Clinics in Surgery

Research Article
Published: 10 Aug, 2018

Clinical Outcome of Patients Submitted to Resection of the Small Bowel Segments

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Abstract

Background: Segments of the digestive tract have specificities of nutrient absorption. The objective of this study was to identify factors related to the prognosis of patients submitted to bowel resections at a university hospital.

Materials and Methods: A cross sectional, retrospective study, using a specific semi-structured form. An analysis was made of 169 patients records all submitted to bowel resection during the period of August/2007 to July/2013. To perform data analysis, the patients were grouped according to their clinical evolution (hospital discharge/death).

Results: Longer length of hospital stay and age over 60 years old were associated with a higher mortality rate. Among patients submitted to single (n=148) or multiple (n=21) enterectomy, the mortality rate was 33.8% (n=50 deaths) and 52.4% (n=11 deaths), respectively. Hospital discharge was more common among patients undergoing a single enterectomy (p=0.143). Among patients submitted to single bowel resection, non-description of resected bowel segments increased the mortality rate (p=0.002). Remaining small intestine description was performed for 14 patients, and 11 of these patients met the diagnosis criteria for short bowel syndrome (SBS) (78.6%). SBS patients had a 90.9% mortality rate. For most enterectomized patients, no nutritional status assessment was performed (n=103, 60.9%). Patients classified as malnourished (n=19; 52.8%) had a higher mortality rate (p=0.032).

Conclusion: The lack of description of the resected and/or remaining intestinal segments, as well as the non-evaluation of the nutritional status, contributed to the higher mortality rate of patients submitted to resection of bowel segments.

Keywords: Bowel resection; Bowel segments; Short bowel syndrome; Clinical outcome; Malnutrition; Mortality rate

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Received Date: *11 Jul 2018*

Accepted Date: *07 Aug 2018*

Published Date: *10 Aug 2018*

Citation:

Lopes MGF, Duarte TC, Pereira JM, Freitas LA, De-Souza DA. Clinical Outcome of Patients Submitted to Resection of the Small Bowel Segments. Clin Surg. 2018; 3: 2061; 1-7

Introduction

The small intestine is a component of the lower gastrointestinal tract, which is divided into the segments duodenum, jejunum and ileum. The normal length of the small bowel varies between 300 cm to 800 cm, tending to be a little smaller in women [1]. The absorption capacity of the small bowel is amplified sharply by multiple small folds of the mucosa, which characterize the small intestine as the main anatomical structure responsible for the absorption of nutrients [2].

Although there is no consensus between the different researchers concerning the specific location and the bowel segment responsible for the absorption of each nutrient, some nutrients are absorbed almost totally in the first 150 cm of the small bowel [2,3]. More recently, it has been reported that there is an anatomical absorption gradient between the different segments of the small bowel, that is, the absorption of some specific nutrients is greater in the duodenum and in the proximal jejunum than in the ileum [4]. In contrast, the vitamins, minerals and fluids are absorbed simultaneously across the different anatomical segments of the digestive tract [1]. In the large intestine, there occurs the absorption of water and electrolytes still present in intraluminal content [5].

Bowel resection is indicated for surgical treatment in various diseases of the small and/or large

intestine, including cancer, bowel obstruction, chronic inflammatory bowel disease, mesenteric ischemia, trauma injuries, among other clinical conditions [6]. Due to the severity of the underlying disease, there frequently occurs superposition of the clinical manifestations associated with the etiologic factor and intestinal resection [7]. Some researchers have identified that a longer survival rate can be expected for patients submitted to a single and more conservative bowel resection [7]. The single extensive and the multiple small bowel resections, frequently induce severe pathophysiological alterations, including depletion in the nutritional status, with a consequential increase in morbidity and mortality rate [8].

The principal clinical-surgical manifestations identified during the immediate and/or late post-operatory periods are diarrheal episodes both frequent and voluminous, with the presence of food debris, steatorrhea, hydroelectrolytic unbalance, and renal function impairment [1,9]. Among those patients submitted to resection of intestinal segments, the precocious impairment of the nutritional status predispose them to dehiscence of anastomoses, development of fistulae and a recurrent infectious diseases [4,9,10]. In addition, patients submitted to resection of bowel segments present an increase in gastric secretion, which predisposes the patient to the development of acid-peptic diseases [1,11].

