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Postoperative Morbidity After Stoma Creation in Inflammatory Bowel Diseases: Differences Between Crohn´s Disease and Ulcerative Colitis

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Abstract

Background: Stomas are frequently used during the surgical treatment of Crohn's disease (CD) and in ulcerative colitis (UC), with significant morbidity. The aim of this study was to compare rates of complications from stomas created in CD and UC patients.

Methods: Retrospective observational study, in patients with inflammatory bowel diseases (IBD) who needed some type of stoma in a 10-year period. Patients were allocated into 2 groups: UC and CD. The characteristics were compared to detect possible differences between the two diseases.

Results:103 procedures were performed in 86 patients, 67 (65%) in CD and 36 (35%) in UC. The most common type of stoma in both groups was end ileostomy (CD 62.2% vs. UC 51.3%). In CD, stoma creations in emergency setting was more common (47.8% vs. 25% p=0.024) whereas elective creations were more common in UC patients. There was a higher prevalence of permanent stomas in CD as compared to UC (56.7% vs 19.4% p<0.001). Overall complication rate in CD was 53.7% and in UC, 44.4% (p=0.369). Early complications were more common in both groups (32.8% vs. 36.1% p=0.226) and late complications were more frequently observed in CD (19.4% vs. 5.6% p=0.05).

Conclusions: Stoma-related complication rates were similar between patients with CD and UC. Early complications were more frequent than late complications, and late complications were more common in CD. The end ileostomy was the most common type of stoma in both groups. The proportion of permanent stomas was higher in CD.

Keywords: Inflammatory bowel disease; Ulcerative colitis; Crohn's disease; Stomas; Ileostomy; Colostomy

Introduction

The evolution of medical therapy targeting inflammatory bowel diseases (IBD) over the last decades has been remarkable. Disease progression and prognosis have changed with the use of corticosteroids, immunosuppressants and, more recently, biological agents [1]. Despite the evolution in medical therapy for Crohn's disease (CD) and ulcerative colitis (UC), surgery may still be necessary in patients who are refractory to optimized medical treatment and in the presence of abdominal (stenosis, perforation, or abscess) or perianal complications in CD [2]. Up to 58% of CD patients will require surgical treatment at some point during the disease course [3]. Approximately 20% of patients with UC will still require colectomy due to failure to medical therapy or development of dysplasia or neoplasia [4]. Elective surgical resections in IBD can be performed with primary anastomoses. However, in specific situations such as malnutrition, previous exposure to corticosteroids, penetrating disease or in emergency procedures, anastomoses should be avoided, due to the high risk of leakage and consequent sepsis. In these cases, intestinal stomas are often indicated. [5,6]. In IBD, stomas are useful strategies for the treatment of colonic disease or anorectal location, and may be necessary in patients with small bowel CD, especially in complications and in an emergency setting [7]. The specific type of stoma depends on the surgical procedure performed and the patients' conditions at the time of surgery [7]. Intestinal stomas can be

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classified according to the anatomic segment of the intestine, with ileostomies being the most common type of stoma in patients with IBD [5,8]. Intestinal stomas can also be classified as permanent or temporary, according to the type of surgery and the future possibility of bowel transit restoration [5]. Regarding the technique, they can be classified as terminal, loop or double loop stomas [8-10]. Significant morbidity is associated with creation of intestinal stomas [11] Complication rates related to stoma construction range from 20 to 70% [9,12]. Early complications occur within the first 30 days after the procedures and include ischemia, necrosis, retraction, mucocutaneous separation, and parastomal abscess [13]. Late complications include parastomal hernia formation, strictures, prolapses and stoma retraction [14]. Additionally, specific cases of patients with IBD undergoing major surgery may benefit from permanent stomas with restoration of quality of life. Detailed comparative data regarding specific characteristics of stomas and postoperative complications are scarce in the literature in patients with IBD, especially in Brazil and Latin America. The aim of our study was to comparatively analyze the proportions of postoperative complications related to stoma creation in patients with CD and UC. Furthermore, we analyzed the proportion of temporary and permanent stomas, anatomical types of stomas, and different indications for stomas between CD and UC.

