



Deep pelvic endometriosis (Adamyán IV stage): multidisciplinary laparoscopic treatments

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rezime **Background:** Few small studies have confirmed the feasibility of laparoscopic colorectal resection for Deep Infiltrating Endometriosis (DIE), albeit with a wide range of complications. **Aim:** The aim of this study is to evaluate retrospectively the feasibility and clinical outcome of laparoscopic segmental bowel resection for DIE. **Methods:** We have retrospectively reviewed the data of patients undergoing laparoscopic rectosigmoidal resection for bowel endometriosis from January 2000 and June 2008. **Data analysis** included age, preoperative symptoms, operative procedure, operating room time, intraoperative and postoperative complication, length of stay and Quality of life. **Results:** 56 colorectal laparoscopic resection for DIE were performed. No conversion occurred. There were no intraoperative complications; 35 patients had a temporary ileostomy and 15 required reoperation for major complication. **Conclusion:** DIE should be managed in specialised centers with a multidisciplinary equipe; it represents a difficult surgery which require a high surgeon skill and it must be practiced considering both the risks and the benefits.

Key words: deep endometriosis, laparoscopy, colorectal, resection, laparoscopic colorectal resection

INTRODUCTION

Endometriosis is defined as the presence of endometrial gland and stroma outside the uterus and affects 5-10% of the women of child bearing age¹⁻³. Deep Infiltrating Endometriosis (DIE) characterized by infiltration of anatomic structures and pelvic organs. It is defined as a lesion reaching a depth of 5 mm or more into the peritoneum and typically it involves the Douglas pouch, the rectovaginal septum and the uterosacral ligaments⁴⁻⁶. The estimated incidence of bowel endometriosis is between 5.3% and 12%; the rectum and rectosigmoid junction to-

gether account for 70% to 93% of all intestinal endometriotic lesions^{7,8}. Although endometriosis rarely involves the full thickness of the rectosigmoid colon, it may invade the muscularis of the bowel wall⁹. Clinically, patients may complain of dysmenorrhea, deep dyspareunia, chronic pelvic pain (acyclic) and/or infertility. Depending on the site of the lesions, particularly when the bowel and the bladder are affected, patients may also experience pain during micturition and evacuation. Diagnosing endometriosis remains a dilemma in view of the non-specific nature of the symptoms, and laparoscopy continues to be the gold standard for evaluation.

Despite medical treatment might reduce the symptoms often results insufficient and is gravated by side effects and high recurrence rate^{8,10}. Options for management of bowel wall involvement include cautery excision, laser vaporization, disc excision of bowel wall or bowel resection. The surgical treatment is frequently needed, even if surgical option of colorectal localization has been debated. Since the first case of laparoscopic sigmoid resection for endometriosis published by Redwine and Sharpe¹¹, a few small studies have confirmed the feasibility of laparoscopic colorectal resection for endometriosis, albeit with a wide range of complications.

Many improvements about risk of complications and long-term efficacy have been made, although only a few large series have been reported^{7,12-13}. Therefore, the aim of this study is to evaluate retrospectively the feasibility and short-term clinical outcome of laparoscopic segmental bowel resection for endometriosis.

MATERIAL AND METHODS

In this study we have retrospectively reviewed the data of all patients presenting to our institution with stage IV endometriosis and bowel involvement (according to the Adamyán Classification on Table 1)³² from January 2000 and June 2008. Only patients undergoing rectosigmoidal resection were included. We did not include cases of su-

perforial involvement in which the lesion was treated by simple laser vaporization.

Bowel involvement was evaluated by transvaginal ultrasonography, colonoscopy and sometimes previous laparoscopy performed in other institute. MRI-Scan was performed only in a minority of patients in whom clinical extent of disease remained unclear. All patient gave their informed consent and were confirmed, at the time of laparoscopy, to be at stage IV. All patients were operated by the same multidisciplinary equipe.