The occurrence of bacterial overgrowth, deficiencies in macro and micronutrients, as well as varied degrees of insufficiency or even intestinal failure are late complications frequently identified in the clinical practice. Patients who present acute diarrhoea associated with severe fluid and electrolyte instability, the use of complementary or exclusive parenteral nutrition is indicated over prolonged periods or even indefinitely [11,12].

The information that refers to the new anatomic structure of the gastrointestinal tract and the description of the absence of diseases in the wall of the remaining intestine are essential to the evaluation concerning the degree of functional impairment in the digestive tract over the post-operative period [13,14]. In addition, description of the type/length of the remaining small intestine, measured during the intraoperative period, as well as the type/length of the resected intestine, are essential [14]. The aim of the present study was to identify factors related to the prognosis among patients submitted to intestinal resection at a university hospital.

Material and Methods

The design of the present study is of the cross sectional, retrospective type. The study was approved by the research ethics committee on human subjects of the Federal University of Uberlândia, MG, Brazil.

An analysis was made of the medical records of patients of ≥ 20 years, submitted to resection of small bowel segments over the period of August 2007 to July 2013, at the Clinical Hospital of the University.

The medical records of 240 individuals that met the search criteria provided to the Statistics Sector were found. Among the medical records found in the Medical Archive Sector (n=217), medical records of 37 patients who were discharged from hospital and 11 patients who died were excluded. More specifically, the records excluded were those that presented exclusive intestinal raffia (n=4, all the patients received hospital discharge); exclusive colectomy (n=32, 26 patients received hospital discharge); partial or total gastrectomy (n=10, where 7 patients received hospital discharge); and records containing inconsistent data (n=2, all patients died). The final study sample was made from the records of 169 patients who had some type of enterectomy, and received hospital discharge (n=108) or evolved to death (n=61).

The collection of data was performed using a specific semi-structured form. In order to analyse the information presented on the records, the patients were grouped according to their clinical evolution (hospital discharge/death). To characterize the sample, information was collected concerning gender, age and length of hospital stay of the patients.

In relation to the characteristics of bowel resection, information was collected that referred to the number and the etiological factor of enterectomy; to the length and segment type of the resected and remaining small intestine; to the team that described the length and segment type of the resected and remaining small bowel; to the diagnosis of short bowel syndrome; and to the performing or not of colectomy associated with enterectomy. In order to facilitate the analysis of the data, the identified etiological factors were grouped according to their main etiological and clinical characteristics.

In order to analyse the data related to bowel resection, the lengths of the small bowel segments described in the literature for healthy individuals were used. In this manner, for the jejunum and ileum segments lengths of 100 cm to 300 cm and 150 cm to 400 cm, respectively, were used [1,5]. Then, in order to allow for a more detailed analysis of the data, tables with partial value ranges of the jejunum and ileum lengths were constructed.

In order to evaluate the nutritional status, all the information described in the records that referred to the nutritional status before the enterectomy was collected. In this evaluation, any anthropometric parameter that allowed for the classification of the nutritional status was considered valid. In addition, on those records that contained body weight and height descriptions, the Body Mass Index (BMI) was calculated. The adult and senior citizen patients were classified according to the criteria established by WHO [15] and Lipschitz [16], respectively. Considered also were the classification of the Subjective Global Assessment (SGA) [17] and the percentage of weight loss (%WL) [18].

Statistical analyses

To characterize the sample, average and standard deviation, medians, and proportions were estimated. For the comparison of two or more proportions, the chi-squared test of asymptotic multiple comparisons of binomial proportions was used. This test was applied to relate the clinical outcome presented by the patients (hospital discharge/death) to the gender, the number of enterectomy, the description of the etiologic factor of the enterectomy, and to the length and segment type of the resected and remaining small bowel. The qui-square test was also used to verify the relationship between the nutritional state prior to the bowel resection and the clinical evolution. For the analysis of the relationship between age groups and prognosis, the Spearman linear correlation test was used. In all the analyses, a significance of $p \leq 0.05$ was considered. The analyses were performed using the freeware R.

