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Post-operative complications and recurrence rate after treatment of bowel endometriosis: Comparison of three techniques

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ABSTRACT

Objective: The aim of the present study was to compare post-operative complications and recurrence of three surgical techniques: segmental resection, discoid excision and nodule shaving.
Study design: From January 2014 to December 2017, 143 patients who underwent segmental bowel resections for endometriosis at "La Paz" University Hospital, were enrolled and grouped by different techniques. We compared post-operative complications and recurrence rate in three groups: 76 (53%) patients underwent segmental resection (group I), 20 (14%) patients underwent discoid resection (group II) and 47 (33%) patients underwent rectal shaving (group III).
Qualitative data was defined by absolute values and percentages, and quantitative data by mean and standard deviation. Qualitative variables between groups were compared using Chi- squared test. While quantitative data between groups was performed by means of *t*-test and ANOVA test. For all statistical tests a value of $p < 0.05$ will be considered statistically significant.
Result: Segmental resection was associated with higher rate of severe post-operative complications in comparison with discoid resection or shaving technique (23.5% versus 5% versus 0% respectively) ($p = 0.005$). We showed statistical differences among the three study groups for nodule size ($p < 0.001$) and localization ($p = 0.02$). Our analysis showed statistical differences among the three groups in term of additional procedures performed at the same time of bowel surgery, in particular in case of endometriosis of the ureter ($p = 0.001$) and the parametrium ($p = 0.04$).
After a long follow-up (46.4 ± 0.5 months for the group I, 42.2 ± 1.6 months for the group II, 39.7 ± 1.8 months for the group III), the shaving group was associated to higher recurrence rate (12.7%) in comparison with the discoid group (5%) and the segmental resection group (1.3%) ($p = 0.01$).
Conclusion: We showed that segmental resection is associated with high rate of postoperative complications. Conversely, this strategy should avoid the need of further interventions in young patients. Conservative surgery, such as discoid resection and shaving, revealed a higher recurrence rate and could be more appropriate in women approximating menopause because of the lower possibility of recurrence.

Introduction

The prevalence of deep endometriosis involving the bowel has been reported to be 5.3% and 12% of women affected by endometriosis. The rectum and sigma are the most frequently involved tracts, accounting for about 90% of cases [1]. Surgical removal of rectovaginal endometriosis is required when lesions are symptomatic, impairing bowel, urinary, sexual, and reproductive functions [2]. In literature, several surgical techniques such as laparoscopic segmental bowel resection, discoid excision, or rectal shaving have been described, but until now, it is not yet established the gold standard treatment [3–5]. Furthermore, the management of intestinal localizations of endometriosis depends on the depth of the bowel wall invasion (superficial, partial- or full-thickness invasion), leading to different surgical approaches [6]. In the "shaving" technique the nodule excision is performed without opening the rectum, by removing the nodule from the rectal wall

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until the muscularis layer of the rectum. The segmental and discoid resection allow the complete nodule excision en bloc within the rectal wall. Prior studies have reported intestinal and urinary dysfunctions following colorectal resection [7,8], known as "Low Anterior Resection Syndrome" [9]. On the contrary, the shaving technique is associated with less risk of postoperative functional complications compared to intestinal resection [10–12]. The rates of urinary retention (3–5%), ureteral lesions (2–4%), fecal peritonitis (3–5%), severe anastomotic stenosis (3%), rectovaginal fistulas (6–9%) and pelvic abscesses (2–4%) were found to be higher after bowel resection than shaving technique [10]. Conversely, it is well known that the best results in terms of recurrence rates are achieved by intestinal resection [1,6].

Therefore, it is important to balance the dilemma of achieving a high success rate of treatment and low recurrence of disease with a low complication rate [13]. Although the literature is very rich, there is still a great heterogeneity concerning the management of such patients [14]. The aim of the present study was to compare post-operative complications and recurrence of three surgical techniques: segmental resection, discoid excision and nodule shaving.

