



## Instruments and Techniques

# Robotic Shaving Technique in 25 Patients Affected by Deep Infiltrating Endometriosis of the Rectovaginal Space

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**ABSTRACT** Minimally invasive surgery represents the gold standard for the management of deep infiltrating endometriosis (DIE) involving the rectovaginal septum (RVS). This analysis aimed to evaluate the feasibility of robotic-assisted laparoscopy (RAL) and clinical outcomes in terms of long-term complications, pain relief, and recurrence rate for the treatment of DIE of the RVS. A prospective cohort study of robotic procedures was performed between October 2010 and July 2014, including removal of endometriotic nodules from the RVS with rectal shaving alone or in combination with accessory procedures. In all cases, the revised American Society for Reproductive Medicine (rASRM) score for endometriosis was >40 points (stage IV). Twenty-five consecutive patients underwent RAL, with a successful complete nodule debulking by the wall shaving technique. Pathology confirmed the adequacy of the surgical specimen and the median largest endometriotic nodule was of 21 mm (range, 10–60 mm), with free margins in all cases. The median operative time from skin opening to closure was 174 minutes (range, 75–300 minutes), and blood loss was close to 0 mL. The median revised Enzian score for location A (RVS) was 2 (range, 1–3). The most frequent Enzian class was A2B0C0 (48%), followed by A3B0C0 (12%). In 3 cases (12%), partial vaginal resection was required to remove endometriotic nodules of the RVS (1 each in classes A3B0C1FI, A3B0C0FO, and A3B0C0). No intraoperative complications occurred. This series has a median long-term follow up of 22 months (range, 6–50 months) currently available with an optimal operative time, demonstrating good long-term outcomes. Our data support robotics as a safe and attractive alternative for comprehensive surgical treatment of DIE. *Journal of Minimally Invasive Gynecology* (2015) ■, ■–■ © 2015 AAGL. All rights reserved.

**Keywords:** Deep infiltrating endometriosis; Endometriotic nodules; Rectovaginal septum; Robotic; Shaving

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Robotic-assisted laparoscopy (RAL) has progressed significantly over the past few years. Recent advances in the field of minimally invasive surgery have focused on the incorporation of robotic technology for the treatment of gynecologic malignancies [1,2]. RAL is also a well-

described procedure for the staging and treatment of gynecologic and urologic malignancies, overcoming anatomic barriers to the process of staging for endometrial cancer without increasing patient morbidity. Owing to its increased range of indications, RAL appears to be feasible in treating deep infiltrating endometriosis (DIE) as well.

DIE, a complex disorder that affects 6% to 12% all women of childbearing age [3,4], is histologically defined as endometriotic lesions extending more than 5 mm beneath the peritoneal surface. RVS and sigmoid endometriosis, the most common types of DIE, are often associated with severe, progressively debilitating abdominal and pelvic pain, negatively affecting the

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patient's quality of life. No medical treatment has yet been shown to achieve a long-term cure, with symptom recurrence rates as high as 76%. Surgical excision, effective in relieving pain [5–8], is considered the treatment of choice. In addition, the adhesions related to initial endometriosis or induced by the surgery negatively affect the subsequent pregnancy rate [9].

The American Fertility Society [10] system classifies DIE as 1, superficial endometriosis involving the peritoneum; 2, ovarian endometriomas; or 3, DIE resulting in fibrosis, adhesions, and significant nodules that invade deeper than 5 mm into the retroperitoneum of the pelvic sidewalls or the RVS, or involves at least the muscularis of the bowel, bladder, or ureters [11–13].

RAL overcomes many of the difficulties associated with standard laparoscopy through improved high-definition 3D visualization of the operating field, improved range of motion with increased maneuverability of the instruments with 6° of freedom, surgical dexterity, and ergonomics. The advantages offered by RAL may be highly valuable in the management of infertility with the assimilation of microsurgery principles into fertility-promoting procedures. Owing to the numerous drawbacks of laparoscopic surgery in DIE and the very limited data available to date [14], consideration should be given to the potential role of robotics for this indication. Here we present our results and evaluate the feasibility and long-term outcomes of RAL for treating DIE of the RVS, including complications, pain relief, and recurrence rate.