Results

Among the 169 medical records analyzed, the performing of an enterectomy was more frequent among male patients (n=94, p=0.039). A positive association was identified between the increase in age and

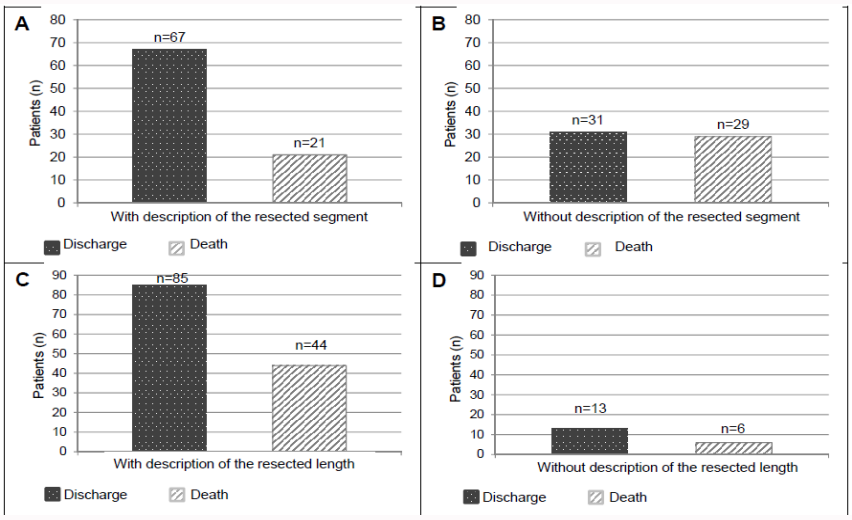

Figure 1: Distribution of patients submitted to single enterectomy, according to the description of the segment and the length of resected small intestine (n=148).

Table 1: General characteristics of patients submitted to enterectomy (n=169).

Patients	Hospital discharge patients n (%)	Death patients n (%)	Total n
Gender			
Women	46 (46.2) Ba	29 (47.5) Ab	75
Men	62 (57.4) Aa	32 (52.5) Ab	94
Total	108 (100.0)	61 (100.0)	169
Age Group*			
20 to 40 years	46 (42.6) Aa	11 (18.0) Bb	57
41 to 60 years	33 (30.6) Aba	20 (32.8) Aba	53
>60 years	29 (26.9) Bb	30 (49.2) Aa	59
Mean ± SD	46.8 ± 18.6 b	59.2 ± 17.6 a	51.3 ± 19.2
Intestinal Resection			
Enterectomy (n)			
Single	98 (90.7) Aa	50 (82.0) Ab	148
Multiple	10 (9.3) Ba	11 (18.0) Ba	21
Two	9	8	17
Three	1	2	3
Four	-	1	1
Length of hospital stay (days)			
Median	8	20	9

*Spearman's correlation test was used at a significance level of 5% (Kendall's coefficient =0.2539; p<0.001). Different lowercase letters in the line represent proportions that differ from each other by means of the qui-square test. Distinct capital letters in the column represent proportions that differ from each other by means of the qui-square test.

mortality rate (p<0.001), i.e., patients over 60 years old submitted to an enterectomy presented a worse prognosis than younger patients. The median for the length of hospital stay was higher among patients that evolved to death than those patients that received hospital discharge (20.0 days *vs.* 8.0 days, respectively; p=0.001) (Table 1).

Among those patients submitted to a single (n=148) or multiple (n=21) enterectomy, the mortality rate was equal to 33.8% (n=50 deaths) and to 52.4% (n=11 deaths), respectively. Hospital discharge was more common among patients undergoing single enterectomy than those patients undergoing multiple enterectomy (p=0.143) (Table 1).

