



## Transvaginal Specimen Extraction after Laparoscopic Colorectal Resection: Multicentre Observational Study

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### Abstract

**Background:** Complications related to abdominal wall incisions as infection, pain or incisional hernia are the most common problems in abdominal surgery. New laparoscopic techniques such as Natural Orifice Specimen Extraction (NOSE) allow a reduced rate of surgical site infection and incisional hernia with the avoidance of a laparotomy. We present the experience of one multi-institutional surgical team in transvaginal assistance for minimally invasive colorectal procedures.

**Methods:** Retrospective multicenter review of consecutive colorectal minimally invasive resections with transvaginal assistance and specimen extraction from June 2008 to January 2016. We included female between 45 and 65 years old, with colorectal laparoscopic resection and absence of gynaecological disease.

**Results:** 24 women were included in the study. Laparoscopic approach was employed in 12 patients (50%), mini laparoscopy in 11 (45.8%) and one patient was operated by umbilical-single-port using SILS™ device (4.2%). The mean postoperative hospital stay was  $6.39 \pm 3.56$  days (range 3 to 17). Three patients (12.5%) had complications, two of them presented anastomotic leakage (8.33%) with non-operative treatment and one patient (4.16%) had prolonged postoperative ileus. No late complications were reported.

**Conclusions:** Transvaginal specimen extraction for colorectal resection has low incidence of surgical complications and adequate short-term oncological results. Decreasing the risk of infection and incisional hernia and also better cosmetic result.

**Keywords:** Transvaginal; Laparoscopy; Colorectal

### Introduction

Complications related to abdominal wall incisions as infection, pain or incisional hernia are the most common problems in abdominal surgery. Several studies comparing laparoscopic to open surgery have demonstrated less stress and inflammatory response for the laparoscopic approach, resulting in less damage to the peritoneum and postoperative intra peritoneal adhesions [1-4]. However some studies report the same incidence of incisional hernia and wound infection in midline incision for specimen extraction than in open surgery [5-6]. Laparoscopic surgery is changing and nowadays we have emerging new techniques such as minimal invasive laparoscopy, Natural Orifice Trans Luminal Surgery (NOTES) or Natural Orifice Specimen Extraction (NOSE). This last technique includes transvaginal extraction, providing a reduced rate of surgical site infection and incisional hernia with the avoidance of a laparotomy. The NOTES technique has been realized through different approaches: Transgastric was the initial one followed by the transvaginal, transcolonic and transurethral. This minimally invasive approach was not only used to access the abdominal cavity and some procedures made in the mediastinum with a transoesophageal approach were described. The most popular one is the Per-Oral Endoscopic Myotomy (POEM), procedure that is called to be the alternative to the laparoscopic myotomy for achalasia [7]. The trans gastric approach presented problems such as the peritoneal contamination and the difficulty to close the gastrotomy. The transvesical approach had the size's limitation for the introduction of instrumentation and specimen extraction. Regarding the transrectal approach it seems to be an alternative for rectal and distal colonic procedures, not a way to access the peritoneal cavity and to perform non-colorectal intra peritoneal procedures. The transvaginal access has been confirmed to be ideal for NOTES procedures, not only as an entry-point into the abdominal cavity even more

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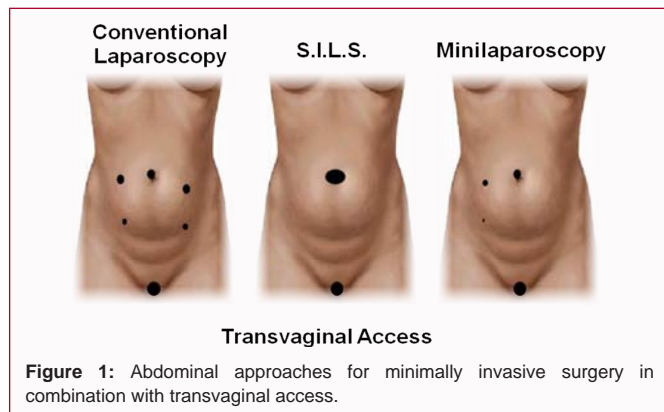
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**Figure 1:** Abdominal approaches for minimally invasive surgery in combination with transvaginal access.

important to remove the specimen with a low complication's rate and avoidance of the mini laparotomy. In the first years this approach was getting more popular mostly in cholecystectomy and bariatric surgery and nowadays the approach is gaining adepts in colorectal minimally invasive surgery and in collaborations with gynaecologists [8]. We present the experience of one multi-institutional surgical team in transvaginal assistance for minimally invasive colorectal procedures.

