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Postoperative bowel symptoms improve over time after rectosigmoidectomy for endometriosis

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ABSTRACT

Study Objective: To evaluate bowel function (changes in stool caliber, sensation of incomplete evacuation, stooling frequency and rectal bleeding) and urinary function (dysuria and retention) after segmental resection in patients with bowel endometriosis.

Design: Retrospective study.

Setting: A tertiary Hospital.

Patients: A total of 413 (mean age = 33.6±5.1 years) of reproductive aged women, with bowel endometriosis that underwent segmental bowel resection of the rectosigmoid from 2005 to 2018, without history of prior bowel surgery, without existing or history of malignancy.

Interventions: laparoscopic segmental bowel resection performed by the same team and with the same technique.

Measurements and Main Results: Data collected from the patients' records included length of resected segment, distance of the lesion from the anal verge, and complications. Information on intestinal / urinary function were obtained from a questionnaire applied before the surgery, and at two, six and twelve months after the surgery. There was significant increase in the incidence of stool thinning and rectal bleeding two months after surgical procedure; these symptoms decreased significantly over time. The incidence of urinary symptoms decreased significantly over time after surgery. The length of the bowel segment resected was not associated with the postoperative symptoms, but the rectosigmoid lesion was significantly closer to the anal verge in patients with rectal bleeding and urinary symptoms. There was no association between the length of intestinal segment resected and the frequency of stooling. At six months, patients who had a decreased frequency of stooling underwent a resection closer to the anal verge (9.7 cm) in comparison to the ones with unchanged or increase frequency of stooling (10.1 cm and 10.7 cm respectively; $p < 0.05$).

Conclusion: patient complaints on bowel and urinary alterations after segmental resection are transient with significant improvement over time up to twelve months. Bowel and urinary symptoms were not associated with the size of the bowel segment resected, while rectal bleeding at two months after surgery was significantly associated with the distance from anal verge. Segmental resection was also associated with a great improvement in constipation at twelve months postoperative.

Keywords: Deep endometriosis; bowel endometriosis; laparoscopic surgery; bowel symptoms; urinary symptoms

Precis: Postoperative bowel symptoms improve over time after rectosigmoidectomy for endometriosis independently of the size of the bowel lesion and the distance from anal verge.

Introduction

Intestinal endometriosis (IE) affects 20% of women with deep disease and the rectosigmoid has been noted to be involved in 66.1% of all IE cases [1, 2]. Deep endometriosis is usually associated with incapacitating symptoms such as severe pelvic pain, dysmenorrhea, deep dyspareunia, and cyclic intestinal symptoms such as dyschezia, diarrhea, constipation, and rectal bleeding [3, 4]. Likely as a result of chronic inflammation and pelvic pain, patients with IE have also been noted to have hypertonia of the internal anal and urethral sphincter which manifest with symptomatic rectal and bladder dysfunction in affected patients [5].

Due to the limited response to the clinical treatment for patients with deep endometriosis compromising the bowel, surgical treatment has therefore been a treatment option in patients with severe pelvic pain (VAS > 7), infertility, symptomatic partial bowel occlusion, or in the presence of cecal or appendiceal nodules [6-8]. Generally, segmental resection, as opposed to shaving or disc resection, is indicated for rectosigmoid lesions greater than 3 cm in size, when more than 40% of the bowel circumference is compromised, and/or when multiple intestinal nodules are found to be in close proximity to each other[9]. Although still not a consensus, most surgeons choose segmental resection for the above mentioned criteria because of its safety with less morbidity [10]. The postoperative complications of such bowel surgeries have varied from 1.3% to 22.0% depending on the surgical technique performed [8, 9].

At present, there is conflicting evidence in the literature regarding the functional bowel and urinary symptoms in patients after segmental resection for bowel endometriosis. A recent retrospective descriptive study [11] including 51 patients reported acceptable clinical impairment in evacuation (score increased from a median of 0 to 2 points; $p = 0.002$) and fecal incontinence (score increased from a median of 0 to 2 points; $p = 0.003$) after laparoscopic segmental rectal resection.