The main etiological factors for the performing of an enterectomy were malignant neoplasm (n=39; 23.1%), trauma (n=35; 20.7%), and intestinal obstruction (n=28; 16.6%). Among those patients that evolved to death, the most frequent etiological factors for enterectomy were malignant neoplasm (n=17; 27.9%); intestinal obstruction (n=11; 18.0%) and vascular ischemia (n=11; 18.0%). For those patients that received hospital discharge, the most frequent etiological factors for enterectomy were trauma (n=26; 24.1%); malignant neoplasia (n=22; 20.3%) and intestinal obstruction (n=17; 15.7%). Patients diagnosed with vascular ischemia presented a higher mortality rate (n=11; 18.3% of deaths; p<0.001) (Table 2).

Among the patients submitted to a single enterectomy (n=148), the description of the type of bowel segment resected was performed for 88 patients (59.5%). A mortality rate of 23.9% and of 48.3% was identified for patients with and without description of the type of the bowel segment resected, respectively (Figure 1A and 1B). In relation to the clinical evolution of patients submitted to a single enterectomy, the description of the bowel segment was identified as a factor directly related to the prognosis. More specifically, among the patients with hospital discharge (n=98), it was identified that 67 patients (69.4%) presented a description of the bowel resection segment (p=0.002). Among the patients that evolved to death (n=50), it was identified that 29 of the patients (58.0%) did not present a description of the bowel resection segment (p=0.002) (Figure 1A and 1B). The description of the bowel resection length was identified for 129 patients (87.2%), all submitted to a single enterectomy (Figure 1C and 1D). There was no difference in the mortality rate among patients with (n=44; 34.1%) and without (n=6; 31.6%) description of the resected bowel length, respectively (p=0.828) (Figure 1C and 1D).

Among the patients submitted to a single bowel resection (n=148; 98 patients with hospital discharge and 50 patients evolved to death), 43 patients (29.1%) presented a description of the segment and/or length of the bowel resection only through the surgical team, and 51 patients (34.5%) presented a description only through the anatomy pathological team. The mortality rate was higher (p=0.006) among those patients submitted to a single enterectomy which had

Table 2: Causal factors for enterectomy described in the patient charts analyzed (n=169).

Causal factors for enterectomy	Hospital discharge patients			Death patients			Total patients
	Gender		Total	Gender		Total	
	Women	Men	n (%)	Women	Men	n (%)	n (%)
Malignant neoplasm	13	9	22 (20.3) a	9	8	17 (27.9) a	39 (23.1)
Trauma*	4	22	26 (24.1) a	1	8	9 (14.8) a	35 (20.7)
Intestinal obstruction‡	7	10	17 (15.7) a	5	6	11 (18.0) a	28 (16.6)
Inflammatory acute abdomen‖	8	8	16 (14.8) a	6	3	9 (14.8) a	25 (14.8)
Vascular ischemia¥	2	1	3 (2.8) b	4	7	11 (18.0) a	14 (8.3)
Intestinal hernia	6	6	12 (11.1) a	2	0	2 (3.3) a	14 (8.3)
Crohn's disease	3	3	6 (5.6) a	1	0	1 (1.6) a	7 (4.1)
Others¶	3	3	6 (5.6) a	1	0	1 (1.6) a	7 (4.1)
Total	**46**	**62**	**108 (100.0)**	**29**	**32**	**61 (100.0)**	**169 (100.0)**

*Includes: gunshot wound, white gun injury, automobile accident, falling object on the abdomen, car crash; ‡Includes: obstructive acute abdomen, volvulus and intestinal adhesions; ‖Includes: perforating acute abdomen and dehiscence of suture; ¥Includes: thrombosis, ischemic acute abdomen; ¶Includes: enterocutaneous fistulae and intestinal polyposis. Different lowercase letters in the line represent proportions that differ from each other by means of the qui-square test.

Table 3: Distribution of patients submitted to single enterectomy (n=148), according to the segment description and the length of the resected small bowel.