Material and methods

After Institutional Review Board approval (PI-3349), we included in this retrospective study all patients underwent surgical treatment of bowel endometriosis (segmental resection, discoid excision, shaving) between January 2014 and December 2017. The study was carried out at the Department of Gynaecology of "La Paz" University Hospital. Inclusion criteria was: endometriosis of the recto-sigma and eventual other intestinal localization (ileum, cecum, appendix) with histological confirmation; correct possibility and disposition to follow-up. Exclusion criteria was: patients with DIE (deep infiltrating endometriosis) which not affected the bowel, previous bowel resection, no monitoring possible. All surgical procedures were performed by two gynaecologists experienced in minimally invasive treatment of endometriosis and one colorectal surgeon. Pre-operative evaluation was performed by bimanual examination, transvaginal ultrasound performed by one gynaecologist with experience for diagnosing of endometriosis and magnetic resonance imaging, using previously published criteria [15]. All patients were informed and counselled about the associated risk of bowel resection and surgery associated. Perioperative data were recorded including: age, body mass index (BMI), previous surgery for endometriosis, operative time, details of surgery performed, hospital stay. Intra- and post-operatory complications occurred, according the Clavien-Dindo classification [16] and recurrence rate were described and compared. We considered recurrence of endometriosis when the disease was observed at laparoscopy and histologically proven [17,18].

Operative technique

Bowel lesions were systematically intraoperatively re-evaluated and three different techniques were performed in order to infiltration, nodule size and stenosis. Segmental bowel resection was indicated in case of large (>3 cm), multifocal nodules and stenosis of the lumen >40% [14]. The procedure was realized as previously described [2]. The level of the end-to-end anastomosis was defined, according to the distance from the anus, as high/medium (≥8 cm), low (>5 and <8 cm) and ultralow (≤5 cm) [1]. The integrity of the anastomosis was tested by filling the pelvic cavity with warm saline solution and insufflating air rectally. In cases of involvement of the muscularis of the rectum or recto-sigmoid, we proceed to "shaving" the nodule from the wall of the affected bowel using cold scissors with minimal coagulation in order to prevent late bowel lesions. After the excision of the endometriotic nodule, the integrity test of the bowel wall was performed. When the "shaving" was not sufficient for removing the nodule from the rectal wall, the discoid resection was carried out [2]. Protective ileostomy was carried out depending on intraoperative findings and after discussion between gynaecologic and digestive surgeons. In case of anastomosis leakage and fecaloid peritonitis a reintervention with neo-anastomosis and provisional colostomy was performed.

Statistical analysis

Statistical analysis was carried out using the SAS 9.3 Software (SAS Institute, Cary, NC, USA). Qualitative data was defined by absolute values and percentages, and quantitative data by mean and standard deviation. Qualitative variables between groups were compared using Chi- squared test. While quantitative data between groups was performed by means of *t*-test and ANOVA test. For all statistical tests a value of $p < 0.05$ will be considered statistically significant.

Results

From January 2014 to December 2017, 143 patients underwent surgical treatment for symptomatic bowel endometriosis. They were collected and grouped following the different procedures: 76 (53%) patients underwent segmental resection (group I), 20 (14%) patients underwent discoid resection (group II) and 47 (33%) patients underwent rectal shaving (group III). Histology confirmed bowel endometriosis in all patients. Conversion to laparotomy was necessary in three (3.9%) patients of the group I, 0 (0%) of the group II and 1 (2.1%) of the group III for difficult control of intraoperative bleeding ($p = 0.2$).

Patients' characteristics and surgical data of the three groups are summarized in Tables 1 and 2. In one (1.3%) case of the group I occurred an intraoperative complication, represented by superficial injury of the left ureter during advanced ureterolysis. A monocryl 4-0 suture was sufficient and no JJ stent was required. We identified five intraoperative complications (10.6%) in the group III: 2 cases of injury of the serosa and the muscularis of the rectum, repaired with vicryl 3-0 suture; 2 cases of uterine perforation by the manipulator, 1 case of ureter injury required ureter reimplantation.

