



# Robotic multiple sigmoid and rectal mucosa skinning in a multicentric deep infiltrating bowel endometriotic nodules: a case report

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Endometriosis is a benign gynecological disease characterized by the presence of endometrial tissue outside the uterus. The eradication of non-gynecological localizations represents the real surgical challenge. A 29-year-old woman underwent robotic surgery with the Da Vinci system (Intuitive Surgical Inc.) for a diagnosis of stage IV deep endometriosis. The patient presented with 5 cm left ovarian endometrioma, an infiltration of the left posterior parametrium, and bilateral ureteral endometriosis. Once inside the pelvic cavity, deep intestinal infiltrating endometriosis implants were confirmed as triple, multicentric, and multifocal lesions, affected distal sigmoid, rectosigmoid junction, and upper rectum. An expert multiple excision, sparing the intestinal mucosa, was performed. To our knowledge, this is the first description of a multiple robotic shaving of multicentric endometriotic intestinal lesions. After the surgery, a normal diet was quickly restored, accelerating the recovery of the physiological peristalsis and the overall recovery time.

**Keywords:** Fertility preservation, Robotic surgical procedures, Rectal shaving, Endometriosis

**Received** October 11, 2022

**Revised** May 18, 2023

**Accepted** May 27, 2023

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## INTRODUCTION

Endometriosis is a benign gynecological disease characterized by the presence of endometrial tissue outside the uterus. The real challenge of the disease consists in the need to balance the expected benefits of radical surgery with potential iatrogenic damage related to an aggressive approach and in the

involvement of non-gynecological sites (mainly the urinary and/or intestinal tracts).

While the rectum and/or sigmoid are involved, conservative and radical surgeries are, nowadays, the two main ways to operate. Nodules, the removal of the endometriotic nodule, represents the conservative method and it is performed by rectal shaving, mucosal skinning, or disk excision. The resection

of the intestinal segment involved in the disease, with primary colorectal anastomosis, with or without protective ileostomy, depicts the “radical” approach [1].

Clinical symptoms related to intestinal endometriosis can be abdominal pain or bowel dysfunction; when the main symptom reported by the woman is general pain (chronic pelvic pain, CPP) rather than fecal obstruction by lumen restriction, the resulting discomfort is multifactorial and includes inflammation, neurogenic inflammation, neuroangiogenesis, peripheral and central sensitization [2].

Inflammation is mediated by several mediators. Interleukin (IL)-8 and IL-1 $\beta$  are elevated in the peritoneal fluid of women with endometriosis who have reported CPP. Unmyelinated nerve fibers produced by neuroangiogenesis have also been identified as strongly implicated in the genesis of CPP [2].

These findings partly explain the discrepancy between pain severity and lesion size in women with gross lesions. Moreover, chronic pain frequently recurs within 12 months of removal of the lesion, even in the absence of its macroscopic regeneration [3].

Furthermore, there is a clear discrepancy between these observations and the traditional theory that pain associated with endometriosis depends solely on the number, extent, and location of the lesions. Therefore, the idea that the greater the removal of the lesion, the greater the expected benefit in terms of pain relief, must be questioned and more tailored solutions must be proposed for each patient.

We report the case of a woman with a large infiltrating endometriotic intestinal nodule, perceived at clinical evaluation and visualized with both transvaginal ultrasound (US TV) and magnetic resonance imaging (MRI). After surgical consultation for possible segmental intestinal resection, she was treated with triple mucosal skinning of the sigmoid and rectum.