## Methods

Retrospective multicenter review of consecutive colorectal minimally invasive resections with transvaginal assistance and specimen extraction. The surgical procedures were performed in three Spanish hospitals (Hospital Son Llàtzer – Palma, Hospital General Universitario – Valencia and Complejo Hospitalario Universitario – A Coruña) from June 2008 to January 2016. The team's surgeons realized the surgical training for NOTES procedures and clinical transvaginal approach at Hospital Son Llàtzer in 2007 and they moved later to the other centres where they implemented the technique. The patients signed a specific informed consent for a transvaginal approach and the protocol of the prospective studies and the retrospective data collect were authorised by the Ethical Committee. The inclusion criteria were: female between 45 and 65 years old, indication for surgery with colorectal laparoscopic resection and absence of gynaecological disease. All the patients had at least 18 months of postoperative follow-up to test the incidence of postoperative complications.

## Surgical techniques

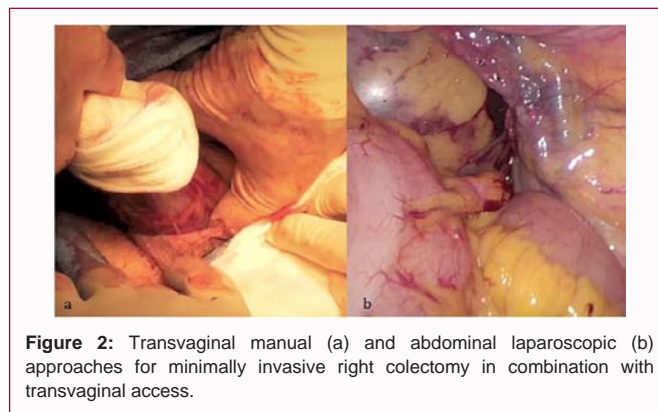
In all clinical cases the abdomen was insufflated to 12 to 14 mmHg using a left upper-quadrant Verses' technique or an open umbilical approach in single-incision-technique (Figure 1).

### Abdominal access

It was performed according to the surgeon's choice, using the conventional laparoscopic approach, mini laparoscopic or SILS™ device.

- In laparoscopic approach we used 3 to 5 trocars according to need. A 12-mm camera port is placed at the umbilicus. The other trocars were placed according to the planned resection.

- In mini laparoscopic approach surgeons used 3 trocars. One 5-mm trocar at the umbilicus for the optics, a 3 to 5 mm trocar for the left hand of the surgeon and a 5 mm to 12 mm trocar for the right hand, according to the planned resection and the location of the disease.



**Figure 2:** Transvaginal manual (a) and abdominal laparoscopic (b) approaches for minimally invasive right colectomy in combination with transvaginal access.

- In SILS technique the surgeon performed an umbilical incision (3 cm) and introduced the SILS™ device with 3 working channels, 1 of 12 mm and 2 of 5 mm.

### Vaginal access

Location with finger exploration of the posterior vaginal fornix. Introduction of a 15-mm trocar that was used as port assistance. In all cases the surgical specimen extraction was performed through this approach with a wide protection by a plastic bag (Figure 2).

### Resection method

The tumour's resection was carried out according to the standard oncological technique and the reconstruction was made with a mechanical intracorporeal anastomosis.

## Results

Between June 2008 and January 2016, 340 patients underwent minimally invasive colorectal surgery in the 3 centers. Of them 24 women were included in the study with a mean follow up of  $2.18 \pm 0.6$  years. Table 1 shows the clinicopathological characteristics of the patients. Ten patients (41.7%) had right colon tumour, nine of them with adenocarcinoma and one with a low grade tubulovillous adenoma. Another six patients (25%) had sigmoid neoplasia, five (20.8%) a rectal tumour and three cases (12.5%) had sigmoid diverticular disease. Laparoscopic approach was employed in 12 patients (50%), mini laparoscopy in 11 (45.8%) and one patient was operated by umbilical-single-port using SILS™ device (4.2%). The operative time range from 110 to 300 minutes (mean  $187.08 \pm 56.81$ ). The mean postoperative hospital stay was  $6.39 \pm 3.56$  days (range 3 to 17): for right hemicolectomy was  $7.8 \pm 4.78$  days, for sigmoidectomy  $5 \pm 1.3$  days and for low anterior resection was  $5 \pm 0.81$  days. Three patients (12.5%) had complications, two of them presented anastomotic leakage (8.33%) in the right hemicolectomy group, both cases had liver metastases disease and were managed with conservative treatment. The other complication was a patient (4.16%) with a prolonged postoperative ileus in a laparoscopic sigmoidectomy treated with prokinetic drugs. No incisional infections or hernia were reported at 18-month follow-up. In late follow up four deaths were reported due to disease progression, all of them in stage IV at diagnosis (range 11–23 postoperative months). None of the patients had local recurrence or port-site metastases and none of our patients experienced complications related to the transvaginal extraction like surgical infection site, metastases at the vaginal access or dyspareunia.