Data analysis included age, preoperative symptoms, associated operative procedure, operating room time, intraoperative and postoperative complication, length of stay. Quality of life has been evaluated before and after surgery by a questionnaire based on the Visual Analogic Scale (VAS) (0: absence of pain, 10: most severe pain).

Preoperative antibiotics and no mechanical bowel preparation were used in all cases.

SURGICAL TECHNIQUE

The laparoscopic procedure was performed with patient in supine position, legs parted, and the left arm abducted with the intravenous line. Pneumoperitoneum was induced with carbon dioxide with Veress technique. After the introduction of 10 mm 30 degree laparoscope in right paraumbelical position, other 2 trocars (10 and 12mm) were placed in right hypocondrium and in right iliac fossa like a standard triangulation for left colon and rectal surgery. Another optional 5 mm trocar sometime was placed in the left abdomen. The severity of the pelvic pathology and the extend of bowel involvement were evaluated in order to determine the best surgical strategy.

We always started the procedure first by accomplish adhesiolysis, ovarian cystectomy and excision of peritoneum implants of endometriosis.

The operation was performed with a harmonic scalpel (Ultracision, Ethicon Endosurgery). We began in anti-Trendelenburg position with the mobilization of splenic flexure, of descending and sigmoid colon, detaching Gerota's from Toldt's fascia . The gonadal vessels and the left ureter were identify. The inferior mesenteric vessels were identified, clipped and divided. The artery was taken 1–2 cm anterior to the aorta and the vein was divided close to the pancreas after the incision of Treitz muscle. During mobilization of the mesorectum care must be taken to avoid any damage to the underlying hypogastric nerve plexus, living undamaged the Heald's Fascia. Always both ureters were isolated until their cross with uterine vessels; in case of stenosis we performed an ureteral resection with neo uretero-bladder anastomosis (Gregoire's Technique). Sometimes it was necessary to perform a vaginal wall resection. The rectum was divided intracorporeally with the GIA stapler. The rectal anterior resection was performed extracorporeally after a 5 cm Pfannenstiel's incision or through a vaginal hole. The T-T stapled colorectal anastomosis was performed intracorporeally according to the Knight-Griffen technique and checked by hydropneumatic test. A drain was left in place until the spontaneous release of flatus or until the 8 post-

TABLE 1

ADAMYAN CLASSIFICATION (32)

Stage I	Endometriotic lesion confined in the rectovaginal tissue
Stage II	The vaginal wall is invaded with lesion visible at the posterior fornix
Stage III	The lesion spreads into the sacrouterin ligaments and rectal serosa
Stage IV	The rectal wall and rectouterine peritoneum is involved completely

TABLE 2

PATIENT CHARACTERISTICS

Medial age, year	36	28-43
Mean body mass index	20.8	3.2
Parity	0.4	0-2
Infertility	28	50%
Previous surgery for endometriosis	32	57.1%
Previous medical therapy	29	51.8%

operative day if it was performed a neo ureteral-bladder anastomosis. All excised specimens were sent for histological examination. Colorectal anastomoses were classified as very low (<4 cm from the anal verge), low (4–8 cm from the anal verge), and high (>8 cm from the anal verge). In cases of very low colorectal anastomosis, we opted for protective ileostomy usually converted 1 month later by end-to-end anastomosis after Gastrografin enema to confirm an intact colorectal anastomosis.

The nasogastric tube was routinely removed immediately after surgery, whereas the urinary catheter was removed on postoperative day 1 except in case of neo ureteral-bladder anastomosis.

RESULTS

Between January 2000 and June 2008 56 colorectal resection for DIE were performed by our equipe. At laparoscopy, all the patients were confirmed to be at stage IV according to Adamyan classification of DIE, and in each case it was confirmed by hystological study. The characteristics of the patients are summarized in Table 2. Preoperative symptoms included pelvic pain in 39 patients (70%), intestinal symptoms in 44 patients (78%), dyspareunia in 38 patients (68%), dysuria in 8 patients (14%) and all reported dysmenorrhoea.

