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VIDEO FORUM

# Totally intracorporeal robotic en bloc resection for deep infiltrating endometriosis of the rectovaginal wall with natural orifice specimen extraction

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## Introduction

Deep infiltrating endometriosis is a complex disease affecting young women, impairing their quality of life and their fertility. The estimated incidence of bowel endometriosis is between 3 and 36%, and the rectum and the rectosigmoid junction together account for 70–93% of all intestinal lesions. When deep infiltration of the sigmoid or rectum is present, it can involve the serosa through to the mucosa. To ensure a complete excision and the best results in terms of symptom relief and recurrence, intestinal surgery with or without segmental resection may be required. Laparoscopic surgery is considered the gold standard for diagnosis and treatment. However, a 10% rate of conversion to open surgery has been reported even when is the operation is performed by skilled laparoscopic surgeons, and is much higher in low volume centers. To improve surgical outcomes, robotic assistance is a promising next step in performing minimally invasive gynecological surgery, especially in challenging endometriosis cases. Natural orifice specimen extraction (NOSE) has been developed to decrease the incidence of surgical wound complications that include postoperative pain, wound infection and incisional hernia. All these complications could reduce the advantages of minimally invasive techniques. The vagina has been established as one of the preferred routes for specimen extraction due to its improved healing and elasticity. This results in reduced wound pain, a shorter hospital stay and good cosmetic outcomes. We report a case of totally intracorporeal robotic en bloc resection for deep infiltrating endometriosis of the rectovaginal wall with NOSE.

## Materials and methods

An attached video shows the surgical technique (ESM appendix 1).

After approval from the Review Board Committee, informed consent was obtained and the patient was taken to the operating room. General endotracheal anesthesia was induced. The patient was placed in low lithotomy position in the Allen stirrups. The arms were tucked to the sides. A Foley catheter was inserted sterilely. A surgical time out was performed confirming the correct patient and procedure. The Veress needle was inserted in the left upper quadrant at Palmer's point. The abdomen was insufflated with $CO_2$ gas. A 12 mm port was placed at the umbilicus. A 12 mm AirSeal port (SurgiQuest, Milford, CT, USA) was placed in the right lower quadrant. Additional trocars were then placed as follows: a 5 mm port in the right upper quadrant, a 5 mm port in the epigastrium and two 8 mm robotic ports in the left lateral abdomen.

The patient was placed in the Trendelenburg position with the left side up. The abdomen was surveyed for endometrial implants. The posterior cul-de-sac was completely obliterated by a rectovaginal nodule. There was a right ovarian cyst and endometrioma. There was no evidence of disease elsewhere. The robot was docked from the left position. Arm number 1 was monopolar scissors, arm number 2 was double fenestrated bipolar, and arm number 3 was a ProGrasp. A uterine manipulator was placed and the uterus was retracted anteriorly. The dissection was directed around

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the rectovaginal nodule. Anteriorly the nodule was adherent to the inferior uterus and involved the vagina. The nodule was dissected off of the uterus using monopolar scissors. In order to excise the nodule, the upper posterior vagina was incised. A small portion of upper vagina was removed with the nodule. Posteriorly, the lesion was invading into the rectum. The area of rectal involvement was large and required removal of part of the rectum. Thus, we proceeded with low anterior resection.

The sigmoid colon was mobilized off the left pelvic sidewall using the scissors. The rectum was elevated and retracted cephalad. The peritoneum was incised and a plane was developed between the fascia propria of the rectum and presacral fascia. Mesorectal dissection was performed circumferentially until we were past the area of rectal involvement. The inferior mesenteric artery was identified and the colonic mesentery was lifted off the retroperitoneum. The inferior mesenteric artery was isolated. Hemolok clips were placed and the artery was divided with the bipolar and then scissors. The mesentery of the colon was divided with the LigaSure device (Medtronic, Minneapolis, MN, USA). The colon was divided with a purple load of the Covidien endoscopic stapler. The mesorectum was divided with the bipolar and scissors. The rectum was divided with three 45 purple loads of the Covidien endoscopic stapler. The specimen contained the rectum, rectovaginal nodule, and partial vaginectomy en bloc. A large endobag was placed through the vagina and the specimen was placed within the endobag. This was removed through the vagina. The anvil of a 28 EEA stapler was passed into the abdomen through the vagina. The staple line of the colon was removed with the scissors. The anvil was placed within the lumen of the colon and secured in place with a purse-string polydioxanone (PDS) suture. The EEA stapler was advanced into the stapled off rectum and joined with the anvil to create the anastomosis. The colon was occluded with an atraumatic grasper and flexible sigmoidoscopy was performed. The anastomosis was visualized and located 5–6 cm to the anal verge. The pelvis was filled with irrigation and a leak test was performed which was negative. The vagina was closed with running 0 Vicryl sutures. The robot was undocked. A drain was placed in the pelvis.