Methods

A retrospective single center observational study was carried out in patients with IBD who required some type of stoma as part of the surgical treatment, in a period of 10 years, at a tertiary referral center from a major capital of the south of Brazil. All patients over 18 years of age, with IBD (CD or UC), undergoing surgical treatment for any IBD-related indication, with a intestinal stoma as part of the surgical procedure, operated between January 2010 and June 2020, by the same surgical team, were included. Patients undergoing major abdominal surgery without stomas, undergoing intestinal stomas for other causes unrelated to IBD, and patients with incomplete data in their medical records were excluded. Patients were allocated into two groups: UC and CD. Patient demographics such as age at surgery, age at diagnosis, disease duration from diagnosis to surgery, sex, and smoking history were collected. Preoperative clinical treatment information, such as concomitant and previously used medications, were also collected. Data regarding intestinal stomas such as type (ileostomy, colostomy, terminal, loop), setting (elective or emergency surgery), long-term characteristic (temporary or permanent) and presence and type of any stoma-related complication (early and late) were important variables of the study. A stoma was considered permanent if bowel transit was not restored for 2 years after its creation. Early complications were defined as those that occurred up to 30 days after stoma creation, and late complications those that occurred more than 30 days after the procedure. Patients who had both early and late complications were also considered. The characteristics were compared between the two groups to detect possible differences between the two diseases. The study's hypothesis was to identify whether there was a difference between the groups (CD and UC) regarding the type, anatomical characteristics and complications of intestinal stoma creation. Data were compiled and stored in a Microsoft Excel spreadsheet. For quantitative variables with normal distribution, the mean and standard deviation (SD) were presented and Student's t test was used to compare two independent samples. Categorical data were presented in percentages and Pearson's Chi-square test or Fisher's exact test were used to compare two proportions of independent samples (qualitative variables). Statistical significance was considered for $p<0.05$. Statistical analyzes were performed using the IBM SPSS v. 22.0 (IBM Corp. IBM SPSS Statistics for Windows. Armonk, NY: IBM Corp; 2013).

Results

In total, 121 stoma procedures performed in 105 patients with IBD were identified for the study. After excluding 18 procedures for not meeting the inclusion criteria, 103 stoma procedures were analyzed in 88 patients, 67 (65%) in CD and 36 (35%) in UC. These data are detailed in figure 1. The main baseline demographic characteristics of included patients at the time of the procedures are summarized in table 1, comparing patients with CD and UC. There was no difference in relation to the mean age of the groups studied at the time of the procedures ($p=0.343$).

Regarding smoking, most patients never smoked (CD 91% vs. UC 91.7 % p=1,000). Extraintestinal manifestations were not present in most cases in both groups. Most patients had not used corticosteroids up to 12 weeks before surgery. There was a difference between the groups regarding the use of azathioprine (CD 61.2 % vs. UC 38.9 %; $p=0.030$). Most patients in both groups had used some type of biological agent up to 12 weeks before the procedures (CD 65.7% vs. UC 52.8%; $p=0.200$). The stoma characteristics are summarized in table 2 in a comparative manner between patients with CD and UC. The type of stoma most commonly performed in both groups was end ileostomy followed by loop ileostomy. The indication for defunctioning of an anastomosis was more commonly observed in UC cases (CD 2.9% vs. UC 40.5% $p<0.001$). In CD, indication for emergency complications (such as perforation or obstruction) were more common (CD 47.8% vs. UC 25% $p=0.24$) whilst in UC stomas were more constructed in the elective setting (CD 52.3% vs. UC 75% $p=0.024$). Regarding the possibility of reversal and surgical approach, there was a higher prevalence of permanent stomas in CD as compared to UC (CD 56.7% vs. UC 19.4% $p<0.001$). The most frequent surgical approach for performing stomas in the CD group was conventional (open) surgery, while in most UC stomas were mostly performed by laparoscopy. Among the 103 procedures, 52 presented any type of stoma-related complication. The rates of overall, early, and late complications are demonstrated in figure 2. Of the 67 stoma procedures performed in patients with CD, 36 (53.7%) had some type of complication [22/67 (32.8%) early and 13/67 (19.4%) late complications], and one case with both early and late complications was not taken into consideration. Among the 36 stoma procedures performed in patients with UC,