## Discussion

Several techniques of minimally invasive approach for colorectal

**Table 1:** Clinicopathologic characteristics of patients.

Characteristics	Value
Age (years)	61.43 ± 13.38
BMI (kg/m <sup>2</sup> )	24.79 ± 4.53
<b>Diagnosis</b>	
Colon cancer	20
Diverticular disease	3
Tubulovillous adenoma	1
<b>Surgical Procedure</b>	
Righth hemicolectomy	10
Sigmoidectomy	9
Low anterior resection	5
<b>Surgical Approach</b>	
Laparoscopic	12 (50%)
Mini-laparoscopic	11 (45.83%)
Single- port (SILS™)	1 (4.17%)
Surgical time (min)	187.08 ± 56,82 6.39 ± 3.56
Hospital stay (days)	6.39 ± 3.56
<b>Tumor Size (T)</b>	
T	3 (12.5%)
T1	1 (4.2%)
T2	2 (8.3%)
T3	13 (54.2%)
T4	1 (4.2%)
<b>Lymph Nodes Involved (N)</b>	
N0	10 (41.7%)
N1	4 (16.6%)
N2	6 (25%)

surgery have been described. The most popular for general surgeons is the transumbilical single-access for colorectal resection and specimen extraction. A disadvantage for transumbilical single port access is the need of a wider incision in cases of large tumors, increasing the risk of incisional hernia and also a worst cosmetic result. The minimally invasive surgery through natural orifices has revolutionized the laparoscopic surgery for abdominal procedures. The transvaginal approach for nongynecological intraperitoneal procedures like colorectal resections seems to be a valid option. In the review by Noguera et al. [8] (Noguera JF, Martín G, Muñoz JM, Melero A, Sánchez R, Valdivia J et al. Transvaginal Approach for Nongynecologic Intraperitoneal Procedures. *International Journal of Clinical Medicine* 2014; 5:1417-1429) the transvaginal approach is safe when it is used as an additional port to help in the laparoscopy and to extract the surgical specimen in cases of cholecystectomy, appendectomy and colonic and rectal resections. It is well known that postoperative pain and postoperative abdominal hernia are related to the size, number and location of the incisions in the abdominal wall [9]. In a systematic review from Kahn moui et al. [10] the reported incidence of extraction site infection is 0 to 9%, so to avoid the assistance laparotomy in the abdomen may be a great benefit for the female patients. Additionally, some studies [9-12] have reported that intracorporeal laparoscopic anastomosis has been found to be superior to extracorporeal anastomosis, with a significant reduction in analgesic requirement, earlier bowel activity and shorter hospital

stay. The transvaginal approach allows avoid an incision and it offers optimal results for colorectal surgery and additional benefits such as the aesthetic and the faster functional recovery. In fact, only one of our 24 patients (4.16%) included in this review presented a prolonged postoperative ileus, delaying oral intake to fifth postoperative day. On the other hand, NOTES can be considered safe for oncological results [7,13]. Resection margins and the number of harvested lymph node seem to be oncological adequate without any report of vaginal metastasis [9]. Similar results are found in our clinical series. A case-control study compared the outcome between standard laparoscopic right colectomy and laparoscopic one with transvaginal NOSE, founding similar oncological outcome with a decrease in postoperative pain and hospital stay with a faster functional recovery. In our study we did not found any complication related with the transvaginal specimen extraction. The postoperative complications resulting from transvaginal access route in early period described in literature are: vaginal bleeding, surgical site infection at the posterior vaginal fornix and transvaginal bowel evisceration, being vaginal bleeding the most frequent (2% to 18%) [14-16]. In gynaecological literature for fertiloscopy the reported rate of infection was 0.01% and they appears to be related mainly to the accidental opening of the rectum [17]. Other described complication is dyspareunia that can be at early and late postoperative period but the reported rates are not significant after posterior colpotomy and specimen retrieval [18,19]. Anastomotic leakage is one of the most serious complications in colorectal surgery. Reported leak rates range from 1.5% to 16 %, however definitions of leaks differs between published studies [20]. Furthermore, a review by Kingham and Pachter reported that experienced colorectal surgeons often quote 3% to 6% as a generally acknowledged overall leakage rate [21]. In our series we had 8.3% of anastomotic leakage. This percentage is higher than the describe in literature, however we think is due to our small sample size (24 patients) and also could be related the oncological characteristics, because both patients were in clinical stage IV.

## Conclusion

The transvaginal specimen extraction for colorectal resection in minimal invasive surgical approach has similar outcomes than laparoscopic approach, with a low incidence of surgical complications and adequate short-term oncological results. Adding the benefit of avoid an assistance incision for specimen extraction decreasing the risk of infection and incisional hernia, and also better cosmetic result.

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