All the operation were completed laparoscopically, and no conversion occurred. Median length of stay was 8 days (range 4-22).

TABLE 3

CONCOMITANT PROCEDURES (N =56 patients)		
Procedure	N	%
Adhesiolysis	56	100
Cystectomy	23	31.3
Unilateral adnexectomy	8	14.3
Bilateral adnexectomy	3	5.3
Monolateral salpingectomy	5	8.9
Total hysterectomy	2	3.5
Partial vaginal resection	12	21.4
Myomectomy	3	5.3
Bilateral ureteral lysis	56	100
Ureteral anastomosis	7	12.5
Ureteral stenting	10	17.8
Appendectomy	9	4.7
Ileocolic resection	2	3.5
Ileo jejunum resection	10	17.8
Defunctioning loop-ileostomy	35	62.5

TABLE 4

POST.OPERATIVE COMPLICATIONS		
Type	N	%
Rectal fistula	3	5.3
Rectal/vaginal fistula	6	10.7
Occlusion of ileostomy	3	5.3
Bladder atomy	4	7.1
Bleeding	2	3.5
Vesicovaginal Fistuoa	1	1.7
Ureteral stenosis	2	3.5

Concomitant procedure and surgery data are shown respectively in tables 3 and 4.

It's to remark that we performed 10 jejunum and 2 ileal-cecum concomitant resection (table 3) and in all patients adhesiolysis an bilateral ureteral lysis. In 7 patients (12.5%) it was required an ureteral resection with neo uretero-bladder anastomosis.

There were no intraoperative complication; 35 (62.5%) patients had a temporary ileostomy and 15 (26.7%) requires reoperation for major complication (table 4).

Major postoperative complications were: 3 (5.3%) rectal fistula, 6 (10.7 %) rectovaginal fistula, 4 (7.1%) occlusion of the ileostomy, 2 (3.5%) bleeding, 2 (3.5%) ureter stenosis, 1 (1.7%) vescico-vaginal fistula and 4 (7.1%) cases of urinary retention after 30 days.

All rectovaginal fistula occurred after very low anastomosis and in all cases we had opened the vagina for specimen extraction.

About 6 cases of recto-vaginal fistulas, 3 occurred even if a loop ileostomy was been practiced and it was no necessary to perform other surgery. In the others 3 cases we performed a loop ileostomy (2 laparoscopically and 1 laparotomically), and 2 laparotomic resuture of the bowel anastomosis and of the vagina with the use of an omental flap.

After surgery, all the patients were submitted to telephonic questionnaire with a medium follow-up of 45 months 6 to 90 (table 5). We reported an overall Quality of life improvement in the 86.5%of the patients. When improvement was present, it was considered excellent in 62% of cases, and satisfactory in the 38% of the cases. In particular of the 39 patients with pelvic chronic pain 23 (60%) had total remission and 9 (23%) an improvement; 28 (70%) of the patients with intestinal symptoms had a total remission and 10 patients (23%) a partial remission. Dysmenorrhea was disapperaed in 18 patients (3%) and was improved in 34 (62%).All the patients with dysuria had a total remission. Before surgery, 38 of 56 patients (68%) avoided intercourse because of severe dyspareunia and 30 of them (79%) began a satisfying sexual life after surgery. We observed only one recurrence localized to left ureter treated by ureteral resection and neo uretero-bladder anastomosis.

DISCUSSION

Literature data support that surgical treatment of DIE is recommended when the disease is symptomatic and causes a reduction in the quality of life of the women^{14,15}. A complete excision of endometriosis seems to provide long-term pain relief, improved quality of life, and a low rate of recurrent disease in most patients with DIE¹⁶⁻¹⁸ also in case of bowel involvement^{8,11,19-22}.

Data emerging by our study seem to confirm that segmental colorectal resection for DIE significantly improves both gynecologic and digestive symptoms. Infact the 92% of them has resolt or improved their symptom. Laparoscopic colo-rectal resection was first described by Nezhat in 1992 and, in the past fifteen years, the technological development has increased the use of this surgical approach to many abdominal disease. Therefore there is a wide acceptance for laparoscopic approach even if a bowel resection is necessary^{3,14,23-24}.