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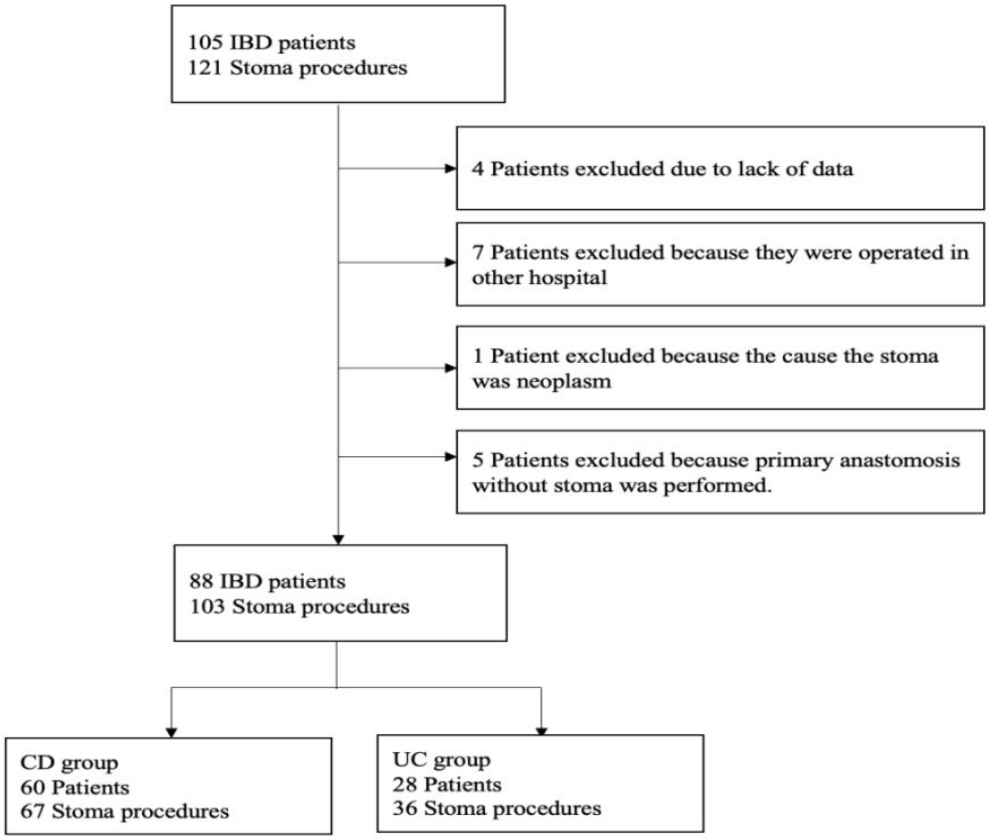

Figure 1: Study flowchart and reasons for exclusion.

Table 1: Baseline demographic characteristics in patients with CD and UC. Results described by mean ± standard deviation (minimum value – maximum value) and by frequency (percentage). Pearson's chi-square test.