The comparison of post-operative complications among the three groups are summarized in the Table 3. In the Group I, a total of 24 patients (31.5%) presented post-operative complications. In particular: Clavien-Dindo Grade I-II: 6 patients (7.8%): 2 (2,6%) cases of pelvic hematoma, 1 (1.3%) case of urinary infection, 1 (1.3%) pelvic abscess, 1 (1.3%) post-operative ileo, 1 (1.3%) blood transfusion. The pharmacological treatment was sufficient for resolution in all of cases. Clavien-Dindo Grade III-IV: 18 patients (23.6%): 4 (5.2%) cases of recto-vaginal fistula, 2 (2.6%) cases of fecal incontinence, 1(1.3%) case of ureteral fistula managed by JJ stent, 1 (1.3%) case of ureteral fistula which required ureter reimplantation, 2 (2.6%) cases of hemoperitoneum, treated by laparoscopic surgery, 3 (3.9%) cases of anastomotic leakage with fecaloid peritonitis diagnosed on the fourth day and which required reintervention and colostomy, 4 (5.2%) cases of permanent urinary retention requiring self-catheterization (in 2 cases, the patients accepted the sacral neuromodulator), 1 case (1.3%) of localized peritonitis (pelvic abscess) treated by laparoscopy.

In the Group II, 1 (5%) patient was treated postoperatively with antipyretics (Clavien- Dindo Grade I) and 1 (5%) patient presented rectal bleeding after 24 h of surgery, required urgent colonoscopy and haemostatic clips (Clavien-Dindo IIIb). In the Group III, 2 (4.2%)

Table 1
Characteristics of patients and surgical data of the three groups (segmental resection, discoid resection, nodule shaving).

	Group I segmental resection n: 76	Group II discoid resection n: 20	Group III nodule shaving n: 47	p
Age, year Mean (SD)	36.3 (5.6)	34.9 (6.8)	36.6 (5.8)	0.5
BMI, Mean (SD)	21.8 (0.7)	21.05 (1.2)	21.6 (0.9)	0.003
Body mass index, kg/m^2				
Previous surgery n (%)	66 (86.8%)	7 (35%)	23 (48.9%)	<0.001
Operative Time (min)	309 (43.6)	285 (362)	195 (25)	<0.001
Mean (SD)				
Nodule localization n (%)				0.02
Rectum	27 (37.5%)	13 (68.4%)	27 (65.9%)	
Sigmoid	5 (6.9%)	1 (5.3%)	2 (4.9%)	
Recto-sigmoid	40 (55.6%)	5 (26.3%)	12 (29.3%)	
Size of the Nodule (mm) mean (SD)	32 (11.8)	24 (10.6)	17.9 (3.1)	<0.001
Intraoperative Complications n (%)	1(1.3%)	0	5 (10.6%)	0.02

Table 2
Surgery associated in the three groups (segmental resection, discoid resection, nodule shaving).

Endometriosis surgery associated	Group I- segmental resection n: 76	Group II- discoid resection n: 20	Group III nodule shaving n: 47	p
Hysterectomy+ salpingectomy n, %	28 (36.8%)	11 (55%)	25 (53.2%)	0.1
Unilateral adnexectomy	20 (26.3%)	8 (40%)	18 (38.3%)	0.2
Bilateral annexiectomy n, %	7 (9.2%)	4 (20%)	4 (8.5%)	
Endometrioma n, %	51 (67%)	17 (85%),	13 (27.6%)	<0.001
Monolateral parametrium	10 (13.2%)	1 (5%)	8 (17%)	0.04
Bilateral Parametrium n, %	12 (15.8%)	2 (10%)	0 (0%)	
Rectovaginal nodule with partial colpectomy n, %	24 (31.5)	5 (25%)	11 (23.4%)	0.5
Bilateral uterosacral ligament n, %	30 (39.5%)	6 (30%)	19 (40.4%)	0.9
Monoteral uterosacral ligament n, %	9 (11.8%)	3 (15%)	5 (10.6%)	
Bladder resection n, %	5 (6.6%)	1 (5%)	0 (0%)	0.2
Ureter Reimplantation	9 (11.8%)	0 (0%)	1 (2.1%)	0.001
Unilateral nodule	10 (13.2%)	3 (15%)	0 (0%)	
Bilateral nodule	7 (9.2%)	0 (0%)	0 (0%)	
Appendix	7 (9.2%)	2 (10%)	1 (2.1%)	0.2
Ileum	9 (11.8%)	2 (10%)	3 (6.4%)	0.6
Caecum	2 (2.6%)	0 (0%)	0 (0%)	0.4

Table 3
Post-operative data of the three groups (segmental resection, discoid resection, nodule shaving).