Our study could confirm this concept. Infact we had not conversion to laparotomy and our rate of rectal fistula and rectovaginal fistula is similar to those reported in licterature²⁵. By a Cochrane review on the colo-rectal anastomosis emerges that clinical anastomotic dehiscence and reoperation should be respectively 7.8 and 4.1%²⁷.

TABLE 5

RESULTS OF QUALITY OF LIFE

	Pre Surgery	Post Surgery			
		Remission	Improvement	Unvaried	Worse
Pelvic chronic pain	39	23	9	5	2
Intestinal symptoms	44	28	10	5	1
Dyspareunia	38	22	8	8	0
Dysmenorrhea	56	18	34	4	0
Dysuria	8	8	0	0	0
TOTAL	185	99	61	22	3

These data are referred to colo-rectal resection practiced for any disease but we think that results regarding resection for DIE can be considered acceptable also if worst, especially when the anastomosis is very low and the dissection very radical. Infact DIE is an anatomic-pathological condition in which the tissues are distorted by fibrosis and inflammation.

Even if some authors encourage opening the vagina to extract the specimen²⁸ we must underline that we had a rectovaginal fistula in the 90% of cases in which we had utilized this technique. This data has not a statistical value but should be taken in consideration.

One of the major cause of debate regards when and how bowel endometriosis must be treat. Bowel involvement can be established by Adamyan Classification and main options for the management of bowel endometriosis are cautery excision, laser vaporization, disc excision of bowel wall, and formal bowel resection^{12,24,28}.

Remorgida in 2005 and Kavallaris in 2003 showed that bowel endometriosis almost always is a multicentric and multifocal disease and often involves enteric nervous system (Auerbach's and Meissner's plexus) and the interstitial cells of Cajal, behaving an altered intestinal motility^{4,29}. Kavallaris concludes saying that in more than one-third of patients a distance of 2 cm from the main lesion is not sufficient to obtain clean margins and Remorgida affirms that full thickness colorectal resection for endometriotic nodule is associated with a risk of incomplete resection in nearly half of the patients. Kavallaris showed not obvious difference in complicate rate between resection and ablation (4) while the recurrence rate is significantly higher when a local excision or disc resection is practiced respect to a formally bowel resection^{4,13,21,30}.

For these reasons we think that laparoscopic bowel resection for DIE must be practiced all the time that the intestinal wall is involved until the muscular layer or deeply (Stage IV according with Adamyan Classification)³².

Laparoscopy surgery for DIE minimizes the surgical trauma without compromising the adequacy of the resection offering an improved visualization of the pelvic

structures, a very good approach to retroperitoneal space and the possibility to perform an adequate "nerve sparing" technique, with very good result in reducing symptoms and restoring fertility^{7,27,31}.

In conclusion it must remark that DIE is an insidious progressive disease, difficult to diagnose with heavy evolution. For these reasons bowel endometriosis should be managed in specialised centers with a multidisciplinary equipe including the radiologist, the gynecologist, the surgeon and the urologist; in our opinion it represents a difficult surgery which require a high surgeon skill and it must be practiced considering the risks and the benefits without forget that it should be a radical but not a demolition surgery.

SUMMARY

DUBOKA PELVIČNA ENDOMETRIOZA (STADIUM ADAMYAN IV): MULTIDISCIPLINARNO LAPAROSKOPSKO LEČENJE

Nekoliko manjih studija potvrdilo je izvodljivost laparoskopske kolorektalne resekcije kod duboko infiltrirajuće endometrioze (DIE), iako sa širokim spektrom komplikacija. Cilj ove studije je da se analiziraju retrospektivni rezultati u cilju procene izvodljivosti i kliničkog ishoda kolorektalne resekcije zbog DIE. Metodologija: pregledani su retrospektivni podaci kod bolesnika kod kojih je načinjena kolorektalna resekcija zbog kolonične endometrioze u periodu od januara 2000 do juna 2008. godine. Podaci uključuju opšte demografske karakteristike, preoperativnu simptomatologiju, detalje o hirurškoj tehnici, vreme operacije, intraoperativne i postoperativne komplikacije, dužinu hospitalizacije i kvalitet života posle operacije.