Another study [12] reported better long-term (80 ± 19 months) outcomes for constipation and evacuation in patients treated by shaving compared to segmental resection. Patients who were treated by rectal shaving had significantly better Gastrointestinal Quality of Life Index values, lower Knowles-Eccersley-Scott-Symptom scores for postoperative constipation, and better anal continence [12]. In contrast, a randomized trial that evaluated functional bowel outcomes in patients after conservative bowel surgery, by shaving or disc excision, compared to segmental bowel resection reported no difference in patients with deep disease and extensive rectal involvement [13]. This study, however, included only patients with lesions up to 15 cm from anal verge.

The main objective of this study is to evaluate the bowel symptoms such as changes in stool caliber, sensation of incomplete evacuation, stooling frequency and rectal bleeding after segmental resection in patients with IE. Our secondary objective is to determine if the bowel and urinary symptoms are associated to the length of intestinal segment resected and the distance of site of resection from the anal verge.

Methods

Medical records from consecutive patients with IE who underwent segmental bowel resection between 2005 and 2018 were reviewed at Hospital Beneficencia de Sao Paulo, Brazil, a large tertiary referral center. These patients where from a private institution, with sufficient understanding of the research, easy access when needed, with standardized medical files, with frequent medical care. Segmental surgery was indicated for patients with pelvic pain, cyclic bowel symptoms, lesion greater than 3 cm in size (longitudinal length) that is infiltrating beyond the internal muscular layer of the bowel, and/or multifocal lesions affecting the rectosigmoid. Patients were excluded from this study if they were menopausal, had history of prior bowel surgery, and had existing or history of malignancy. Included patients were selected randomly from the group that had all the post-surgical visits reported in the medical charts, met the inclusion criteria and did not had any exclusion criteria. All included patients underwent pre-operative clinical examination and transvaginal ultrasonography and/or magnetic resonance with bowel preparation in accordance with the previously published protocol for the diagnosis of deep endometriosis affecting the rectosigmoid [14, 15]. The study was approved by the internal review board (n° 3128263/2019).

Surgical technique

All laparoscopic surgeries, performed by the same surgical team, followed a standardized pre-operative protocol and consistent technique (previously published) and was not changed during the studied period [16]. Bowel preparation began 24 hours before the surgical procedure including oral intake of 100 ml lactulose, and rectal enema the evening before surgery. Prophylactic antibiotic treatment included 2 g of cefazolin given up to one hour pre-operatively. Surgical procedures consisted of complete excision of endometriotic lesions. After insufflation of pneumoperitoneum with a Verres needle, a 11-mm trocar was inserted in the umbilical wound as well as three accessory trocars (suprapubic, left and right iliac fossa). A thorough abdominal survey was performed, and the procedure started with adhesiolysis, drainage and cystectomy of ovarian endometriomas, if present, and resection of peritoneal endometriosis. After bilateral ureterolysis, we proceeded with opening of the para-rectal space, identification of hypogastric nerve plexus, and dissection to the rectovaginal space in order to isolate the bowel lesion(s). Shaving resection is performed with combination of monopolar instruments, ultrasonic device and cold scissors, followed by a seromuscular suture of the rectosigmoid when needed. Bowel segment was resected after full mobilization above and below of the affected bowel, preserving vascular and nervous supply. The distal healthy bowel loop was transected with a linear laparoscopic stapler (Echelon Flex^{tm} GST System, Ethicon, BR) 1- 2 cm away from the disease. The affected proximal loop was exteriorized through the extended (3-4 cm) right lower trocar incision and transected 1-2 cm away from the involved lesion. Anastomosis was performed with a trans-anal circular stapler (CDH 33 cm, Ethicon, BR) and its integrity was evaluated by both distension of the rectosigmoid with air and diluted methylene blue solution.