		CD	UC	p value
Total n = 103		67 (65%)	36 (35%)	
Age (*yr*)		32.69 ± 11.37 (15 - 66)	33.53 ± 12.73 (17 -67)	0.343
Sex				
Female	55	38 (56.7)	17 (47.2)	0.357
Male	48	29 (43.3)	19 (52.8)	
Smoking				
No	94	61 (91)	33 (91.7)	1
Yes	9	6 (9)	3 (8.3)	
Extraintestinal manifestations				
No	69	44 (65.7)	25 (69.4)	0.698
Yes	34	23 (34.3)	11 (30.6)	
Use of corticosteroids 12 weeks before the procedure				
No	57	38 (56.7)	19 (52.8)	0.701
Yes	46	29 (43.3)	17 (47.2)	
Use of azathioprine 12 weeks before the procedure				
No	55	41 (61.2)	14 (38.9)	0.03
Yes	48	26 (38.8)	22 (61.1)	
Use of biologicals 12 weeks before the procedure				
No	40	23 (34.3)	17 (47.2)	0.2
Yes	63	44 (65.7)	19 (52.8)	

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Table 2: Characteristics of stomas compared between CD and UC patients.

		CD	UC	p value
Total N = 103	N	67 (65%)	36 (35%)	
Stoma indication [b]				
Defunctioning of anastomosis	17	2 (2.9)	15 (40.5)	**<0.001**
Perianal CD	7	7 (10.4)	0 (0)	
Emergency abdominal surgery	33	27 (40.2)	6 (16.2)	
Corticosteroid use	5	0 (0)	5 (13.5)	
Malnutrition	1	1 (1.4)	0 (0)	
Others	29	24 (35.8)	5 (13.5)	
Corticosteroid + malnutrition	11	6 (8.9)	5 (13.5)	
Emergency/elective stoma indication [a]				
Emergency	41	32 (47.8)	9 (25)	**0.024**
Elective	62	35 (52.2)	27 (75)	
Surgical approach [a]				
Open	76	57 (85.1)	19 (52.8)	**<0.001**
Laparoscopic	27	10 (14.9)	17 (47.2)	
Stoma type [b]				
End ileostomy	61	42 (62.6)	19 (51.3)	**0.01**
Loop ileostomy	26	10 (14.9)	16 (43.2)	
End colostomy	5	5 (7.4)	0 (0)	
Loop colostomy	2	2 (2.9)	0 (0)	
Double loop	7	6 (8.9)	1 (2.7)	
Ileostomy with mucosal fistula	2	2 (2.9)	0 (0)	
Stoma characteristics [a]				
Temporary	58	29 (43.3)	29 (80.6)	**<0.001**
Permanent	45	38 (56.7)	7 (19.4)	

[a] Pearson's chi-square test.
[b] Fisher 's exact test

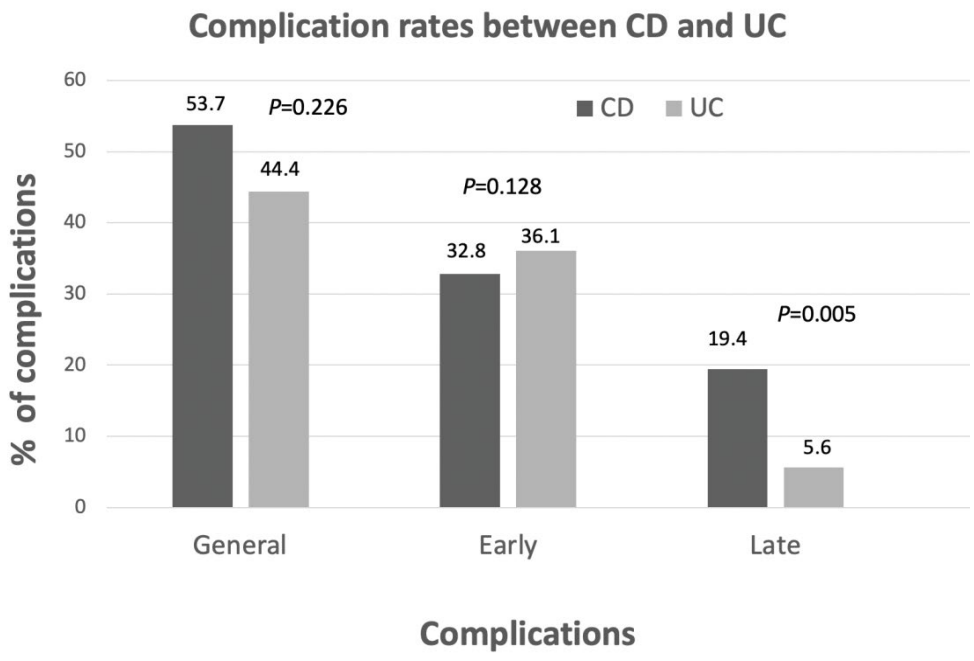

Figure 2: Complication rates between CD (n=67 procedures) and UC (n=36 procedures).