## CASE REPORT

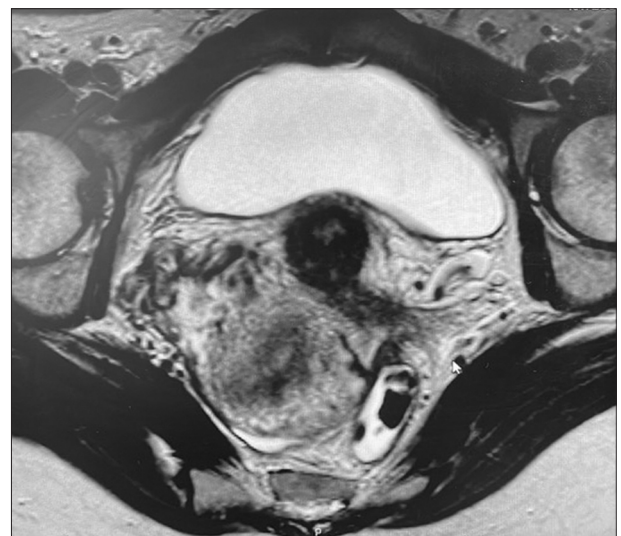
A 29-year-old woman was scheduled for robotic surgical treatment of a 5-cm left ovarian endometrioma, excision of left posterior parametrial endometriosis, bilateral ureteral adhesiolysis, and intestinal deep intestinal infiltrating endometriosis (DIE) implant nodulectomy with possible intestinal segmental resection at the rectosigmoid junction.

In 2019, she was diagnosed with intestinal and parametric endometriosis confirmed by clinical gynecological examination, US TV, and MRI. While she complained of CPP (visual analog scale [VAS] 8), dyspareunia (VAS 9), and dysmenorrhea (VAS

10), neither constipation nor other difficulties in passing stool were present. In the first 8 months, she had been treated with 2 mg/day of dienogest; then, due to the spotting, she took 5 months of low doses of estroprogestin, always continuously. In the last 12 months, finally, she returned to dienogest. Every 6 months, she was seen in a specialized endometriosis center, with a gynecological examination and pelvic and renal ultrasound, and reported an acceptable quality of life. The intestinal nodules were monitored regularly to identify a possible enlargement, despite the well-being derived from the medical treatment. The urinary tract was also periodically evaluated, to identify any early signs of kidney dysfunction, as hydronephrosis can develop silently. However, after 2 years of medical treatment, she became a poor responder. The pain was no longer controlled with VAS 8 for CPP, VAS 9 for dyspareunia, and, for the first time, VAS 7 for pain on defecation.

Informed about the possible side effects of gonadotropin hormone-releasing hormone therapy (such as spotting, weight gain, decreased libido, mood disturbances, vaginal dryness, or headache), she refused to take it.

The last US TV carried out in 2021, showed no changes in the shape and size of the nodules. Similarly, the MRI (Fig. 1) performed in the same institution by the same radiologist, did not show differences in the shape and size of the intestinal localization: sigmoid infiltration involved more than 50% of the muscular layer, and the thickening of the submucosa was also described, although the percentage of involvement was not specified. At least two multifocal lesions with a diameter of >2



**Fig. 1.** Preoperative magnetic resonance imaging.

cm was reported.

The robotic radical surgical treatment with the Da Vinci Xi Surgical System (Intuitive Surgical Inc.) was planned. Informed consent was obtained for both mucosal excision and segmental resection. A preoperative administration of maltodextrins was used.

Under general anesthesia, robotic arms were docked on the supraumbilical line, at 8 cm one from another. Four arms were used: the central one for the endoscope (both 0° and 30° were used), on the left side the Maryland forceps and the grasper, and on the right side the scissors. One accessorial trocar (Airseal, CONMED Corp.) was placed in the right iliac fossa.

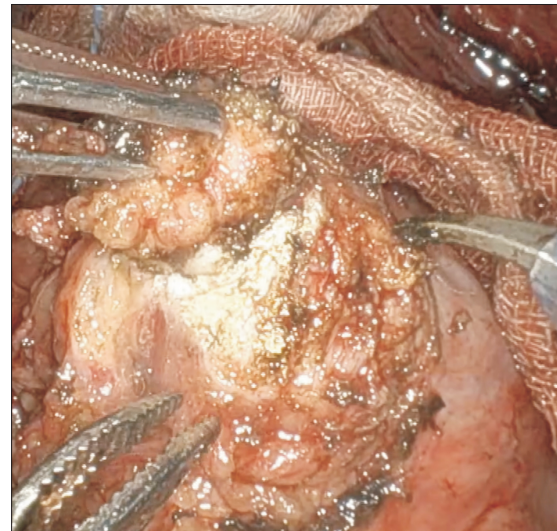
The patient was placed in Lloyd Davies position and a 22° Trendelenburg was applied. The pneumoperitoneum was kept at 10 mmHg. Once left ovarian cyst enucleation with ovarian suspension, adhesiolysis, and restoring of Douglas pouch were completed, the general surgeon was called into the operative room to perform shaving by reverse technique. The endometriotic nodule was macroscopically confirmed as a triple multicentric and multifocal lesion located on the distal sigmoid: 2 cm in diameter; 1.5 cm in diameter, 2 cm apart and located at the rectosigmoid junction; and 2 cm in diameter, 4 cm apart and located in the upper rectum (Fig. 2).