Measured Outcomes

All patients were evaluated at two (PO2), six (PO6) and twelve (PO12) months after surgery. Data regarding bowel symptoms of intestinal function symptoms and bothersome urinary symptoms were collected before surgery and in each follow-up using a patient questionnaire developed by our team (Figure 1). Outcomes included frequency of stooling, stool caliber (if thinner than usual according the patients subjective answer), rectal bleeding at evacuation, urinary symptoms (dysuria and temporary urinary retention).

Post-operative complications were recorded according to the Clavien-Dindo classification [17]. Major complications include leakages, fistulae, severe bowel obstruction (defined as severe constipation, abdominal distention and pain, multiple distended loops of bowel on imaging requiring additional procedure) and haemorrage. Minor complications include anastomosis bleeding or partial stenosis, partial bowel occlusion, abdominal wall infection, temporary bowel dysfunction and temporary bladder dysfunction [18, 19].

Statistical analysis

Continuous variables were analyzed as mean ± standard deviation and compared using Kruskal Wallis test or ANOVA. Categorical variables were analyzed as absolute numbers and frequencies and compared using Fisher's exact and Chi-square tests. P-values < .05 were considered significant.

Results

Patients characteristics

A total of 425 patients underwent segmental bowel resection during the study period, of whom twelve did not complete follow up at 12 months resulting in 413 patients included (Figure 2). Mean age of patients was 33.6 ± 5.1 years. The mean longitudinal length of the bowel lesion was 30.9 ± 10.2 mm, the mean circumferential involvement of the disease was 34.2 ± 12.1%, and the mean distance between the bowel lesion and the anal verge was of 10.2 ± 2.0 cm (Table 1). Concomitant procedures besides bowel resection were performed in 94.4% of cases that included excision of peritoneal, ovarian and other sites of deep endometriosis. No diverting loop ostomies were performed in this series of patients. The mean length of hospital stay was 4 days (range of 3 to 7 days).

Follow-up

All included patients were followed for twelve months after surgery. At two months after surgical procedure (PO2), the incidence of stool thinning (40.9% vs 2.9%; p < .001) and rectal bleeding (7.0% vs 0%; p < 0.001) after surgery were significantly greater compared to baseline (or pre-operative). The incidence of both symptoms of stool thinning (21.1% PO6, 10.4% PO12; p < .001) and rectal bleeding (0% PO6, 0% PO12; p < .001) decreased over time (Table 2). The overall incidence of bothersome urinary symptom at two months was 1.5% compared to 18.4% at baseline (p<.001). The incidence of

bothersome urinary symptoms (dysuria and retention) was similarly noted to significantly decreased over time after surgery and was not reported by any patient at six and twelve months ($p < .001$).

The length of the bowel segment resected was not associated with the complaint of stool thinning, rectal bleeding and urinary symptoms at PO2, PO6, PO12 ($p > .05$; Table 2). At PO2, rectal bleeding was significantly associated to a lesser distance to the anal verge (9.4 $\pm$ 1.5 cm vs 10.2 $\pm$2,0 cm; $p = .029$). Similarly, at PO2 bothersome urinary symptoms were significantly associated to a lesser distance to the anal verge (8.5 ± 2.4 cm vs 10.2 ± 2,0 cm; $p = .037$, Table 2). There was no association of the complaint of stool thinning to the distance of the lesion from anal verge during follow up.

Frequency of stooling

Before surgery, 196 (80.9%) reported defecation interval greater than 2 days and 46 (11.1%) reported defecation interval between 7 to 15 days. Patients with interval greater than 11 days had intestinal lesions that varied in depth from internal muscular (58%), to submucosa (33%) and mucosa (9%). At PO12, significantly less patients reported defecation interval of greater than 2 days (14.0% vs. 80.9%; $p < .001$) and none reported defecation interval greater than 7 days (0% vs. 11.1%; $p < .05$).

