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Results of surgical treatment of colorectal cancer in nonagenarian patients

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ABSTRACT

Purpose: The objective of the present study was to compare the results of surgical treatment of nonagenarian patients having colorectal cancer with patients younger than 90 years.

Methods: A total of 622 patients who underwent curative surgery were included in the present study. The database of the surgical service, in the period from 2007 to 2013, was used to obtain the sample. This is a descriptive, retrospective study that compared the profiles of 17 nonagenarian patients (Group I) with 605 patients younger than 90 years (Group II). The groups were compared regarding surgical complications, length of hospital stay, type of surgery performed and ASA classification.

Results: The mean age between the groups was 92.2 years and 61.2 years. The mean length of hospital stay in Groups I and II was 17.3 days and 8.75 days, respectively. The surgery performed most frequently was the right colectomy, in both groups. The most common postoperative complication was sepsis (11.8%) among the nonagenarians, and paralytic ileus (4.5%) among those younger than 90 years. Laparoscopic surgery was performed on 5 out of a total of 17 patients evaluated in Group I. Among the three mortalities registered in this latter group, two were classified as ASA III and only one as ASA I.

Conclusion: The results indicate that colorectal surgery may be performed in this group, with acceptable morbidity and mortality rates, in patients with low preoperative risk (ASA I/II).

Resultados do tratamento cirúrgico do câncer colorretal em pacientes nonagenários

RESUMO

Finalidade: O objetivo do presente estudo foi comparar os resultados do tratamento cirúrgico de pacientes nonagenários portadores de câncer colorretal *versus* pacientes com menos de 90 anos.

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Métodos: O estudo envolveu 622 pacientes que foram submetidos à cirurgia curativa. Para obtenção da amostra, utilizamos o banco de dados do serviço de cirurgia, abrangendo o período de 2007-2013. Este é um estudo retrospectivo descritivo que comparou os perfis de 17 pacientes nonagenários (Grupo I) *versus* 605 pacientes com menos de 90 anos (Grupo II). Os grupos foram comparados para complicações cirúrgicas, duração da permanência no hospital, tipo de cirurgia realizada e classificação ASA.

Resultados: A média de idade para os Grupos I e II foi, respectivamente, 92,2 e 61,2 anos. A duração média de permanência no hospital nos Grupos I e II foi, respectivamente, 17,3 dias e 8,75 dias. A cirurgia mais frequentemente realizada foi colectomia direita, nos dois grupos. A complicação pós-operatória mais comum foi sepse (11,8%) entre os nonagenários, e íleo paralítico (4.5%) entre os pacientes com menos de 90 anos. Cirurgia laparoscópica foi realizada em 5 pacientes, em um total de 17 pacientes avaliados no Grupo I. Considerando as três mortalidades registradas nesse último grupo, duas foram classificadas como ASA III e apenas uma como ASA I.

Conclusão: Os resultados obtidos indicam que, nesse grupo, a cirurgia colorretal é opção válida, com percentuais aceitáveis de morbidade e mortalidade, em pacientes com baixo risco pré-operatório (ASA I/II).

Introduction

Colorectal cancer (CRC) is more prevalent in people aged 65 or more and its incidence increases with age. Considering the increase in life expectancy of the population, according to data provided by the World Health Organization, the diagnosis of CRC in the elderly has increased concomitantly. A lower physiological reserve to address homeostasis imbalances, whether in cardiovascular, metabolic or respiratory areas, associated with a much greater coexistence of comorbidities, makes this age group more subject to complications. Thus, the benefit of surgery and anesthesia must be carefully evaluated, as well as the prognosis and survival rates. Cancer in this elderly population is an ethical dilemma for surgeons and oncologists regarding the decision about the aggressiveness of the treatment, balancing the benefit of surgery and the increase of associated risks, in an age group with short expectancy of survival.[1]

There are few available studies on the postoperative results of surgical treatment of colorectal cancer in patients over 90 years or more, both of the laparoscopic and the conventional procedures.[2]

In general, the randomized trials, in the medical literature, have shown that laparoscopic colorectal resection for cancer had survival and recurrence rates similar to those shown in open resection surgery, but with a reduction in hospital stay, postoperative pain and morbidity.[3]

The objective of the present study was to compare the results of surgical treatment in nonagenarian patients with colorectal cancer, with patients of less than 90 years. The little evidence available in the literature on the subject, associated with the fact that there is a predominance of articles with small samples, confirms the relevance of this study.