	Group I-segmental resection n: 76	Group II-discoid resection n: 20	Group III nodule shaving n: 47	p
Hospitalization, day Mean (DS)	10.8 (6.5)	6.3(2.4)	10.5 (34.2)	0.6
Post-operative complications, n (%)				0.005
Dindo-Clavien Grade I	1 (1.3%)	1 (5%)	2 (4.2%)	
Dindo-Clavien Grade II	5 (6.5%)	0	0	
Dindo Clavien Grade IIIb	12 (15.7%)	1 (5%)	0	
Dindo-Clavien Grade IVa	6 (7.8%)	0	0	
Recurrence	1 (1.3%)	1 (5%)	6 (12.7%)	0.01

patients developed hyperthermia, treated with antipyretics (Clavien-Dindo Grade I) and no Grade III-IV complications occurred. Ileostomy was performed in 17 (22.3%) patients of the group I, and none of the group II and III. Seven patients (41%) who had ileostomy developed postoperative complications. After a mean follow up of 46.4 ± 0.5 months for the group I, 42.2 ± 1.6 months for the group II, 39.7 ± 1.8 months for the group III, the patients with highest recurrence rate belonged to the shaving group (Table 3). Median recurrence time was 44 months (Fig. 1). In particular, we showed in the group III: 1 (2%) case of recurrence at one ureter treated by ureter reimplantation; 2 (4.2%) cases of recurrence of rectal nodule treated by segmental resection; 1 (2%) case of recurrence at the utero-sacral ligaments; 1 (2%) case of recurrence of endometriosis at the retrocervix; 1 (2%) case of recurrence at the vaginal posterior fornix. One (1.3%) patient of the segmental resection group and one patient (5%) of the discoid resection group showed endometriosis recurrence which required unilateral ureter reimplantation.

Comment

Our data suggest that the segmental resection was associated with higher rate of severe post-operative complications in comparison with discoid resection or shaving technique (23.5% versus 5% versus 0% respectively) ($p = 0.005$).

When we compared basal characteristics, we observed a significant difference in BMI (body mass index) among groups. We think it had no clinical impact on the results due to the small differences evidenced. In the present study, 86.8% of patients who underwent segmental resection, had previous surgery for endometriosis. This data could be explain by an incomplete surgery with persistence of symptomatology which led the patients to an

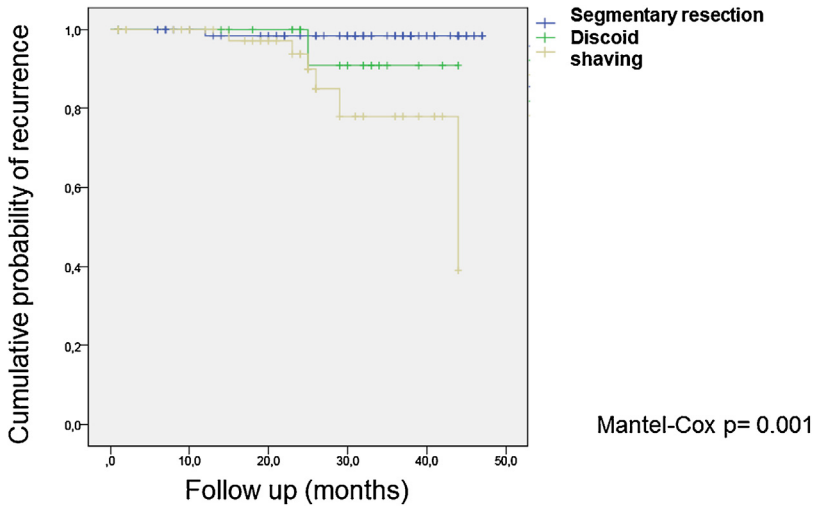

Fig. 1. Kaplan–Meier analysis of recurrence in the three groups. The recurrence rate was significantly higher in the shaving group compared with discoid and segmental resection groups (12.7% vs 5% vs 1.3%) ($p = 0.01$).