There was a significant increase in the number of patients defecating 4 or more times per day at PO2 compared to baseline (49.8% vs 3.1%; $p < .001$). This frequency, however, was noted to decrease over time (19.8% at PO6 and 10.9% at PO12).

There was no association between the length of intestinal segment resected and the frequency of stooling after surgery and at any moment of the follow-up (Table 3). At PO6, patients who had a decreased frequency of stooling underwent to a resection closer to the anal verge (9.7 cm) in comparison to the ones with unchanged or increase frequency of stooling (10.1 cm and 10.7 cm respectively; $p < .05$; Table 3, Figure 3).

Peri-operative Complications

Postoperative complications occurred in 25 (6.0%) patients and were classified as Clavien Dindo I in two (0.5%) cases, Clavien Dindo 2 in nine (2.2%) cases, and Clavien Dindo III in fourteen (3.4%) cases (Table 4). Bleeding at anastomotic site occurred in five patients and occurred from twelve hours to three days after surgery. Four cases (80.0%) were managed with observation alone

and one (0.25%) case required colonoscopy for hemostasis. Partial stenosis of the anastomosis occurred in five cases (1.2%) and diagnosis ranged two to six months after surgery: four were managed with colonoscopic dilatation and one required a laparoscopic reoperation. Re-operation occurred in four cases (1.2%): one for bowel anastomosis stenosis, one for a small bowel obstruction, one for rectovaginal fistula and one for vaginal cuff dehiscence.

Discussion

Deep endometriosis compromising the bowel is associated with more severe symptoms in comparison with ovarian and peritoneal disease, such as dysmenorrhea, deep dyspareunia, acyclic pelvic pain and dyschezia [20-24]. The surgical treatment of these lesions compromising the bowel often requires segmental resection of the rectosigmoid. It is known that patients requiring colorectal resection for bowel endometriosis are more likely to experience unfavorable postoperative outcomes, including rectal and urinary dysfunction [22, 25, 26]. In this study, segmental resection for bowel endometriosis was not associated with significant bowel or urinary dysfunction at twelve months post-procedure and significant improvement of constipation was observed, in agreement with previous studies [7, 27]. Our findings, however, differed from three other previously published studies [3, 11, 28].

Of the 413 patients included in this study, 40.9% of women reported thinner stool caliber at two months after surgery and it was significantly diminished overtime. At short-term follow-up, this finding may be a consequence of residual edema and scar retraction at the anastomotic site, while at long-term follow up thinner stool caliber may be related to partial stenosis due to the anastomosis, partial ischemia after large dissections, edema and local fibrosis, and to the size of the stapling line. In our knowledge, stool caliber has not been assessed in previous studies on bowel function after segmental bowel resection.

Constipation is not a rare complaint of patients with IE, and the improvement of such symptom should be a goal of surgical management. However, different findings are reported in the literature. In a series of 25 patients followed for 24 months [29], five of them presented with postoperative severe constipation following colorectal resection, which may be attributed to rectal neurological sequelae, stenosis of the anastomosis, colorectal intussusception through the anastomosis, and slow-transit constipation. Another study [30], showed that surgery with segmental bowel resection for IE can be

associated with new bowel symptoms such as abdominal pain, incomplete bowel movements and/or false alarms, without worsening of constipation or fecal incontinence.

In our experience, patients may experience an increase in the frequency of stooling at short-term follow up following segmental resection, a possible result of transitory nervous lesion and loss of stool reservoir. However, this symptom significantly improved over time and it is not related to the size of the bowel segment resected nor the distance of anal verge. Moreover, constipation significantly improved after segmental resection after 12 months. A randomized prospective study[13] that compared 60 patients who underwent conservative surgery (i.e.: shaving or discoid resection) as opposed to segmental bowel resection for lesions up to 15 cm from anal verge find similar results. No difference was observed in functional intestinal and urinary outcomes during 24 months of follow up. These results are supported by other recent publication [31].