The general surgeon evaluated both the possibility of a mucosal excision and a segmental resection, deciding on a multiple-skilled excision. One by one the nodules were removed with cold scissors, leaving the intestinal mucosa intact and closing the muscle layer with two continuous 3-0 monofilament sutures (Fig. 3). The final distance between the sutures was <2 cm (Fig. 4). At the end of the procedure, gas and blue dye tests

were performed to detect the presence of any occult rectal perforation. Although these tests may be reassuring, there is a possibility that necrosis will occur due to a thermal rectal injury, which subsequently results in a late rectovaginal fistula.

Intraoperative fluid administration was <2,000 mL, total blood loss was 80 mL, and the operating time was 156 minutes. Two drainages were placed in the abdomen. In the immediate postoperative period, prevention of hypothermia was carried out with active warming with an air blanket. She had no prophylactic nasogastric tube.

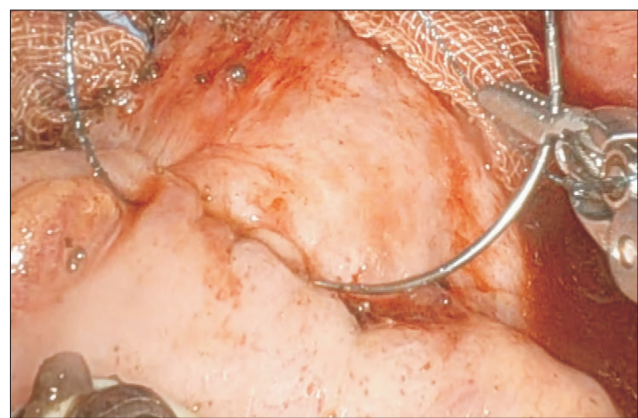
Antibiotics were administered for 3 days; metronidazole of 1,500 mg/day intravenously and amoxicillin-clavulanic acid of 3 g/day intravenously. Postoperative prophylaxis for nausea and vomiting was administered using 1 mg of droperidol, 4 mg of ondansetron, and 4 mg of betamethasone. Thrombo-prophy-



**Fig. 3.** Progressive enucleation of the sigmoid lesion.



**Fig. 2.** Lesion at the rectal wall-inverse technique.



**Fig. 4.** Final appearance of the double suture.

laxis was administered with subcutaneous low-weight heparin (4,000 IU/day). The first abdominal drain was removed on day 1, and the other on day 2.

According to ERAS (Enhance Recovery After Surgery), she was fed a clear liquid diet on day 1, a soft diet on day 2, and a normal diet on day 3. She mobilized on day 1. She passed gas on day 2, solid stool type 4 according to Bristol Stool Chart (BSC) on day 3 and was discharged on day 4 with 10 g/day for 10 days of an osmotic laxative.

Follow-up visits were carried out 10 and 30 days after surgery without any complications being reported. On day 30, there was no discomfort with defecation, with stools of type 4 BSC. Moreover, abdominal pain was not present upon resuming work. Two months after the surgery, she reported the resumption of normal sexual activity and a high quality of life.

## DISCUSSION

Rectal shaving consists of the removal of the DIE nodule from the muscle layer of the intestinal wall possibly avoiding opening the intestinal lumen. Depending on the depth of the resection, the intestinal wall defect may or may not be sutured. Rectal shaving can be performed in two ways: the traditional and the reverse techniques. With the traditional technique, first, the nodule is removed from the anterior rectal wall and then the retrocervical area and posterior vaginal fornix are treated. In the reverse technique, the nodule is first removed from the retrocervical area and the posterior vaginal fornix, with or without colpectomy, and secondarily it is shaved from the anterior wall of the rectum [3]. Mucosal skinning keeps the mucosa intact, while the DIE nodule is removed through the layers of the intestinal wall. The defect in the rectal wall is sutured at the end of the procedure and must be performed by reverse technique to quickly check for any opening of the mucosa.