Resected small bowel (cm)	Resected length (cm)[A]	Description									
		Not reported (n)	Only by the team of				Both teams				Total (n)
			Surgery (n)		Pathology (n)		Same classification (n)		Different classification (n)		
			Hospital Discharge	Death	Hospital Discharge	Death	Hospital Discharge	Death	Hospital Discharge	Death	
Jejunum	Up to 100	-	6	-	3	1	5	2	-	-	17
	100 -| 200	-	-	-	-	-	-	-	-	-	-
	>200	-	-	-	-	-	-	-	-	-	-
Ileum	Up to 150	-	17	2	14	6	11	2	-	-	52
	150 -| 300	-	-	-	-	1	-	-	-	1[B]	2
	>300	-	-	-	-	-	-	-	-	-	-
Jejunum and ileum	Up to 250	-	1	-	1	2	2	3	-	-	9
	250 -| 350	-	-	-	-	1	-	-	-	-	1
	350 -| 500	-	-	-	-	-	-	-	-	-	-
	>500	-	-	-	-	-	-	-	-	-	-
With length description and no segment description	Up to 100	-	5	3	14	5	6	6	-	2[C]	41
	100 -| 200	-	-	2	-	1	-	1	-	1[D]	5
	200 -| 300	-	-	-	-	1	-	-	-	-	1
	>300	-	-	-	-	1	-	-	-	-	1
With segment description and no length description	-	-	2 (jejunum)	-	-	-	-	-	-	-	2
	-	-	5 (ileum)	-	-	-	-	-	-	-	5
No segment and length description	-	-	-	-	-	-	-	-	-	-	12
Total	-	12	36	7	32	19	24	14	0	4[E]	148

[A] Classification of resected length performed taking as reference that the small intestine has length between 300 cm and 800 cm (ASPEN, 2005). [B]For a patient with ileum resection, the resection of "150 -| 300 cm" by the surgical team and "up to 150 cm" by pathology team were reported in the medical record. [C]Patients classified as: "no description of the segment of resected small intestine" there was description of resection of "up to 100 cm" by the surgical team and resection of "100 -| 200 cm" by pathology team. [D]Patient classified as: "without description of the resected small intestine segment" there was description of resection of "100 -| 300 cm" by the surgical team and "100 -| 200 cm" by pathology team. [E]Patients who had a description in different grades of classification were included in the ranges corresponding to the resected small bowel length described by the surgical team.

a description of the segment and/or bowel resection length made exclusively through pathology (n=19; 37.3%). Among the 48 patients that had exclusively the description of the bowel resected length, the proportion of patients evolved to death (n=23; 46.0% of deaths) was higher than the proportion of patients that received hospital discharge (n=25; 25.5% of discharges) (p=0.012) (Table 3).

Among the patients submitted to multiple enterectomy (n=21), there were no identifications made in the medical records to

Table 4: Distribution of patients submitted to multiple enterectomy (n=21), according to the description of the segment and the length of the resected small intestine.

Number of enterectomy	With description[A]		No description / Incomplete description[B]		Total
	Hospital Discharge	Death	Hospital Discharge	Death	
Segments description					
Two resections	1	-	8	8	17
Three resections	-	-	1	2	3
Four resections	-	-	-	1	1
Total	1	-	9	11	21
Length description					
Two resections	6	7	3	1	17
Three resections	-	-	1	2	3
Four resections	-	-	-	1	1
Total	6	7	4	4	21

[A] Description of segment/length of bowel resected in all operative acts; [B] No segment/length of the resected bowel was described in at least one of the operative acts performed.

Table 5: Clinical evolution of patients submitted to enterectomy, according to the description of the remaining small bowel (n=14).