## Materials and Methods

This was a prospective analysis of patients who underwent robotic surgery for the treatment of DIE of the RVS in our institution between October 2010 and July 2014. All of the robotic procedures were performed by the same surgeon (A.P.), who has extensive experience and expertise in laparoscopic and abdominal gynecologic surgery for oncologic conditions. Institutional Review Board approval was obtained.

The diagnosis of DIE was established based on medical history, clinical symptoms, and instrumental findings. Baseline characteristics included age, body mass index (BMI), previous surgery, parity, and previous cesarean delivery (Table 1). Examined factors included total operative time, robot docking time, estimated blood loss (EBL), histological findings, nodule diameter, length of stay, and both early and long-term complications. EBL was calculated by measuring the blood collected in the suction canister and subtracting the amount of irrigation used during the surgery. Preoperative and postoperative complete blood cell counts were compared for accuracy. Neither high BMI nor previous abdominal surgery was considered a contraindication for RAL. All clinical data were collected by our team, and all patients were interviewed preoperatively about endometriosis-related symptoms.

The preoperative workup included clinical examination with bimanual palpation and with rectal exploration, along with transvaginal and abdominal ultrasound. Magnetic resonance imaging was performed to assess the extent of the disease and to plan surgery and ureteral involvement. Patients with bowel symptoms associated

**Table 1**

Patient demographic data and characteristics of previous surgery

Characteristic	Value
Age, yr, mean ± SD	33.9 ± 6.1
BMI, kg/m <sup>2</sup> , mean ± SD	21.2 ± 2.9
Pregnancy, n (%)	4 (16)
Spontaneous delivery	2 (0–1)
Cesarean section, n (%)	2 (8)
Nulliparous, n (%)	23 (92)
Previous abdominal surgery, n (%)	0 (0)
No surgery, n (%)	18 (72)
Surgery for endometriosis, n (%)	7 (28)
Previous laparoscopic surgery, n (%)	7 (28)
Previous obstetric/gynecologic surgery, n (%)	7 (28)
Diagnostic LPS, n (%)	2 (8)
LPS miomectomy + DT of EL, n (%)	1 (4)
LPS excision of EL of the RVS, cystotomy, n (%)	1 (4)
LPS Miomectomy + enucleation of ovarian cyst, n (%)	1 (4)
LPS excision of EL of the bladder, n (%)	1 (4)
LPS excision of the utero sacral endometriotic nodule, n (%)	1 (4)
CA-125 serum level, UI/L/dL, median (range)*	35 (4–368)

BMI = body mass index; LPS = laparoscopy; DT = diathermocoagulation; RVS = rectovaginal septum; EL = endometriotic lesion.

\* Preoperative value.

with nodules of the RVS underwent a double-contrast barium enema and/or rectocolonoscopy.

Data were analyzed using SPSS 17.0 (SPSS Inc, Chicago, IL). The Student *t* test for paired samples was used to compare the outcomes regarding evaluation symptoms. A *p* value < .05 was considered statistically significant. Inclusion criteria were the presence of more than 1 lesion of the RVS partially involving the muscle layer (no involvement of the deep muscle layer or mucosal layer), and no change in symptoms with hormone treatment (for >6 months) or previous surgery.

Before surgery, all patients were informed about potential risks and benefits of this kind of intervention. On the day before surgery, all patients received a clear fluid diet and bowel preparation with 2 L of polyethylene glycol. Low-molecular weight heparin was given 12 hours after surgery. Prophylactic antibiotic therapy (cefazoline 2 g and metronidazole 500 mg intravenously) was administered at the beginning of the procedure.

Surgery was performed with the Da Vinci S system (Intuitive Surgical, Sunnyvale, CA), docked in a standard fashion at the foot of the bed, between the patient's legs. All patients underwent surgery under general anesthesia. The patient was positioned supine with both arms tucked comfortably, and her legs placed in Allen stirrups, abducted and with hip extension to accommodate the second assistant surgeon. A Foley catheter was placed to empty the bladder and control urine output, and a uterine manipulator was introduced through the cervix. After induction of pneumoperitoneum established to 20 mmHg with a closed Verres needle and insertion of the robotic videolaparoscope, through a 12-mm port just above the umbilicus, the entire abdominal cavity was explored to evaluate the extension of the endometriotic lesions.

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