At PO2, rectal bleeding (7.0%) and urinary changes (1.5%) were observed in patients with lesions closer to the anal verge. Out of six patients that reported urinary retention at PO2, four presented the same symptoms before surgery and the other two had ultralow rectal lesions (< 6 cm from anal verge). The incidence of urinary dysfunctions was reported between 0.5% and 19.5%, and did not improve over time after operation, ratifying the hypothesis that this complication is correlated to a neurological impairment resulting from the surgical technique [32]. The nerve-sparing radical excision of deep infiltrating endometriosis with segmental bowel resection was associated with good results in terms of reduced bladder dysfunction in a single-center prospective study performed on 126 patients [33].

The strength of this study includes a large number of patients who were followed for a year after bowel resection for deep endometriosis, and evaluated for both bowel and urinary function. However, our study has the limitation of being retrospective and based only on the patients' report, without any objective measure (such manometry or contrast evacuation study, for example) for confirmation and the lack of validated of Portuguese bowel symptoms questionnaires. Thus, bowel and urinary symptoms may be underestimated. Future studies on bowel and urinary dysfunctions after bowel segmental resection for deep endometriosis should include also objective measures to be compared to the patients' reports.

Conclusion

In conclusion, our experience showed that patient complaints on bowel and urinary alterations after segmental resection are transient, lasting for no more than two months. The bowel and urinary symptoms were not associated with the size of the bowel segment resected, while rectal bleeding at two months was significantly associated with the distance from anal verge. Segmental resection was also associated with a great improvement in constipation at twelve months postoperative.

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Figure's legend

BOWEL AND URINARY FUNCTION AFTER

SEGMENTAL RESECTION IN

PATIENTS WITH BOWEL ENDOMETRIOSIS

BRIEF QUESTIONNAIRE

NAME:

DATE OF SURGERY: | | | |

QUESTIONS	APPLICATION			
	PRE	PO2	PO6	PO12
1. How often do you evacuate?	___/day ___/week 1/__ days	___/day ___/week 1/__ days	___/day ___/week 1/__ days	___/day ___/week 1/__ days
2. Do you have a sensation of incomplete evacuation?	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y
3. Does your stool seem thinner than usual?	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y
4. Have you noticed rectal bleeding at evacuation?	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y
5. Do you feel pain with urination?	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y
6. Do you feel that you are able to empty your bladder completely?	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y	( ) N ( ) Y

Figure 1. Questionnaire applied to patients pre-operatively, and at two (PO2), six (PO6) and twelve (PO12) months postoperatively.

