Transvaginal-laparoscopic anterior rectum resection in a hysterectomized woman with deep-infiltrating endometriosis: Description of a gynecologic natural orifice transendoluminal surgery approach

Ebert, A D; Burkhardt, T; Parlayan, S; Riediger, H; Papadopoulos, T
Transvaginal-laparoscopic anterior rectum resection in a hysterectomized woman with deep-infiltrating endometriosis: Description of a gynecologic natural orifice transendoluminal surgery approach

Abstract

Deep-infiltrating endometriosis may affect the vagina, the rectum, and the cervicoisthmic part of the uterus, resulting in severe pain, particularly dyschezia, dysmenorrhea, dyspareunia, and diminished quality of life. Advanced surgical techniques, such as laparoscopic-assisted anterior rectum resection, are recognized as safe and effective therapeutic approaches. In some cases, a laparotomy or minilaparotomy has to be performed for technical reasons. This can be avoided in some cases by transvaginal-laparoscopic low anterior rectum resection. The technique is a 4-step procedure, which can be described as follows: step 1 (vaginal) - rectovaginal examination, preparation of the rectovaginal septum, opening of the pouch of Douglas, mobilization of the endometriotic nodule and the rectum, temporary vaginal closure; step 2 (laparoscopic) - removal of additional endometriotic lesions, adhesiolysis, final mobilization of the rectum, mobilization of the rectosigmoid, endoscopic resection using an endoscopic stapler step 3 (vaginal) - transvaginal resection of the lesion, preparation of the oral anvil, closure of the vagina; and step 4 (laparoscopic) - endoscopic transanal stapler anastomosis and underwater rectoscopy, prophylaxis of adhesions, drainage. We used this procedure to treat a 46-year-old woman (gravida 2, para 2) who was admitted to our hospital for severe lower abdominal pain, constipation, dyspareunia, dyschezia, and cyclic rectal bleedings. The symptoms were caused by an endometriotic nodule accompanied by a palpable rectum stenosis. In addition, she reported a past abdominal hysterectomy with complications caused by symptomatic myomatous uterus. As a gynecologic natural orifice surgery approach, the transvaginal-laparoscopic anterior rectum resection may be an additional useful surgical technique that could be offered by surgical gynecologists to some women with deep-infiltrating endometriosis.
Transvaginal-laparoscopic anterior rectum resection in a hysterectomized woman suffering from deep-infiltrating endometriosis – description of a Gynecologic Natural Orifice Trans-Endoluminal Surgery (Gy-NOTES) approach

Andreas D. Ebert 1, Tilo Burkhardt 1, Semra Parlayan 1, Hartwig Riediger 1, and Thomas Papadopoulos 3

German Endometriosis Research Center Berlin, 1 Department of Obstetrics and Gynecology, 2 Department of Visceral Surgery, 3 Department of Pathology, Vivantes – Network for Health, Campus Humboldt, Berlin, Germany.

Correspondence:

Professor Andreas D. Ebert, M.D., Ph.D.
Department of Obstetrics and Gynecology
German Endometriosis Center Berlin Level III
Vivantes – Network for Health, Campus Humboldt
Am Nordgraben 2,
13509 Berlin, Germany
P.: +49 30 130 12 1261
F.: +49 30 130 12 1262
Mail: andreas.ebert@vivantes.de

