lesions. In addition, this hypothesis confirmation is not

Table 6 Analysis of early mortality (up to 30 d) after urgent surgery for colon cancer

	Early mortality	Survivals	P value	OR and 95%CI
Total	10 (15.2%)	56 (84.8%)		
Sex			0.076 ^a	
Male	1 (10.0%)	24 (42.9%)		
Female	9 (90.0%)	32 (57.1%)		
Age (yr)				
mean and SD	84.0 ± 8.7	69.6 ± 10.7	< 0.001 ^b	95%CI: 7.2-21.6
< 80	2 (20.0%)	47 (83.9%)	< 0.001 ^a	
≥ 80	8 (80.0%)	9 (16.1%)		OR: 20.89, 95%CI: 3.79-115.00
Type of urgency			0.156 ^a	
Obstruction	5 (50.0%)	41 (73.2%)		
Perforation	5 (50.0%)	15 (26.8%)		
Location			0.245 ^a	
Cecum/ Ascendent	2 (20.0%)	16 (28.6%)		
Transverse	2 (20.0%)	3 (5.4%)		
Splenic Angle	1 (10.0%)	3 (5.4%)		
Descendent	0	9 (16.1%)		
Sigmoid	5 (50.0%)	25 (44.6%)		
Surgery			0.059 ^a	
Right colectomy	2 (20.0%)	18 (32.1%)		
Transversectomy	2 (20.0%)	0		
Left colectomy	1 (10.0%)	10 (17.9%)		
Retosigmoidectomy	5 (50.0%)	22 (39.3%)		
Total colectomy	0	6 (10.7%)		
T			0.407 ^a	
T2	1 (10.0%)	5 (8.9%)		
T3	7 (70.0%)	47 (83.9%)		
T4	2 (20.0%)	4 (7.4%)		
N			0.100 ^a	
N0	9 (90.0%)	33 (58.9%)		
N1	0	17 (30.4%)		
N2	1 (10.0%)	6 (10.7%)		
Staging			0.118 ^a	
I	1 (10.0%)	4 (7.1%)		
II	8 (80.0%)	29 (51.8%)		
III	1 (10.0%)	23 (41.1%)		
Differentiation grade			> 0.999 ^a	
Well	0	3 (5.4%)		
Moderate	9 (90.0%)	43 (76.8%)		
Poor	1 (10.0%)	4 (7.1%)		
Compromised lymph nodes rate	5.0% ± 15.8	8.4% ± 17.4	0.147 ^c	
Angiolymphatic invasion	2 (20.0%)	19 (33.9%)	0.483 ^a	

Perineural invasion	1 (10.0%)	6 (10.7%)	> 0.999 ^a
ALI + PNI	1 (10.0%)	4 (7.1%)	0.573 ^a
Margin (cm) ¹	5.3 (1.6-8.5)	7.0 (3.9-10.0)	0.400 ^c
Number of resected lymph nodes ¹	12.5 (11.3-17.5)	14.0 (12.0-20.3)	0.306 ^c
≥ 12 resected lymph nodes	7 (70.0%)	44 (78.6%)	0.683 ^a

¹p25-p75.

^aExact Fisher's test.

^bt test for independent samples.

^cMann Whitney test.

Q1: Quartil 1, Q3: Quartil 3.

within the scope of this study. As for the type of urgency, it was observed that the prevalence of perforation (28.8%) was slightly higher than that reported in most of the literature, which is around 20% [11,12], yet similar distributions have also been demonstrated[23].