Rezultati: učinjeno je ukupno 56 laparoskopskih kolorektalnih resekcija zbog DIE. Nije bilo konverzija, kao ni intraoperativnih komplikacija. 35 bolesnika imalo je privremenu ileostomu, dok je kod 15 načinjena reoperacija zbog komplikacija. Zaključak: lečenje DIE zahteva vsoko specijalizovane ustanove i multidisciplinarni pristup. Hirurško lečenje DIE je tehnički složeno i zahteva vi-

soko obučenog hirurga. Izvodjenje ove procedure je neophodno uzimajući u obzir njene rizike i prednosti.

Ključne reči: duboka endometrioza, laparoskopija, resekcija, kolorektalna laparoskopjska resekcija

REFERENCES

- Weed JC, Ray JE. Endometriosis of the bowel. *Obstet Gynecol.* 1987;69:727–730.
- Bazot M, Darai E, Hourani R, et al. Deep pelvic endometriosis: MR imaging for diagnosis and prediction of extension of disease. *Radiology.* 2004; 232: 379–389.
- Darai E, Thomassin I, Barranger E, et al. Feasibility and clinical outcome of laparoscopic colorectal resection for endometriosis. *Am J Obstet Gynecol.* 2005;192:394–400.
- Kavallaris A, Kohler C, Kuhne-Heid R, Schneider A. Histopathological extent of rectal invasion by rectovaginal endometriosis. *Hum Reprod.* 2003;18:1323–1327.
- Cornillie FJ, Oosterlynck D, Lauweryns JM, Koninckx PR. Deeply infiltrating pelvic endometriosis: histology and clinical significance. *Fertil Steril* 1990;53:978–983.
- Koninckx PR, Mueleman C, Demeyere S, Lesaffre E, Cornillie FJ. Suggestive evidence that pelvic endometriosis is a progressive disease, whereas deeply infiltrating endometriosis is associated with pelvic pain. *Fertil Steril.* 1991;55:759–65.
- Coronado C, Franklin RR, Lotze EC, Bailey HR, Valdes CT. Surgical treatment of symptomatic colorectal endometriosis. *Fertil Steril* 1990;53:411–6.
- Bailey HR, Ott MT, Hartendorp P. Aggressive surgical management for advanced colorectal endometriosis. *Dis Colon Rectum* 1994;37:747–53.
- Nezhat C, Nezhat F and Pennington E. Laparoscopic treatment of infiltrative rectosigmoid colon and rectovaginal septum endometriosis by the technique of videolaparoscopy and the CO2 laser. *Br J Obstet Gynaecol.* 1992;99:664–667.
- Ling FW. Randomized controlled trial of depot leuprolide in patients with chronic pelvic pain and clinically suspected endometriosis. Pelvic Pain Study Group. *Obstet Gynecol.* 1999;93:51–58
- Redwine DB, Sharpe DR. Laparoscopic segmental resection of the sigmoid colon. *J Laparoendosc Surg.* 1991;1:217–220.
- Jerby BL, Kessler H, Falcone T, Milsom JW. Laparoscopic management of colorectal endometriosis. *Surg Endosc.* 1999;13:1125–8.
- Possover M, Diebolder H, Plaul K, Schneider A. Laparoscopically assisted vaginal resection of rectovaginal endometriosis. *Obstet Gynecol.* 2000;96:304–7.
- Garry R, Clayton R, Hawe J. The effect of endometriosis and its radical laparoscopic excision on quality of life indicators. *BJOG.* 2000;107: 44–54.
- Chapron C, Jacobs S, Dubuisson JB, Vieira M, Liaras E, Fauconnier A. Laparoscopically assisted vaginal management of deep endometriosis infiltrating the rectovaginal septum. *Acta Obstet Gynecol Scand.* 2001;80:349–54.