Materials and methods

This is a retrospective and descriptive study, with 622 patients with colorectal cancer, undergoing curative surgery in the period from 2007 to 2013. The service database was used to obtain the sample which compared the profile of 17 nonagenarian patients (Group I) with 605 patients less than 90 years of age (Group II). The groups were analyzed as to the occurrence of postoperative complications, length of hospital stay, the type of surgery performed and the ASA classification. The Clavien-Dindo classification was also used to categorize complications that occurred.

Those without indication for emergency surgery, with no history of recurrent colorectal cancer, with no fixed, palpable mass and without involvement of adjacent structures were considered suitable for the laparoscopic approach. All surgeons involved had performed 20 or more colorectal laparoscopic surgeries and had the necessary knowledge regarding the principles of cancer surgery.

Statistical analysis was performed using Stata (version 9.1) and SPSS (version 20.0). The level of significance was 0.05. The statistical tests used were the asymptotic Pearson Chi-square, to compare gender between the groups, and the tests of proportions for postoperative complications and types of surgical techniques. The Mann–Whitney test was used to compare length of hospital stay, and the exact Pearson Chi-square test was used to compare ASA.

Results

The sex distribution was similar between the groups (Table 1). The average age in Group I was 92.2, ranging from 90 to 96, and in Group II was 62.1 years since, in the latter group,

Table 1 – Level of significance according to sex distribution.

Gender	<90 years n (%)	>90 years n (%)	p-value[a]
Female	314 (51.8)	10 (58.8)	0.568
Male	291 (48.2)	7 (41.2)	
Total	605	17	

[a] Asymptotic Pearson Chi-squared test.

Table 2 – Age (years).

	<90 years	>90 years
Mean ± SD	62.1 ± 13.2	92.2 ± 1.9
Median (Q1;Q3)	62.0 (53.0;72.5)	92.0 (91.0;93.5)

Table 3 – Length of hospital stay (days).

	<90 years	>90 years	p-value[a]
Mean ± SD	8.8 ± 10.6	16.7 ± 14.7	0.001
Median (Q1;Q3)	6.0 (5.0;9.0)	9.0 (7.0;27.0)	

[a] Mann–Whitney test.

Table 4 – Length of hospital stay between open surgery and laparoscopy in Group I.

Group I	Conventional method	Laparascopic method	p-value[a]
Time (days)/ patients	19.5 d/12 p	13 d/5 p	0.599
Median (Q1;Q3)	9.5 (7.0;28.3)	7.5 (6.0;22.5)	
Mean ± SD	16.50 ± 16.55	12.00 ± 10.10	

[a] Mann–Whitney test.

the youngest patient was 20 years old and the oldest was 89 (Table 2).

The mean lengths of hospital stay in Group I and in Group II, considering only patients who received discharge, were 17.3 days and 8.75 days, respectively. One patient in Group I was admitted for 56 days due to several complications, such as AMI, wound infection, and bronchospasm crises. The patient with the shortest hospital stay in this group was 6 days (Table 3). Comparing the same variable only in the nonagenarian group, among those undergoing laparoscopic or conventional procedures, demonstrated a shorter hospital stay in those with minimally invasive access (5 patients, 13 days) in relation to those with open surgery (19.5 days, 12 patients), but with $p > 0.05$ (Table 4).

Group I had complications in 36.2% of the cases, with three mortalities, while Group II had complications in 36.3% of the sample. Sepsis was the most prevalent complication in Group I (2 cases); one was of pulmonary etiology and the other due to an anastomotic fistula. In the latter, there was no evidence of events such as paralytic ileus, SRIS and neurogenic bladder. In Group II, paralytic ileus was more prevalent (27 cases). Evaluating statistical significance, the only variable that presented $p < 0.05$ was the urinary tract infection (5.9% and 0.4%, $p = 0.001$) (Table 5).

No statistical difference was found when the most severe complications such as sepsis, anastomotic fistula and peritonitis were analyzed separately. However, when these were put together for between-groups comparison (Clavien-Dindo III and IV), a difference of $p < 0.05$ was found, denoting predominance of these adversities in Group I (Table 6).