* Manuscript
Abstract

Deep-infiltrating endometriosis may affect the vagina, the rectum, and the cervico-isthmic part of the uterus, resulting in severe pain, particularly dyschezia, dysmenorrhoea, dyspareunia, and diminished quality of life. Advanced surgical techniques, such as laparoscopic-assisted anterior rectum resection, are recognized as safe and effective therapeutic approaches. In most cases, a laparotomy or minilaparotomy has to be performed for technical reasons. This can be avoided in some cases by transvaginal-laparoscopic low anterior rectum resection. The technique is a 4-step-procedure, which can be described as follows: step 1 (vaginal) - rectovaginal examination, preparation of the rectovaginal septum, opening of the Douglas pouch, mobilization of the endometriotic nodule and the rectum, temporary vaginal closure; step 2 (laparoscopic) - removal of additional endometriotic lesions, adhesiolysis, final mobilization of the rectum, mobilization of the rectosigmoid, endoscopic resection using an endo-GIA; step 3 (vaginal) - transvaginal resection of the lesion, preparation of the oral anvil, closure of the vagina; step 4 (laparoscopic) - endoscopic transanal stapler anastomosis and “underwater-rectoscopy,” prophylaxis of adhesions, drainage. A more detailed account of the technique is contained in the body of this case report. We used this procedure to treat a 46-year old woman (II gravida, II para) who was admitted to our hospital for severe lower abdominal pain, constipation, dyspareunia, dyschezia and cyclic rectal bleedings. The symptoms were caused by an endometriotic nodule accompanied by a palpable rectum stenosis. In addition, she reported a past abdominal hysterectomy with complications caused by symptomatic myomatous uterus. As a gynecological natural orifice surgery approach, the transvaginal-laparoscopic anterior rectum resection may be an additional useful surgical technique which could be offered by surgical gynecologists to some women suffering from deep-infiltrating endometriosis.
3  Key words:
4  Deep-infiltrating endometriosis
5  Natural Orifice Trans-Endoluminal Surgery (NOTES)
6  Advanced gynaecological Laparoscopy
7  Combined transvaginal-laparoscopic approach
8  recto-sigmoid resection
Introduction

Symptomatic deep infiltrating rectovaginal endometriosis often requires anterior rectum or segmental rectosigmoid resection with anastomosis. Usually, these procedures have been performed by laparotomy. Recently, however, laparoscopically assisted, combined vaginal-laparoscopic, or even combined vaginal-laparoscopic-abdominal approaches have been introduced to achieve complete surgical removal of infiltrating endometriotic lesions. We would now like to introduce and report upon our employment of a transvaginal-laparoscopic technique in a patient who had previously undergone a hysterectomy for fibroids and who subsequently began to suffer from a 4 cm infiltrating rectum endometriosis.
Case Report

Patient History

In March 2008, a 46-year old woman (gravida II, para II) was admitted to our hospital for severe lower abdominal pain. In addition, she was suffering from constipation, dyspareunia, dyschezia and cyclic rectal bleedings. She reported that she had undergone an abdominal hysterectomy because of symptomatic myomatous uterus in 1993. This was followed by revision surgery several days later. Rectovaginal examination was very painful. It revealed a cystic process above the right end of the vaginal stump. The examination had to be interrupted because of the patient's extreme discomfort. As a result, no more details were detectable.

Transvaginal ultrasound demonstrated an adnexal mass of 6 cm Ø. Renal sonography, blood values (including CA125, LH, FSH, E2, P), and CRP were within normal range. Our patient was informed that her symptoms could indicate a deep-infiltrating endometriosis of the bowel.

At that time, she gave her written consent only for “minor surgical procedures”- i.e.; resection of the ovarian endometriosis or bowel adhesiolysis- but not for bowel resection (with the exception of an appendectomy). Before laparoscopy, a rectovaginal examination under general anesthesia revealed an endometriotic nodule of approx. 4 cm Ø with 2/3 rectum stenosis (13 cm ab ano) directly under the right-side ovarian endometrioma. Staging laparoscopy revealed an ovarian endometriosis (rASRMstage III) and the endometriotic infiltration of the appendix. After right-side salpingoovariolysis and gentle ureterolysis, the endometrioma was removed by stripping the wall of the cyst. Laparoscopic appendectomy was performed using the stapler technique. After intense adhesiolysis of the small bowel adherent to the vaginal stump, the infiltrated rectum was visualized. Immediately after surgery, our patient was fully informed about all findings.
Rectosigmoidoscopy, transanal sonography, and MRI of the small pelvis were performed to improve characterization of the deep-infiltrating endometriosis. These techniques confirmed the results of the rectovaginal examination and laparoscopy. Rectum resection was recommended because of the patient's symptoms (dyschezia, dyspareunia, obstipation, rectal bleeding, stenosis). Endocrine treatment options were discussed, but the patient rejected them. She was subsequently discharged on the 4th postoperative day.