- Preziosi G, Cristaldi M, Angelini L. Intestinal obstruction secondary to endometriosis: a rare case of synchronous bowel localization. *Surg Oncol.* 2007 Dec;16 Suppl 1:S161–3.
- Busacca M, Bianchi S, Agnoli B, et al. Follow up of laparoscopic treatment of stage III–IV endometriosis. *J Am Assoc Gynecol Laparosc.* 1999;6:55–58.
- Chapron C, Dubuisson JB, Fritel X, et al. Operative management of deep endometriosis infiltrating the uterosacral ligaments. *J Am Assoc Gynecol Laparosc.* 1999;6:31–37
- Redwine DB, Wright JT. Laparoscopic treatment of complete obliteration of the cul-de sac associated with endometriosis. Long-term follow up of en bloc resection. *Fertil Steril.* 2001;76:358–365.
- Keckstein J, Wiesinger H. Deep endometriosis, including intestinal involvement: the interdisciplinary approach. *Minim Invasive Ther.* 2005;14:160–166.
- Dubernard G, Piketty M, Rouzier R, Houry S, Bazot M, Darai E. Quality of life after laparoscopic colorectal resection for endometriosis. *Hum Reprod.* 2006;21:1243–1247.
- Mohor C, Nezhat FR, Nezhat CH, Seidman D, Nezhat CR. Fertility consideration in laparoscopic treatment of infiltrative bowel endometriosis. *JSL.* 2005;9:16–24.
- Redwine DB. Laparoscopic en bloc resection for treatment of the obliterated cul-de-sac in endometriosis. *J Reprod Med.* 1992;37:620–624.
- Nezhat C, Pennington E, Nezhat F, Silfen SL. Laparoscopically assisted anterior rectal wall resection and reanastomosis for deeply infiltrating endometriosis. *Surg Laparosc Endosc* 1991; 1:106–108.
- Remorgida V, Ferrero S, Fulcheri E, Ragni N, Martin DC. Bowel endometriosis: presentation, diagnosis, and treatment. *Obstet Gynecol Surv.* 2007 Jul;62(7):461–70.
- Lustosa SA, Matos D, Atallah AN, Castro AA. Stapled versus handsewn methods for colorectal anastomosis surgery. *Cochrane Database Syst Rev* 2001;CD003144.
- Boni L, Tenconi S, Beretta P, Cromi A, Dionigi G, Rovera F, Dionigi R, Ghezzi F. Laparoscopic colorectal resections with transvaginal specimen extraction for severe endometriosis. *Surg Oncol.* 2007 Dec;16 Suppl 1:S157–60. Epub 2007 Nov 19.
- Redwine DB, Sharpe DR. Laparoscopic segmental resection of the sigmoid colon. *J Laparoendosc Surg* 1991;4:217–220.
- Remorgida V, Ragni N, Ferrero S, Anserini P, Torelli P and Fulcheri E. How complete is full thickness disc resection of bowel endometriotic lesions? A prospective surgical and histological study. *Hum Reprod.* 2005;20,2317–2320.

30. Duepre HJ, Senagore AJ, Delaney CP, Marcello PW, Brady KM, Falcone T Laparoscopic resection of deep pelvic endometriosis with rectosigmoid involvement. *J Am Coll Surg.* 2002 Dec;195(6):754-8.

31. Campagnacci R, Perretta S, Guerrieri M, Paganini AM, De Sanctis A, Ciavattini A, Lezoche E. Laparoscopic colorectal resection for endometriosis. *Surg Endosc.* 2005 May;19(5):662-4.

32. Adamyan L. Additional international perspectives. In: Nichols DH, ed. *Gynecologic and Obstetric Surgery.* St. Louis: Mosby Year Book, pages 1167-1182, 1993