Regarding the ASA classification, there was a significant difference at the 0.05 level. The group over 90 has more ASA III and IV than the group younger than 90. Among the 17 patients in Group I, four were ASA I, seven ASA II, five ASA III and one ASA IV. Examining the rate of complications, only those identified as ASA III appeared more frequently in Group I than in Group II, with $p < 0.05$ (Tables 7 and 8).

Regarding type of surgery, the right colectomy was the most frequently performed procedure in both groups ($p = 0.069$), followed by left colectomy ($p = 0.833$) and total mesorectal

Table 5 – Postoperative complications.

Complications	<90 years n (%)	>90 years n (%)	p-value[a]	Clavien-Dindo[b]
Paralytic ileus	27 (4.5)	0 (0.0)	–	
Sepsis	25 (4.1)	2 (11.8)***	0.128	IVA
Wall abscess	17 (2.8)	1 (5.9)	0.456	IIIA
Anastomotic fistula	14 (2.3)	1 (5.9)	0.346	IVA
SRIS	10 (1.7)	0 (0.0)	–	
Peritonitis	8 (1.3)	1 (5.9)	0.120	IVA
Neurogenic bladder	7 (1.1)	0 (0.0)	–	
Pneumonia	6 (1.0)	1(5.9)	0.061	IVA
AMI	0 (0.0)	1 (5.9)	–	IVB
Ileostomy obstruction	0 (0.0)	1 (5.9)	–	IIIA
Hypertensive crisis	1 (0.2)	1 (5.9)	–	
UTI	2 (0.4)	1 (5.9)	0.001	
Others	61(10.1)	0 (0.0)	–	
Presented complications	220 (36.3)	7 (35.2)	0.926	

SIRS, systemic inflammatory response syndrome; AMI, acute myocardial infarction; UTI, urinary tract infection.

[a] Z-test for comparison of proportions.
[b] Clavien-Dindo classification of surgical complications.

Table 6 – Critical complications, according to Clavien-Dindo classification.

Clavien-Dindo	Group I	Group II	p-value[a]
III	2/17 (11.76)	17/605 (2.81)	0.0344
IV	6/17 (35.29)	53/605 (8.76)	0.0002

[a] Z-test for comparison of proportions.

Table 7 – ASA classification.

	<90 years n (%)	≥90 years n (%)	p-value[a]
I	290 (47.9)*	4 (23.5)*	0.013
II	259 (42.8)	7 (41.2)	
III	51 (8.4)*	5 (29.4)*	
IV	5 (0.8)*	1 (5.9)*	

[a] Exact Pearson Chi-squared test.

Table 8 – Comparison of the index of complications according to ASA classification.

Index of complications	<90 years	>90 years	p-value[a]
ASA I	74/605 (12.23)	1/17 (5.88)	0.428
ASA II	73/605 (12.07)	2/17 (11.76)	0.969
ASA III	14/605 (2.31)	3/17 (17.65)	0.0001
ASA IV	3/605 (0.50)	0 (0.00)	–

[a] Z-test for comparison of proportions.

Table 9 – Type of surgical technique performed.

	<90 years n (%)	>90 years n (%)	p-value[a]
Right colectomy	165 (27.1)	8 (47.1)	0.069
Left colectomy	83 (13.5)	2 (11.8)	0.833
Total colectomy	34 (5.4)	0 (0.0)	–
Partial colectomy	2 (0.3)	0 (0.0)	–
Total excision of the mesorectum	106 (17.3)	1 (5.9)	0.215
Upper anterior resection	84 (13.7)	1 (5.9)	0.352
Lower anterior resection	14 (2.1)	0 (0.0)	–
Anterior resection with stapler	43 (7.1)	1 (5.9)	0.847
Abdominoperineal amputation	32 (5.3)	0 (0.0)	–
Coloanal anastomosis	11 (1.8)	0 (0.0)	–
Ileostomy	3 (0.5)	0 (0.0)	–
Endoanal lowering	3 (0.5)	0 (0.0)	–
Others	25 (4.1)	4 (23.5)[b]	0.0002

[a] Z-test for comparison of proportions.
[b] Three Hartmann surgeries and a rectosigmoidectomy.

excision (p = 0.215). In Group I, 5 of the 17 nonagenarians underwent laparoscopy. There was statistical significance for both Hartmann and rectosigmoidectomy surgeries (23.5% and 4.1%, p = 0.0002), analyzing Groups I and II, respectively (Table 9).