The patient returned in July 2008, after having experienced greatly reduced quality of life. By this time, she had informed herself of the details of the possible treatment options. We then performed radical surgery for symptomatic rectal endometriosis.

**Surgical Procedures**

The evening before surgery, Prepacol® (Guerbet Gmbh, Sulzbach, Germany) was used for bowel preparation. The patient was placed in the Trendelenburg position. At 13 cm ab ano, rectovaginal examination revealed the immobile infiltrating tumor of the rectum (approx. 4 cm Ø), adherent to the right sacrouterine ligament. Previously, the tumor had not been palpable without anesthesia because of patient discomfort. The vagina was not infiltrated by endometriosis but involved by typical scar-like adhesions. Surgery was performed by a gynecological team (ADE, SP, TB). After gentle disinfection, the edges of the vaginal stump were grasped by sharp clamps. Application of 10 mL lidocaine-adrenaline (200,000:1) supported local haemostasis. The rectovaginal septum was opened by incision. Under rectal-digital control, the dorsal wall of the vagina was gently resected from the anterior rectum, and the Douglas pouch was opened. The infiltration area of the endometriotic lesion became visible (Fig. 1A). It was necessary to perform a bilateral opening of the pararectal spaces for better mobilization of the rectum and for “medialization” of the rectal lesion. The tumor could then be grasped using sharp clamps. The mesorectum and the typical coarse adhesions,
respectively, were removed step-by-step around the tumor-bearing rectum segment using ovelight clamps, bicoagulation clamps, and scissors. The infiltrated part of the rectum thus became mobile, and the laparoscopic resection was prepared transvaginally (Fig. 1B). The vagina was closed temporarily in order to perform laparoscopy. Laparoscopy was performed using AIDA-HDTV equipment (Karl Storz Endoskopie©). Two 5mm-trokars were placed in the left and right lower abdominal region. One 12-mm suprapubic incision and one 10-mm umbilical incision were made to gain access. Despite the patient's complicated treatment history, visualization of the entire abdominal cavity (including a complete bowel check-up) revealed no further endometriotic lesions. The endometriotic lesion of the rectum was identified, and some additional retrorectosigmoidal and pararectal mobilization was carried out. To guarantee a tension-free anastomosis, it was important to resect the physiological left-sided adhesions of the rectosigmoid before rectum resection. Transsection of the rectum was done using a linear endoscopic stapler (Endopath® ATB45, Ethicon Endo-Surgery, Inc.). It was introduced into the suprapubic incision. The involved rectum segment was then placed into the former Douglas, where it was pulled out through the vagina into the introitus. At this point, the affected rectum segment was resected. The 29-mm-anvil of the endoscopic curved intraluminal stapler (Endopath® ILS, Ethicon Endo-Surgery, LLC) was attached at the oral end, then reintroduced into the abdominal cavity (Fig. 1C, D). After final closure of the vagina (Fig. 1E), the laparoscopically assisted transanal anastomosis was finished using standard technique (by ADE and HR) (Fig. 1F). Rectoscopy was performed to exclude anastomosis insufficiency. The anastomosis was checked during rectal insufflation using underwater-laparoscopy. 1000 ml 4% Icodextrin Solution (Adept® Baxter, Deerfield, Illinois, USA) was applied to prevent adhesions. The estimated blood loss, assessed by combination of suction volume and visual estimation, was 250 ml.

The duration of surgery was 3.5 hours. The intravenous antibiotic regime (Mezlocillin and Metronidazole) was discontinued on the 4th postoperative day. n epidural catheter was used for
pain relief from day 0-4. Mobilization and physiotherapy were initiated on day 1 after surgery. The bladder catheter was removed on day 2 after surgery. A fast-track nutritional protocol was used. Vaginal wound healing was supported by vaginal Estradiol ovule (Oekolp®, Dr. Kade Pharmazeutische Fabrik GmbH, Berlin) for 3 postoperative days.