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complications were observed in 16 (44.4%) patients [13/36 (36.1%) early and 2/36 (5.6%) late complications], and one case with both early and late complications was not taken into consideration. There was a higher proportion of late complications in patients with CD as compared to patients with UC (19.4% vs. 5.6%, p=0.005). The most commonly observed early and late complications for each disease are demonstrated in detail in tables 3 and 4.

Discussion

The present study, which analyzed 103 intestinal stoma creation procedures performed in 88 patients with CD and UC, demonstrated that in IBD, early stoma-related complications were more common than late complications. In addition, comparatively, late complications were more commonly observed in patients with CD, which may impact on quality of life and in some cases can lead to new surgical approaches. Takahashi et al. have already demonstrated that there is a greater risk for stoma-related complications in patients with CD as compared to UC, despite not comparing early and late complications, which is important data in the prevention of these outcomes [5]. Our findings confirm the conclusions from Takahashi et al., showing that stomas in CD can be more challenging to manage in the long term as compared to those in UC. Adherence to meticulous surgical technique, attention to preoperative preparation, and postoperative follow-up constitute a fundamental pillar in avoiding and preventing stoma-related complications. Preoperative management is based on a multidisciplinary approach, which includes nurses, psychologists, endoscopists, nutritionists, and radiologists. Patient education and early involvement of stoma nurses play a key role in managing common stoma complications and prevention of their progression [15,16].

Table 3: Most relevant early complications between patients with CD and UC.

	CD	UC
Total N = 35	22 (32.8%)	13 (36.1%)
Peristomal skin irritation (n.%)	12 (17.9)	6 (16.7)
Stoma ischemia/necrosis (n.%)	4 (6)	3 (8.3)
Fluid and Electrolyte imbalances (n.%)	1 (1.5)	1 (2.8)
Other (n.%)	5 (7.4)	3 (8.3)

Table 4: Most relevant late complications between patients with CD and UC.

	CD	UC
Total N = 15	13 (19.4%)	2 (5.6%)
Parastomal hernia (n.%)	-------	2 (5.6)
Parastomal pyoderma gangrenosum (n.%)	2 (3.0)	-------
Parastomal fistulas (n.%)	3 (4.5)	-------
Stoma strictures (n.%)	2 (3.0)	-------
Disease recurrence (n.%)	1 (1.5)	-------
Other (n.%)	5 (7.4)	-------