Discussion

Elderly patients clearly have a higher prevalence of comorbidities. The risk inherent in surgery is directly related to the number of concurrent diseases and to the patient's physiological reserve.[2] The fact that colorectal cancer is the third most diagnosed in the world, associated with the aging trend of the population, leads to the increasingly frequent diagnosis of this disease.[4]

In a randomized, prospective study, the applicability of laparoscopic colorectal surgery was evaluated in 16 elderly patients, with 9 being 90 years or older and 7 between 80 and 89 years. In this trial, there were no statistically significant differences as to the anesthetic-surgical risk (ASA score), postoperative morbidity, surgical time, blood loss and time required to resume oral intake. There was no need for conversion to open surgery and no patient died after the intervention. All postoperative complications were treated by conservative methods, including an anastomotic fistula in the octogenarian group.[2]

In our study, 5 of the 17 nonagenarian patients underwent the laparoscopic approach with no need for conversion. Moreover, as there were no statistically significant differences regarding most complications when evaluated separately, postoperative morbidity might not be a parameter to contraindicate surgery in the over-90 population. However, it is worth remembering that in the analysis of the whole, of the most severe complications with respect to the Clavien-Dindo classification, Group I prevailed with p < 0.05.

In a retrospective study, 289 patients between 80 and 95 years were evaluated. 150 patients underwent the laparoscopic approach and 139 underwent open surgery, with colorectal cancer as the most common indication. The group that underwent open surgery showed the greater number of mortalities, longer hospital stays, higher incidence of paralytic ileus and increased morbidity, with all those variables showing p < 0.05. These data suggest that laparoscopic colectomy may be a preferable option for the elderly, including patients over 90.[5,6]

Similar results were published by Chaudhary et al., highlighting the fact that the laparoscopic approach should not be contraindicated for colorectal cancer patients based only on age, and that elective surgery in the elderly is safe with acceptable rates of morbidity and mortality.[3,7,8]

Another retrospective series, examined short-and long-term results in 44 nonagenarian patients having colorectal cancer who underwent elective or emergency surgery. This series, in agreement with the present study, shows that females prevailed with 10/17 cases. This result, however, was without statistical significance (p = 0.568). The predominance (48/74) was attributed to the greater life expectancy among women.

Postoperative mortality was 23% (11/44), with 12% in elective surgeries (3/25) and 42% in emergency procedures (8/19). Only one mortality occurred among patients with ASA I–II, and there was evidence of an increase in the death rate among those with a higher ASA score. The 5-year survival was 43% and 20% in patients ASA I–II and III, respectively. The averages for length of hospital stay (12 days vs 17.3 days) and mortality

rate for elective surgeries (12% *vs* 17.6%) were lower than in the present study.[1] In the latter, one patient from Group I was admitted for 56 days due to various postoperative complications.

Consequently, to the detriment of statistically significant evidence as to the greater length of hospital stay in the nonagenarian group, such hospital stay was not accompanied by a higher rate of complications. This suggests, therefore, that this variable cannot be adopted as a parameter that contraindicates the surgical approach in this population, as reported by Roscio et al.[9,10]

Also in this context, due to the trend toward shorter hospital stays among those undergoing laparoscopy, the nonagenarian group is related to lower hospital costs compared to those within the same age range undergoing open surgery, according to the report of Bottino et al.[11]

Moreover, of the three mortalities reported in Group I, two were classified as ASA III and only one was classified as ASA I. It is worth noting that, comparing the prevalence of complications according to ASA classification, there was predominance only among ASA III patients in Group I. Therefore, considering the fact that the greater number of ASA III and IV patients in Group I was statistically significant, this makes ASA a reasonable device for predicting the results and evaluating the applicability or not of surgical intervention in these patients. This is similar to the results described by Jeong et al.[12] In this latter study, an interesting account was given of the laparoscopic postoperative success of a 102-year-old patient with colorectal cancer.