The early mortality rate was found about three times higher in urgency than in elective (15.2% vs 4.9%) cases. Morris *et al*[24] conducted an extensive population study in England, involving 160 920 individuals undergoing surgical resection for colorectal cancer, and also found a difference in early mortality with a similar proportion (14.9% vs 5.8%). Other studies have reported early emergency mortality rates ranging from 8.3%–34.0%, that is, it can be said that the mortality observed in this study is within the expected range according to previous literature data[19-22]. In the present study, when analyzing the clinicopathological characteristics between emergency patients who died and those who survived, a statistically significant difference was observed in relation to age. The percentage of the elderly was highest among those who died, of whom 80% were aged 80 years or over. Different from reports in the literature[25], there was no difference in pathological characteristics between those who died and survived, revealing those factors intrinsic to the patient would be more important than tumor staging for the outcome of early mortality. There was a statistically significant difference related to the resection approach employed, and it was observed that 43.1% of the elective surgeries were performed by laparoscopy, while all urgent surgeries were opened. The laparoscopic approaches in the urgency group were less expected based on their indissociable indications for urgency procedures (70.2% of bowel obstruction, and 28.8% of bowel perforation), and in older patients, possibly with more comorbidities. Nevertheless, the results suggest that even for patients in these unfavorable scenarios, patients of the urgency group obtained similar oncological outcomes concerning margin and node status to patients who underwent elective procedures. Laparoscopy was offered in the elective group, as much as possible, based on the current evidence in the literature that supports the oncological safety of minimally invasive colorectal surgery[26-28]. Thus, all patients regardless of their surgical approaches were used, in order not to exclude a certain group of patients or surgeons based on their practice. Ghazi *et al*[25] demonstrated the presence of more advanced tumors in the emergency room, with a higher rate of more advanced staging, greater angiolymphatic and perineural invasion, and a higher rate of compromised lymph nodes. However, our study did not reveal any significant difference between the elective and urgency groups in terms of staging, degree of differentiation, angiolymphatic invasion, perineural invasion and compromised lymph node rate. It is noteworthy that the present study revealed a low rate of early stages even in the elective group, which may be one of the reasons for not having observed this difference. Regarding the location of the tumor, some studies show a worse prognosis in the right colon compared to the left colon[29]. Furthermore, the extent of lymphadenectomy for colon cancer is still an object of study in the literature[30], most of which refer to the right colon, where there is a greater difficulty in standardizing the lymphadenectomy[9]. As there was a statistically significant difference between groups in terms of the location of the tumor in this study, this could bias the results regarding the oncological principles of surgery. However, in the analysis stratified by location, it was observed that, on the right, there was no difference between groups in relation to longitudinal margins, number of lymph nodes resected, or percentage of surgeries with 12 or more lymph nodes resected. On the left, lymphadenectomy was also similar between the groups, but there was a difference concerning the longitudinal margins, being lower in the elective group. The assessment of possible causes for this difference is out of the scope of this study.

Like any retrospective study, this study has limitations regarding the impact of inferential analyzes. In terms of long-term survival analyses, the study's limitations are associated with the immeasurable biases as seen in all retrospective studies, particularly those addressing oncologic outcomes. Selection bias based on several nonobjective criteria could have contributed to some of the differences between the two study groups. Because detailed data on systemic treatment, radiotherapy, or their toxicity were not reasonably available to analyze, they were not addressed in this study. However, for the investigation of oncological approach in urgency compared to elective surgeries, this is a useful and applicable model. The allocation to the elective or emergency group takes into account the patient's

clinical presentation, but not possible *via* any type of randomization. In 30-d mortality, our sample presented a small number of deceased patients to perform an adequate multivariate analysis. Thus, only univariate analysis was presented, and confounding bias cannot be excluded. In summary, we do believe that this study provides subsidies to recommend the oncologically adequate surgery to be performed even in an emergency for most patients. However, it also suggests that a more specific assessment of patients aged over 80 years is appropriate, especially due to the observed mortality. It should be noted that this conduct should be reserved for surgeons with experience in oncology surgery for colon cancer, as well as institutions with a high volume of this disease, as occurred in this study.

CONCLUSION

It is possible to achieve the oncological radicality of colon cancer surgery in both emergency and elective procedures.

ARTICLE HIGHLIGHTS

Research background

Locoregional complications of colon cancer may occur in up to 30% of patients. Many of these patients will need a surgical resection in an urgent scenario. Because of the patient's clinical deterioration, the oncological principles of surgery may be jeopardized.

Research motivation

We intended to determine whether the same oncological principles and surgical outcomes can be achieved in both urgent and elective colon cancer surgery.

Research objectives

This study aims to compare the oncological radicality of urgent surgery for colon cancer in comparison to elective cases.

Research methods

A total of 189 consecutive patients with colon cancer who underwent surgical resection as the first therapeutic approach were selected over two years in a single institution. The institution where the study was performed has a high volume of colorectal cancer patients (over 100 cases per year) and there are experienced surgeons in both elective and urgent situations. Patients were assigned to two groups: elective (123) and urgency (66). Clinicopathological variables were analyzed and compared retrospectively, including the longitudinal margin of resection and the number of harvested lymph nodes, between the two groups.

Research results

There was no significant difference between the two groups concerning the longitudinal margins of resection and the number of resected lymph nodes. A higher percentage of patients aged 80 and over was observed in the urgency group (25.8% vs. 13.0% in elective group, $P = 0.028$). Early mortality was higher in the urgency group (15.2% vs 4.9%), as expected according to previous studies.

Research conclusions

The oncological principles of colon cancer surgery can be adopted in urgency as well as in elective cases.

Research perspectives

Further studies are necessary to elucidate which patients should undergo classical oncological resection in urgency, especially in patients aged 80 and over, due to the higher early mortality in urgent approaches for this population. Intermediate interventions in urgent cases, such as derivative surgery or colonic prosthesis, require further studies as an alternative approach in high-risk patients.

FOOTNOTES

Author contributions: Yoshida BY, Farah JFM, and Goldenberg A contributed to the study conception, data preparation, data interpretation, and writing; Araujo RLC contributed to the data preparation, data interpretation, and critical writing of the paper.

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