Prevention of stoma-related complications is recommended with adequate preoperative demarcation before surgery, as stomas in inappropriate locations, close to bone structures such as ribs and iliac bone, or over abdominal skin folds or scars, are associated with a greater possibility of complications [16]. The present study demonstrated differences in complications between patients with IBD, differentiating into early and late morbidity. These are important data to focus more efforts on preventing these complications. Ileostomy was the most prevalent type of stoma in both diseases, with end ileostomy being the most performed procedure, followed by loop ileostomy. These findings corroborate data already described in the literature, where the end ileostomy is the main stoma performed in emergency surgeries both in CD and UC, in association with ileocecal resections and total colectomies, the most commonly performed procedures in both diseases, respectively. [5,10]. Colostomies are usually not indicated in UC, and are rarely used in CD, due to the higher risk of recurrence. Only seven colostomies were performed in patients with CD (5 terminal and 2 loop) in our study. Recently, a multicenter study published by Lightner et al. demonstrated the results of 63 patients undergoing colostomies in CD after proctectomies [17]. Of these, 22.2% had clinical recurrence, 29.4% had endoscopic recurrence, and only 4.76% required proximal abdominal colectomy for recurrence. Thus, it is questioned whether in selected cases, a colostomy may not be a good option in patients with CD. Studies with larger number of patients are needed to better define the role of colostomies in the surgical management of CD. Temporary stomas in IBD are usually created to divert intestinal transit protecting distal disease activity, to protect high-risk anastomoses, or to treat intestinal obstruction. Permanent stomas are created after proctectomies or when a distal anastomosis is not feasible due to multiple procedures, previous infections or pelvic fibrosis [10]. Our results showed, with a significant difference, that there was a higher prevalence of permanent stomas in CD as compared to UC. A possible interpretation for this finding is that patients with CD have more severe anorectal complications, and lose the distal rectum and anal canal more frequently when compared to UC [18]. In addition, they undergo multiple operations relatively frequently, making the abdominal environment hostile for intestinal transit restorative procedures. Ileal pouch-anal anastomosis (IPAA), with preservation of the normal route of defecation, is a frequent procedure in UC, but not so often indicated in CD. The probability of reversal of stomas initially considered as temporary is generally low (19%) [19]. A meta-analysis of 16 studies with CD patients with diverting stomas showed a stoma closure rate of 34.5%, with a success rate of only 16% [20]. Additionally, a recent Swiss study with a cohort of 18,815 patients showed that less than half of the patients (44%) with CD diverting stomas were able to restore intestinal transit [21]. In CD, the rate of permanent stomas may be higher also due to the limitations inherent to the evolution of the disease, whereas in UC the rates may be lower due to the fact that most stomas are part of staged procedures, after a restorative proctocolectomy, where an IPAA is performed in 2-or 3- stage strategies, which

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requires a temporary diverting ileostomy [22-24]. The findings of the present study corroborate the concepts described in the main studies in the international literature. The rates of stomas in CD have significantly decreased in recent years, due to the decrease in indications for emergency procedures, as demonstrated in the study by Ma et al [25]. Our study showed that in CD, emergency stomas were more prevalent, while in UC elective stomas were more frequently observed. A potential reason for this fact is based on the surgical strategy of UC, where the loop ileostomy is part of the 2- or 3- stage strategies (the treatment of choice in the elective setting) [22-24]. Even so, our study included nine patients with UC operated as emergency procedures, highlighting the role of end ileostomies after total colectomy in this type of scenario, which is more frequent in CD, but equally important in UC. The risk of surgery in patients with IBD has been decreasing over time, but it is still important in treatment algorithms, with a 5-year cumulative risk of 7.0% in UC and 18% in CD [26]. Performing an intestinal stoma is an important part of surgical treatment and, like any procedure, can be associated with complications. The present study showed that the rate of stoma-related complications occurred in about half of the patients with IBD, similarly to previously published data, which ranges from 17.4% to 50.6% [5,12]. The present study is associated with some limitations, which must be carefully interpreted. Through the retrospective methodology, the study is vulnerable to possible biases, mainly in terms of selection and accuracy of data by collecting information from medical records, limiting variables examined. In addition, the study period was long, and changes in surgical strategy over the 10 years may have occurred, despite performed by the same team. The sample was limited to 103 procedures performed in 88 patients. However, despite these limitations, some strengths can be highlighted, mainly because the data are derived from a single tertiary referral unit, with experience in the surgical management of IBD in Latin America, with defined treatment protocols. Due to scarcity of data, our study can help to guide patients and teach physicians undergoing training in the field of colorectal surgery, due to the importance of its data in the surgical management of IBD. In summary, the rate of complications related to intestinal stomas creation was similar between patients with CD and UC. Early stoma-related complications were more common than late complications in IBD, and late complications were more common in patients with CD. End ileostomy was the most common type of stoma in patients in both groups, with a higher prevalence of permanent stomas in CD. Prospective studies on the subject are awaited, for a better understanding of the morbidity related to this important and impacting issue constituted by intestinal stomas in IBD.

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None

Conflict of interest

The authors have no related conflicts of interest to declare.

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