## Results

Total operative time was 240 min and blood loss was 150 ml. The postoperative stay was uneventful and the length of hospital stay was 3 days. The pathological report showed an endometrioma $4 \times 4 \times 2$ cm predominantly involving colonic muscularis propria, with disease free margins. The patient is asymptomatic after 12 months of observation and she is currently pregnant (conceived naturally).

## Discussion

Despite the fact that laparoscopic surgery is considered the gold standard to treat patients diagnosed with endometriosis, the surgical management of advanced stage disease can often be challenging with this approach due to altered tissue planes and dense adhesions. The da Vinci Robotic Surgical System is an advanced laparoscopic-assisted surgical system that can address the current limitations of conventional laparoscopy.

Nehzat et al. [1] published a series of 78 cases comparing conventional ($n = 38$) and robot-assisted laparoscopic ($n = 40$) resection of endometriosis. This study is the only comparative analysis of any stage endometriosis, but just 5% of the robotic cases (2/40) had stage 4 endometriosis. Robotic-assisted procedures were longer than laparoscopic ones (191 vs 159 min), but the complication rates and blood loss in the two groups were comparable. The analysis did not show any benefit for robot-assisted laparoscopic surgery in patients with endometriosis stages 1 and 2, but they recommended the technique for stages 3 and 4. The robotic to laparotomy conversion rate seems to be lower than with conventional laparoscopy, suggesting a possible robotic advantage for these young women who have often undergone many surgical procedures.

In 2011, Brudie et al. [2] published a series of 80 patients who had robotic surgery for stage 4 endometriosis. The mean operative time was 115 min and the laparotomy conversion rate was 5%. No cases of transfusion were reported and the reoperation rate was 1.3%.

Neme et al. [3] reported a series of 10 women with endometriosis involving the colorectal wall who had robotic-assisted surgery. Eighty percent of these women required extensive ureterolysis and 70% also required cystectomy. Colorectal resection was necessary in all cases and partial vaginal resection in 20% of them. Six patients had a diagnosis of infertility before surgery, 4 women conceived naturally and 2 underwent in vitro fertilization. This study shows that robotic-assisted laparoscopic surgery for the treatment of deep infiltrating bowel endometriosis is possible, effective, and safe, and fertility results postoperatively are good.

In 2014, Hassens et al. [4] evaluated the perioperative results of a multicentric trial including patients with deep infiltrating endometriosis who had robotic-assisted laparoscopy surgery. According to nodule location, patients were divided into 4 groups: rectum ($n = 88$), bladder ($n = 23$), ureter and uterosacral ligaments ($n = 115$) and those who underwent hysterectomy ($n = 28$). There was one case of conversion to open in the rectum group and two cases of rectal injuries requiring suturing. This is one of the largest series published on robotic-assisted

laparoscopy for deep infiltrating endometriosis and the authors concluded that robotic-assisted laparoscopy seems to be promising for this complex pathology while no increase in surgical time, blood loss, and intra- and postoperative complications was observed.

A prospective cohort study of 25 consecutive patients with deep infiltrating endometriosis treated by robotic surgery was conducted by Pellegrino et al. [5]. Procedures included removal of endometriotic nodules from the rectovaginal septum with rectal shaving alone or in combination with accessory procedures in patients who had stage 4 disease. All patients had successful surgery and pathology confirmed the adequacy of the surgical specimen.

## Conclusions

Robot-assisted laparoscopy for deep infiltrating endometriosis seems to be promising. Surgeons experienced in conventional laparoscopy surgery can use robotic platform for performing complex surgical dissection and achieving the surgical goals in patients affected of deep infiltrating endometriosis. Introduction of the anvil into the abdominal cavity via the vagina made it possible to perform an intracorporeal colorectal anastomosis with an EEA though the anus.

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### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflicts of interest and nothing to disclose.

**Ethical approval** This work has been approved by the appropriate ethics committee and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

**Informed consent** Research involves a human participant, who has signed a personal informed consent.

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