Patient	Enterectomy (n)	Description of remnant bowel		Short bowel syndrome		Colectomy	Death
		Segment	Total length (cm)	ASPEN classification	AGA classification		
1	Multiple (4[A])	160 cm proximal SB	160	Yes	-	Partial[C]	Yes
2	Simple	10 cm of jejunum+60 cm of terminal ileum	70	Yes	ICA	No	Yes
3	Simple	60 cm SB	60	Yes	-	No	Yes
4	Simple	190 cm SB	190	Yes	-	Partial	Yes
5	Simple	60 cm of proximal jejunum+10 cm of terminal ileum	70	Yes	ICA	No	Yes
6	Simple	150 cm SB	150	Yes	-	Total[C]	Yes
7	Simple	20 cm of jejunum+8 cm of ileum	28	Yes	ICA	No	Yes
8	Multiple (4[B])	110 cm SB	110	Yes	-	No	Yes
9	Simple	70 cm jejunum	70	Yes	JCA	No	Yes
10	Simple	270 cm SB	270	No	-	Total	Yes
11	Simple	70 cm proximal SB+250 cm of terminal ileum	320	No	Colostomy	Partial	Yes
12	Simple	250 cm SB	250	No	-	Partial	No
13	Simple	180 cm SB	180	Yes	-	Partial	No
14	Simple	5 cm jejunum+10 cm ileum	25	Yes	ICA	No	Yes

[A]Among the four surgical procedures, there was a description of the remaining intestine in one surgical procedure; [B]Among the four surgical procedures, there was a description of the remaining intestine in two surgical procedures; [C]Colectomy prior to August/2007 was performed. SB: Small bowel; ASPEN: American Society for Parenteral and Enteral Nutrition; AGA: American Gastroenterology Association. AGA intestinal resection classification for short bowel syndrome patients; D: Duodenostomy; JIA: Jejunum Ileum Anastomosis; ICA: Ileum Colic Anastomosis; JCA: Jejunum Colic Anastomosis; J: Jejunostomy. (-) It was not possible to perform the classification due to lack of description of the remaining intestinal segment

descriptions of the segment and the bowel resected length, in at least one of the surgical procedures, for 20 patients (95.2%) and for 8 patients (38.1%), respectively (Table 4).

The description of the remaining small bowel was performed for 14 patients submitted to resection of bowel segments, with 12 patients being submitted to a single enterectomy. The diagnosis of short bowel syndrome [1] was performed for 11 patients (78.6%) that had a description of the remaining small bowel. Among the patients diagnosed as suffering from short bowel syndrome, the mortality rate was of 90.9% (n=10) (Table 5).

None of the methods used for nutritional status assessment were identified in 103 of the analyzed medical records (60.9%) of patients submitted to resection of small bowel segments. Among the 66 medical records that presented at least one method that allowed for the evaluation of the nutritional status, 36 patients (54.5%) were classified as malnourished. There was no difference in the mortality rate of patients submitted to resection of bowel segments in relation to the evaluation of the nutritional status [27 deaths (44.3%) among the evaluated patients *vs.* 34 deaths (55.7%) among patients not evaluated; p=0.205]. The mortality rate was higher (p=0.032) among the patients classified as malnourished (n=19; 52.8%) than among those not classified as malnourished (n=8; 26.6%) (Table 6).

Discussion

In the present study, an analysis was made of medical records of patients submitted to small bowel resection surgery during the period of August 2007 to July 2013. On a majority of the analyzed medical records, identification was made as to the patients being submitted to single bowel resection. Patients over 60 years of age and with a higher length of hospital stay presented a poor prognosis. The etiological factor of mesenteric vascular ischemia, showed a higher mortality rate.

Table 6: Description of the nutritional status of patients submitted to enterectomy (n=169).

Nutritional status assessment	Hospital discharge n (%)	Death n (%)	Total
Evaluated	39 (36.1)	27 (44.3)	66 (39.1)
Malnutrition classified	17a	19a	36
SGA	10	8	18
%WL	3	3	6
BMI	4	4	8
%WL e SGA	-	2	2
%WL, BMI, SGA	-	2	2
Not malnourished classified	22a	8b	30 (17.8)
SGA	8	2	10
%WL	-	-	-
BMI	7	7	14
%WL, BMI	2	-	2
BMI, SGA	5	1	6
Not assessed	69 (63.9) a	34 (55.7) b	103 (60.9)
Total	108 (100.0)	61 (100.0)	169 (100.0)

SGA: Subjective Global Assessment (Detsky et al. [17]); %WL: percentage of Weight Loss (Blackburn et al. [18]). BMI: Body Mass Index (WHO [15]; Lipschitz [16]). Different lowercase letters in the line represent proportions that differ from each other by means of the qui-square test.