Histopathology of the rectum demonstrated intramural nodules of endometrial mucosa (Fig. 2A, B), thus confirming the clinical diagnosis of endometriosis resected in sano. Additional immohistochemical analysis provided a strong positivity for estrogen- and progesteron-receptors of stromal and epithelial cells within the endometriotic nodules. A moderate proliferative activity of stromal and epithelial cells was demonstrated by the use of the MIB-1 monoclonal antibody.

Our patient was discharged in good health on the 8th postoperative day. Because of premenopausal LH and FSH, we recommended a prophylactic 3-month course of treatment with leuproreline acetate. Rehabilitation was also scheduled.
Discussion

It is well known that rectovaginal deep-infiltrating endometriosis is a challenge in advanced gynecological surgery\(^2, 8-11\). Resection of deep-infiltrating endometriosis can improve the gynecologic and digestive symptoms, as well as the overall pain score.\(^7, 12\) Bowel surgery cannot provide an improved fertility rate.\(^13, 14\) but in 44.6% of patients pregnancies have been reported.\(^12\) Advanced surgery may lead to major complications. It is therefore important for women to be provided with appropriate knowledge of procedures and potential complications in order to give their informed consent.\(^9, 15-19\) In some cases, radical bowel surgery and hysterectomy might be necessary,\(^8, 20\) whereas in asymptomatic or even in symptomatic patients conservative medical treatment options should be considered.\(^7, 13, 14, 21\) However, there is a growing body of evidence (or experience), that open and laparoscopically assisted techniques have their place in the treatment of deep-infiltrating endometriosis.\(^1, 3, 6, 22\) It must be said, though, that most laparoscopic techniques do include some kind of laparotomy. This is necessary for anvil preparation.\(^3, 6, 17\) Usually, the length of (Pfannenstiel) laparotomy can vary from 3-10 cm. As in some cases of rectal cancer, it may be possible, by using the transvaginal-laparoscopic procedure, to avoid even that small laparotomy in patients with deep-infiltrating endometriosis.\(^23-26\)

To our knowledge, the first transvaginal approach in a patient with rectovaginal endometriosis was described by Redwine et al.\(^1\). This team mobilized the rectosigmoid laparoscopically in five patients. A posterior colpotomy incision was made after the affected segment of bowel had been separated from its mesentery. The bowel was delivered through the vagina to the introitus. The affected segment was resected, and a hand-sutured anastomosis was performed.

After returning the bowel to the abdomen, the vagina was closed from below.\(^1\)

The procedure we are suggesting consists of 4 major steps (2 vaginal and 2 laparoscopic):

**Step 1 (vaginal):** rectovaginal examination, preparation of the rectovaginal septum; opening of the Douglas pouch, mobilization of the endometriotic nodule and the rectum, temporary
vaginal closure;

**Step 2 (laparoscopic):** removal of additional endometriotic lesions, adhesiolysis, final mobilization of the rectosigmoid (and - if necessary – of the left flexure), endoscopic resection using a **linear endoscopic stapler**.

**Step 3 (vaginal):** transvaginal resection of the lesion, preparation of the oral anvil, closure of the vagina;

**Step 4 (laparoscopic):** endoscopic transanal stapler anastomosis and “underwater-laparoscopy,” prophylaxis of adhesions, drainage.

Independently, excellent outcome has been reported for the suggested technique. From our point of view, a left-side hemicolectomy, as performed in 11 cases by visceral surgeons, is not necessary. Nevertheless, a sufficient bowel mobilization is important because the final colorectal anastomosis has to be completely tension-free. In addition, the size of the colpotomy should be greater than 1-2 cm. We recommend a posterior colpotomy that is as wide as possible. This approach will be technically difficult in nulliparous women with advanced deep-infiltrating endometriosis of the vagina, the parametrium, and the Douglas pouch. We know this well because of prior experience with vaginal-laparoscopic-abdominal and other approaches. In most cases of deep-infiltrating endometriosis, the retrocervical part of the upper vagina is affected. Therefore, vaginal resection of all visible and palpable vaginal lesions under rectal-digital control should be performed to avoid vaginal recurrences. In addition, there is no need for the insertion of an endobag to protect the vital tissue of the vagina. Contamination of the vagina can be treated by accurate disinfection, perioperative antibiotic regime, and by an E₁-containing vaginal suppository.