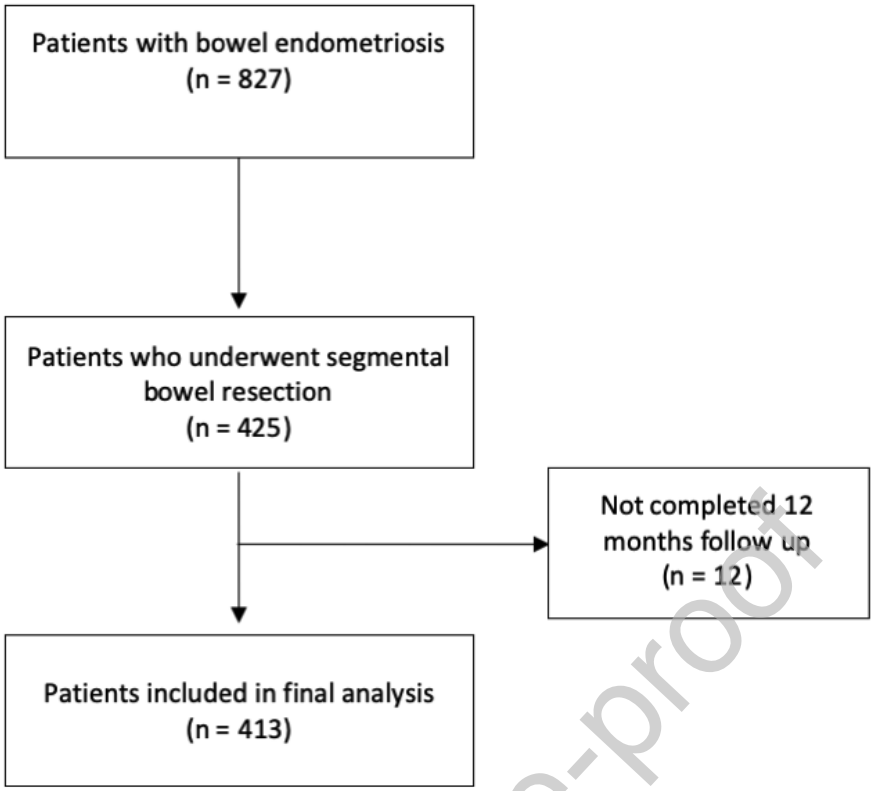

Figure 2. Flowchart of included patients

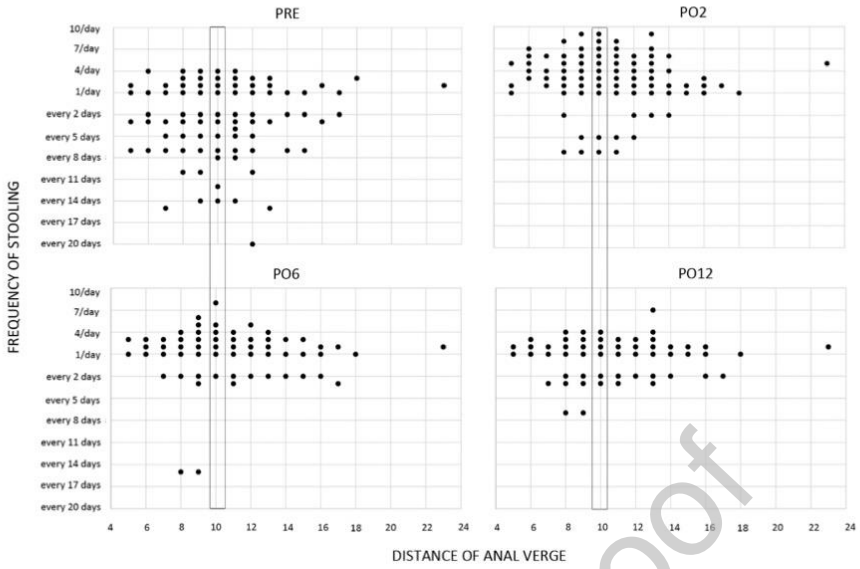

Figure 3. Frequency of stooling distribution in accordance with distance of anal verge at two (PO2), six (PO6) and twelve (PO12) months postoperatively.

Table 1. Clinical and morphological characteristics of the 413 patients submitted to segmental resection of the rectosigmoid for bowel endometriosis.

	Mean	Range
Age (years)	33.6 ± 5.1	(21 – 44)
BMI (kg/m^2)	23.8 ± 3.6	(17.5 – 33.3)
Rectosigmoid lesion		
Number	1.3 ± 0.6	(1 – 4)
Size (mm)	30.9 ± 10.2	(5.0 – 83.0)
Diameter (mm)	20.1 ± 6.9	(0.6 – 45.0)
Circumference (%)	34.2 ± 12.1	(9.0 – 90.0)
Distance from anal verge (cm)	10.2 ± 2.0	(5.0 – 23.0)
Surgical procedure		
Size of bowel segment resected (cm)	11.4 ± 2.9	(5.2 – 22.0)

BMI: body mass index; Data expressed as mean ± standard deviation

Table 2. Bowel and urinary symptoms 2, 6 and 12 months after laparoscopic segmental bowel resection for the treatment of endometriosis