Among those patients submitted to a single enterectomy, the description of the bowel resection length was more frequent than the description of the bowel resection segment (87.2% *vs.* 59.5%, respectively). Among the patients submitted to a single enterectomy, the lack of description for of the bowel resection segment was directly associated with the increase in mortality rate (p=0.002). There was no association made between lack of description of the bowel resection length and the mortality rate.

In the analysis of the association between lack of description of the bowel segment and increase in mortality rate, it is necessary to consider that the absorption of nutrients, as well as some essential functions in the digestive/absorptive process occur at specific locations of the digestive tract [4,19]. As for example, the ileum is the bowel segment responsible for absorbing vitamin B12, and takes on the main role in the enterohepatic cycle, performing the reabsorption of bile salts [20,21]. One additional and relevant aspect is that the ileum is the bowel segment that presents the highest adaptive capacity after the performing of bowel resection [19]. In this way, although the absorption of nutrients occurs mainly in the proximal small bowel, those patients submitted to resection of ileus segments present higher hemodynamic instability and greater impairment of nutritional status [4,20-22]. In addition, in clinical practice the lack of knowledge concerning the bowel resection segment, limits the performance of health team professionals, especially in relation to the establishment of a therapeutic plan that best attends to the needs of each patient.

More recently, the importance of the diagnosis of intestinal insufficiency/failure has been reported [12], that is, in the clinical practice it is essential to identify the degree of bowel autonomy that the patient presents [4,19,23]. Thus, it is of great concern to identify that the description of the remaining small intestine was performed in only 8.3% of the medical records analyzed. The lack of knowledge regarding the degree of intestinal autonomy of a patient makes it difficult to implement more individualized and effective dietary conducts, which impairs the recovery/maintenance of a normal nutritional status, as well as the development of bowel adaptation [24,25].

The description of the remaining small bowel allows for the performing a short bowel syndrome diagnosis. In the present study, 11 patients met the criteria established for the diagnosis of short bowel syndrome [1]. Among these patients, the mortality rate was 90.9%. The high mortality rate among these patients diagnosed with short bowel syndrome is frequently associated with intestinal insufficiency/failure, characterized by diarrheic episodes frequent and voluminous, associated with a severe hemodynamic instability and impairment of the renal function [10]. For patients with short bowel syndrome it is common to become temporarily or permanently dependent on total or complementary parenteral nutrition. In this clinical situation, the patients are exposed to the complications inherent to the use of the intravenous route for diet administration [26]. The treatment of patients diagnosed with short bowel syndrome needs to be individualized, aiming at the development of intestinal adaptation, clinical-nutritional stability and the improvement in life quality [26].

On a majority of the analyzed medical records, no identification was made concerning any method that evaluates the nutritional status, including screening tests, or even body weight and/or height measurements. Among the patients that had nutritional status assessment, 54.5% were classified as malnourished. The evaluation of the nutritional status is an essential procedure for predicting nutritional risks and establishing adequate nutritional therapy, especially for those patients exposed to metabolic stress [27]. Among the patients submitted to enterectomy, the failure to carry out the nutritional status assessment is a conduct, at least questionable, since it neglects the current clinical-nutritional condition, as well as allows the greater commitment of protein-energy malnutrition. Malnourished patients present an increase in the frequency of infectious and non-infectious complications, the length of hospital stay, the costs of hospitalization, as well as higher mortality rate [28].

Conclusion

In the present study, it was demonstrated that the non-description of the resected and/or remnant bowel segments contributed to an increase in the mortality rate among patients submitted to

enterectomy. Although the evaluation of the nutritional status of patients submitted to resection of intestinal segments was rarely performed, patients classified as malnourished had a high mortality rate. The results presented in the present study illustrate the need to establish protocols of conducts for the perioperative and postoperative periods of patients submitted to resection of small bowel segments. In addition, in order to reduce the morbidity and mortality of patients undergoing an enterectomy, it is essential the performance of a multiprofessional team, with emphasis on the diagnosis of nutritional status and the implementation of individualized dietary therapies adapted to the current clinical situation of the patient.

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