endometriosis referral centre. Regarding the size of the nodule, we showed statistical differences ($p < 0.001$) among the three study groups. Our results agree with Afors [6] who showed that nodule >3 cm had a relative risk of 2.5 (95% confidence interval) of receiving bowel resection when compared to those patients with smaller nodules. About the nodule localization, our results demonstrated that it influenced the surgical strategy with statistical differences among the three groups ($p = 0.02$). Indeed, in case of endometriosis of the rectum we preferred, whenever possible, to proceed with shaving technique (65.9%) or discoid resection (68.4%) instead of segmental resection (37.5%) in order to avoid low resections. Similarly, in a recent study [19], including 21 patients surgically treated for bowel endometriosis, the rectal nodules were managed by disc excision in 20 (95.2%) patients and by segmental resection only in 1 (4.8%) patient. Concerning intraoperative complications, we showed significant differences among the three groups ($p = 0.02$) but they did not seem to affect the final prognosis of the patients. About the higher rate of severe post-operative complications in the group of segmental resection, we showed a percentage of recto-vaginal fistula (5.2%) comparable to that reported in literature [3,4,20]. On the contrary, no rectovaginal fistula occurred in the groups of shaving and discoid resections. A possible explanation is the higher rate of partial colpectomy in the group of segmental resection (31.5%) in comparison with the other groups (25% in the discoid group; 23.4% in the shaving group) with the consequence of two adjacent sutures. In this regard, Renner et al. [20] in a study evaluating 113 colorectal resections showed that all patients with rectovaginal fistula (4.4%) had undergone intraoperative excision of endometriotic lesions of the vagina. Moreover, we showed statistical differences among the three groups in term of additional procedures performed at the same time of bowel surgery, in particular in case of endometriosis of the ureter ($p = 0.001$) and the parametrium ($p = 0.04$). We are persuaded that the higher rate of complications in the group of segmental resection could be also explained by the performance of several difficult procedures. In respect of Dindo-Clavien IVa complications, we showed 4 (5.2%) cases of permanent urinary retention requiring self-catheterization and 2 (2.6%) cases of fecal incontinence, in the group of segmental resections. Conversely, no case of severe organ dysfunction occurred in the group of shaving and discoid resections. Indeed, specific surgical steps of segmental resection may cause injury to the hypogastric and splanchnic nerves [12]. In particular the surgical neuroablation of the pelvic plexus may be the principal cause of bladder and rectal dysfunctions [21,22]. Another interesting detail of our study, although it is a retrospective analysis, is the long follow-up (46.4 ± 0.5 months for the group I, 42.2 ± 1.6 months for the group II, 39.7 ± 1.8 months for the group III). Certainly, in most series previously described, the length of postoperative follow-up scarcely exceeded 2 years, while the risk of recurrence is logically a time-dependent variable [2]. We showed that the shaving group was associated to higher recurrence rate (12.7%) in comparison with the discoid group (5%) and the segmental resection group (1.3%) ($p = 0.01$). Other authors [6] described similar results with a great number of reinterventions for recurrence of endometriosis after rectal shaving. Undoubtedly, the challenge is to achieve a low recurrence rate of disease with reasonable post-operative complication rate. Therefore, we believe that a nodule with similar characteristics could be managed by different strategies following a *"patient-oriented treatment"*. We think that segmental resection could be a feasible option in young patients with desire to conceive, in whom the possibility of recurrence is greater than in aged women approximating menopause. Finally, it is important to underline that in our study, the majority of patients submitted to segmental resection were previously operated (86.8%). Indeed, it is difficult to distinguish between residual and recurrent disease [6,17]. This could represents a bias of our analysis. However, after all surgical procedures performed in our study, no patients showed macroscopic disease.

Conclusion

We showed that segmental resection is associated with high rate of postoperative complications especially in case of performing additional procedures for endometriosis infiltrating the ureter or the parametrium. Conversely, this strategy should avoid the need of further interventions in young patients. Conservative surgery, such as discoid resection and shaving, revealed a higher recurrence rate and could be more appropriate in women approximating menopause because of the lower possibility of recurrence.

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Authors' contribution

A.H., A.L. and I.P. performed the surgeries; E.S. and I.Z. collected and analyzed data; A.H. and E.S. wrote the manuscript, which was edited by P.S. and R. GA; I.P. supervised and lead the development of the study.

All the authors conform the International Committee of Medical Journal Editors (ICMJE) criteria for authorship, contributed to the intellectual content of the study and gave approval for the final version of the article.

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