A possible source of criticism could be that the patient in this reported case was hysterectomized, and that the situation we found was therefore much much less complicated than it would have been in a patient who had not had a hysterectomy. We believe, however,
that this procedure could be of value even in *some* young women who still retain their uterus.

1. 2, 27 Seen from this perspective, the transvaginal-laparoscopic anterior rectum resection may be an *additional* useful surgical technique which could be offered to some women suffering from deep-infiltrating endometriosis.
Acknowledgement

The authors would like to express their gratitude to Ms. Vanessa Conley and Mr. Cornelius Herzig for their excellent technical support in the OR. The Journal's conditions did not allow us to cite all of the related reports and papers that have been published over the years. In spite of this limitation, we would like to state our emphatic recognition of the importance of the work that has been done by all of our uncited colleagues and their teams.
References


1  Thomassin I, Bazot M, Detchev R, Barranger E, Cortez A, Darai E. Symptoms before
2 and after surgical removal of colorectal endometriosis that are assessed by magnetic
3 resonance imaging and rectal endoscopic sonography. *Am J Obstet Gynecol.* May
5
6  Duepree HJ, Senagore AJ, Delaney CP, Marcello PW, Brady KM, Falcone T.  
7 Laparoscopic resection of deep pelvic endometriosis with rectosigmoid involvement. *J
9
10  Langebrekke A, Istre O, Busund B, Johannessen HO, Qvigstad E. Endoscopic  
11 treatment of deep infiltrating endometriosis (DIE) involving the bladder and  
13
14  Darai E, Bazot M, Rouzier R, Houry S, Dubernard G. Outcome of laparoscopic  
15 colorectal resection for endometriosis. *Curr Opin Obstet Gynecol.* Aug
17
18  Fedele L, Bianchi S, Zanconato G, Raffaelli R, Berlanda N. Is rectovaginal  
20 1542.
21
25
26  Darai E, Ackerman G, Bazot M, Rouzier R, Dubernard G. Laparoscopic segmental  
28 2007;21(9):1572-1577.
29
30  Slack A, Child T, Lindsey I, et al. Urological and colorectal complications following  
32
33  English J, Kenney N, Edmonds S, Baig M, Miles A. Limited segmental anterior rectal
resection for the treatment of rectovaginal endometriosis: pain and complications. 


20. Ford J, English J, Miles WA, Giannopoulos T. Pain, quality of life and complications following the radical resection of rectovaginal endometriosis. 


23. Kim J, Shim M, Kwun K. Laparoscopic-assisted transvaginal resection of the rectum. 


transvaginal specimen extraction for severe endometriosis. *Surgical Oncology.*

Figure legends

Figure 1: Transvaginal-laparoscopic anterior rectum resection: (A) Opening of the vagina and the Douglas pouch. The endometriotic lesion becomes visible. (B) The infiltrating lesion has been mobilized. It was possible to deliver the affected part of the bowel through the vagina to the introitus. After transient closure of the vagina, the infiltrated part of the rectum was mobilized by laparoscopy followed by endoscopic resection of the infiltrated part. The bowel was delivered through the vagina, where the aboral part of the rectum was resected and fixed by Allis clamps (C). After the 29-mm anvil was prepared (D), the whole rectum was reintroduced in the abdominal cavity, and the vagina was finally closed (E); After the transanal-endoscopic anastomosis (F) was done, two easy-flows were placed on both sides.

Figure 2: Gross pathology of the affected rectum segment resected in sano (A); Representative photomicrograph of the deep-infiltrating endometriosis (Hematoxylin/eosin staining, B).