Full-thickness anterior rectal wall excision or disk excision consists of removing the DIE nodule from the bowel including all layers of the anterior rectal wall. The nodule can be excised using cutting instruments such as scissors or harmonic scalpel (Thunderbeat, Olympus) that simultaneously cut and cauterize the tissue thanks to ultrasound energy, or by employing a transanal circular suturing stapler. The typical indication for this procedure includes intestinal DIE lesions on the anterior wall of the rectosigmoid, less than 30 mm in diameter and affecting less than one-third of the intestinal circumference [1-4].

According to Donnez [5], when the shaving technique is performed by skilled surgeons and well-trained teams, more than

95% of deep endometriosis (DE) nodules can be treated with a low complication rate. In particular, rectovaginal fistulas, anastomotic leaks, delayed bleeding, and long-term bladder atony are much more frequent after rectal resection [6]. Furthermore, the relapse rate is comparable.

In a review of the literature, Donnez and Roman [6] specifically reported that anastomotic leaks (0%–4.8%), pelvic abscesses (0%–4.2%), rectovaginal fistulas were higher both after rectal resection (0%–18.1%) and disk excision (0%–11.6%), compared to the shaving technique (0%–2.3%). A consensus of experts reported >85% pain relief after complete resection of the DE nodule with the shaving technique [7], confirming that DE surgery significantly reduces pain symptoms. Comprehensive DE surgery improves both qualities of sex-life and overall quality of life, and this improvement remains stable 6 months after surgery [8].

Having established that a less radical approach potentially involves fewer complications with an optimal decrease in symptoms, the main points that are still debated and there is no consensus in the literature concerning the number, diameter, location, and distance between lesions.

Based on the size of the lesion, the presence of a single nodule >3 cm is considered an indication of bowel resection. The presence of multiple multicentric nodules of intestinal DE is also considered an indication for resection [9,10]. As far as the localization is concerned, the sigmoid and rectum are two different anatomical parts of the entire intestine with different functions, diameters, and thicknesses. Final reabsorption from the intestinal content occurs at the sigmoid level to allow the storage of stools in the rectal ampoule before evacuation. Since the muscle layer of the rectal wall is thicker than that of the sigmoid, shaving is better tolerated by the rectum than by the sigmoid. In the literature, the description of multiple robotic mucosal shaving of the sigmoid and rectal mucosa has not yet been reported.

In our case, the removal of a triple multicentric/multifocal endometriotic lesion of the sigmoid and rectum in a strongly symptomatic woman was possible thanks to the robotic approach that allowed a very precise skinning and a double-controlled suture. The best view of the three-dimensional system allowed one to perform a complete shaving with cold scissors, preserving the integrity of the mucosa using monopolar or bipolar energy. We believe that a minimally invasive surgical approach has been made possible thanks to better vision and more degrees of movement, which are hardly achievable by other means.

Since the surgery which also included ureteral dissection and left parametric excision of the endometrioma lasted more than 120 minutes, we decided to recover a rapid normal diet post-operatively, to normalize the catabolic response and cope with the increase in metabolic demands. This approach, despite the multiple sutures, accelerated the recovery of bowel movements and the recovery time. In our case, the robotic approach allowed personalized treatment, quick recovery to normal life, and the complete resolution of the pain after only 60 days from the operation.

## Notes

### Ethical statements

This report has been written following CARE guidelines for case reports. According to Italian law, no formal institutional review board or ethical committee permission was required (Agenzia Italiana del Farmaco Guidelines for Observational Studies; March 20, 2008). The informed consent for the procedure and for the publication of this case report, along with the accompanying images, was obtained. The procedure was performed in accordance with the best clinical practice recommendations.

### Authors' contributions

Conceptualization: GG

Supervision: AMM

Writing—original draft: GG

Writing—review & editing: MA, GF, PPB, MCS

All authors read and approved the final manuscript.

### Conflict of interest

All authors have no conflicts of interest to declare.

### Funding/support

None.

### Data availability

The data presented in this study are available on request from the corresponding author.

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