Another descriptive, retrospective study, that compared the profile of 52 octogenarian patients (Group I) with 386 patients younger than 80 years (Group II), from 2007 to 2011, found an average length of hospital stay equal to 9.3 days and a rate of postoperative complications of 28.84% in the group of octogenarians.[4] Thus, according to these data, it was observed that nonagenarians have a hospital stay (17.3 days) and a postoperative complication rate (36.2%) higher than octogenarians. The right colectomy was also the most prevalent surgery and sepsis the most common postoperative complication in the group described, as with the nonagenarian sample evaluated here.

Regarding colorectal cancer, the increased age was associated with decreased specific survival and this difference was related to a decrease in the use of radical surgery. However, studies have shown that the 5-year survival rate has been equal among both elderly and young patients when the appropriate surgical treatment is performed. So, whenever possible, surgery should be offered as the first treatment of choice to elderly patients with colorectal cancer.[13]

The non-randomized and retrospective nature of the present study were considered limiting factors of this work, opening the possibility for bias in the selection of patients between the two groups. The data analyzed showed that nonagenarian patients present no greater rate of complication, when compared with younger patients. This shows that advanced age, in and of itself, should not be a reason to contraindicate surgery for the elderly, unless their clinical condition and physiological parameters do not permit large resections. However, they spend more time hospitalized, resulting in higher hospital costs. All results indicate that colorectal surgery can be performed in this group with acceptable rates of morbidity and mortality in patients with low preoperative risk (ASA I/II). The clinically significant advantages of laparoscopic surgery, according to the evidence already largely consolidated in the literature, have social and economic implications in an aging society, justifying the return of these patients to a productive life in a timely manner.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Arenal J, Tinoco C, Labarga F, Martínez R, Gonzalo M. Colorectal cancer in nonagenarians. Colorectal Dis. 2012;14:44–7.
2. Soma T, Sugano M, Kawasaki C, Tsuji M, Fukui I. Colorectal resection in nonagenarians: effectiveness of laparoscopic surgery. Asian J Endosc Surg. 2014;7:222–6.
3. Chaudhary B, Shabbir J, Griffith J, Parvaiz A, Greenslade G, Dixon A. Short-term outcome following elective laparoscopic colorectal resection in octogenarians e nonagenarians. Colorectal Dis. 2012;14:727–30.
4. Oliveira FH, Lacerda Filho A, Queiroz FL, Laumonier PCC, Castilho BA, Rabelo FEF, et al. Feasibility of surgical treatment of octogenarians patients with colorectal cancer. J Coloproctol. 2013;33:131–4.
5. Arveux I, Boutron MC, El Mrini T, Arveux P, Liabeuf A, Pfitzenmeyer P, et al. Colon cancer in the elderly: evidence for major improvements in health care and survival. Br J Cancer. 1997;76:963–7.
6. Kurian A, Suryadevara S, Vaughn D, Zebley D, Hofmann M, Kim S, et al. Laparoscopic colectomy in octogenarians and nonagenarians: a preferable option to open surgery? J Surg Educ. 2010;67:161–6.
7. Mutch M. Laparoscopic colectomy in the elderly: when is too old? Clin Colon Rectal Surg. 2006;19:33–9.
8. Hobler K. Colon surgery for cancer in the very elderly. Cost and 3-year survival. Ann Surg. 1986;203:129–31.
9. Xie M, Qin H, Luo Q, He X, Lan P, Lian L. Laparoscopic colorectal resection in octogenarian patients: is it safe? A systematic review and meta-analysis. Medicine (Baltimore). 2015;94:e1765.
10. Roscio F, Bertoglio C, De Luca A, Frigerio A, Galli F, Scandroglio I. Outcomes of laparoscopic surgery for colorectal cancer in elderly patients. JSLS. 2011;15:315–21.
11. Bottino V, Esposito MG, Mottola A, Marte G, Di Maio V, Sciascia V, et al. Early outcomes of colon laparoscopic resection in the elderly patients compared with the younger. BMC Surg. 2012;12 Suppl. 1:s8.
12. Jeong D, Hur H, Min B, Baik S, Kim N. Safety and feasibility of a laparoscopic colorectal cancer resection in elderly patients. Ann Coloproctol. 2013;29:22–7.
13. Chang G, Skibber J, Feig B, Rodrigez-Bigas M. Are we undertreating rectal cancer in the elderly? An epidemiologic study. Ann Surg. 2007;246:215–21.