Symptom	Baseline		PO 2 months			PO 6 months			PO 12 months		
	Yes	No	Yes	No	p	Yes	No	p	Yes	No	p
Stool thinning, n(%)	**12 (2.9)**	**401 (97.1)**	**169 (40.9)**	**244 (59.1)**	**<.001[a]**	**87 (21.1)**	**326 (78.9)**	**<.001[a]**	**43 (10.4)**	**370 (89.6)**	**<.001[a]**
Length of Intestinal segment (cm)			*11.4 ± 2.9*	*11.4 ± 3.0*	*.974*	11.4 ± 3.1	11.4 ± 2.9	*.811*	11.2 ± 3.3	11.4 ± 2.9	*.666*
Distance from anal verge (cm)			10.2 ± 1.8	*10.2 ± 2.1*	*.798*	10.0 ± 1.8	10.2 ± 2.1	*.329*	10.0 ± 2.0	10.2 ± 2.0	*.460*
Rectal bleeding, n(%)	**0 (0)**	**413 (100)**	**29 (7.0)**	**384 (93.0)**	**<.001[a]**	**1 (2.4)**	**412 (97.6)**	**<.001[a]**	**0 (0)**	**413 (100)**	**<.001[a]**
Length of Intestinal segment (cm)			10.7 ± 3.2	11.5 ± 2.9	*.210*	-	-	-	-	-	-
Distance from anal verge (cm)			9.4 ± 1.5	10.2 ± 2.0	*.029*	-	-	-	-	-	-
Urinary symptoms, n(%)	**76 (18.4)**	**337 (81.6)**	**6 (1.5)**	**407 (98.5)**	**<.001[a]**	**0 (0)**	**413 (100)**	**<.001[a]**	**0 (0)**	**413 (100)**	**<.001[a]**
Length of Intestinal segment (cm)			10.2 ± 2.8	11.4 ± 2.9	*.335*	-	-	-	-	-	-
Distance from anal verge (cm)			8.5 ± 2.4	10.2 ± 2.0	*.037*	-	-	-	-	-	-

Data expressed as mean ± standard deviation or n(%); PO: postoperative; Chi-square test; [a] Comparison with baseline

Table 3. Frequencies of stooling 2, 6 and 12 months after laparoscopy segmental bowel resection for the treatment of intestinal endometriosis according to the length of segment resected and distance from anal verge.

Frequency of stooling	**Length of intestinal segment (cm)**			**Distance from anal verge (cm)**		
	PO2	**PO6**	**PO12**	**PO2**	**PO6**	**PO12**
Unchanged	11.7	11.3	11.4	10.4	10.1	11.1
Increased	11.5	10.7	11.4	10.4	10.7	9,9
Decreased	11.3	10.7	11.5	10.3	9.7*	10.1

Data expressed as mean; PO2: postoperative evaluation at 2 months; PO6: postoperative evaluation at 6 months; PO12: postoperative evaluation at 12 months. Chi-square test. * $p < .05$.

Table 4 – Perioperative complications 413 patients submitted to rectosigmoid segmental resection for the treatment of bowel endometriosis

Complications	**N (%)**
Clavien Dindo I	2 (0.5)
Wound/trocar site infection	2 (0.5)
Clavien Dindo 2	9 (2.2)
Transient urinary retention	2 (0.5)
Intestinal partial occlusion	2 (0.5)
Anastomosis bleeding	4 (1.2)
Venous embolism	1 (0.25)
Clavien Dindo 3	14 (3.4)
Anastomosis bleeding requiring colonoscopy, n (%)	1 (0.25)
Anastomosis stenosis requiring colonoscopic dilatation, n (%)	4 (1.2)
Anastomosis stenosis requiring re-operation, n (%)	1 (0.25)
Rectovaginal fistulae[a]	3 (0.7)
Urinary fistulae requiring additional procedure	2 (0.5)
Small bowel obstruction (requiring re-operation)	1 (0.25)
Vaginal cuff dehiscence (requiring re-operation)	1 (0.25)

[a]One patient required re-operation