

Transvaginal Specimen Extraction in Minimally Invasive Colorectal Resections: Initial Experience of a Tertiary Referral Hospital

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ABSTRACT

Purpose: The aim of the present (this) study is to present the initial experience of a single team on specimen extraction from the vagina after laparoscopic or robotic colorectal resections.

Patients and methods: Between January 2010 and April 2015, ten female patients whose resection specimens had been extracted transvaginally after robotic or laparoscopic colorectal resections were evaluated in terms of short and mid term postoperative outcomes.

Results: 10 cases were included. The operations were robotic rectal resections for cancer (n=6), laparoscopic total colectomy for transverse colon tumor (n=1), single port laparoscopic transumbilical right colectomy for Crohn's disease (n=1), laparoscopic rectal resection for endometriosis (n=2). In one patient, a vaginal bleeding occurred on postoperative day 7 and a vaginal tampon was inserted and the bleeding was stopped. One patient had a urinary tract infection, it was treated with proper antibiotic therapy. The median postoperative hospital stay was 5 (4-9) days. No mortality occurred.

Conclusion: Transvaginal specimen extraction is feasible after colorectal resection and could prevent additional skin incision and its potential complications.

Keywords: Transvaginal specimen extraction, natural orifice specimen extraction, minimally invasive surgery, laparoscopic colorectal surgery, robotic surgery

MİNİMAL İNVAZİV KOLEREKTAL CERRAHİDE TRANSVAJİNAL SPESİMEN EKSTRAKSİYONU: ÜÇÜNCÜ BASAMAK BİR HASTANEDE İLK DENEYİM

ÖZET

Amaç: Bu çalışmanın amacı, ekibimizin laparoskopik ya da robotik kolorektal rezeksiyon sonrasında transvajinal spesimen çıkartma ile ilgili ilk deneyimini sunmaktır.

Hastalar ve yöntem: Ocak 2010-Nisan 2015 tarihleri arasında, robotik veya laparoskopik kolorektal rezeksiyon sonrası transvajinal olarak rezeksiyon örneği çıkarılmış on kadın hasta, kısa ve orta dönem ameliyat sonrası sonuçları açısından değerlendirildi.

Bulgular: 10 olgu dahil edildi. Operasyonlar, robotik rektal kanser rezeksiyonu (n=6), transvers kolon tümör için laparoskopik total kolektomi (n = 1), Crohn hastalığı için tek port laparoskopik transumbilikal sağ kolektomi (n = 1), endometriyozis için laparoskopik rektal rezeksiyon (n = 2) idi. Bir hastada postoperatif 7. günde vajinal kanama görüldü, vajinal tampon ile kanama kontrolü sağlandı. Bir hastada üriner enfeksiyon görüldü, antibiyoterapi ile tedavisi sağlandı. Postoperatif medyan hastanede kalış süresi 5 (4-9) gündü. Mortalite gözlenmedi.

Sonuç: Kolorektal rezeksiyondan sonra transvajinal spesimen çıkartma yapılabilir ve bu yolla ilave cilt insizyonu ve buna bağlı potansiyel komplikasyonlar önenebilir.

Anahtar sözcükler: Transvajinal spesimen çıkarma, natural orifis spesimen çıkarma, minimal invaziv cerrahi, laparoskopik kolorektal cerrahi, robotik cerrahi

Minimally invasive approaches have been evolved rapidly in the field of colorectal surgery since the first description of laparoscopic colectomy for colon cancer by Jacobs in 1991 (1). While colorectal resections can be done with totally laparoscopic techniques, an additional incision is required for specimen extraction (SE) from the abdominal cavity. Every additional skin incision could increase the risks for postoperative complications such as pain, infection, hematoma and incisional hernia. Extraction of the specimen via natural orifices such as the vagina or rectum may decrease the risks related with a skin incision. In recent years, natural orifice transluminal endoscopic surgery (NOTES) (2,3) has come on the scene. However, there is a need for additional technological improvements to achieve a pure NOTES procedure on the surgical equipment. Single access surgery and natural orifice SE (NOSE) are the preliminary procedures to define the requirement and season?? the surgeons for performing NOTES (4,5).

We have applied new techniques to reduce incision sizes and creating less invasive techniques for years (6-9). Majority of the colorectal surgeons are not familiar with surgical access via the vaginal route and transvaginal extraction of the specimen. The aim of the present study is to present the initial experience of a single team on SE from the vagina after laparoscopic or robotic colorectal resections.

Patients and methods

between January 2010 and April 2015, robotic and laparoscopic colorectal resections with a transvaginal SE were included in the study. The investigation conforms to the principles outlined in the Declaration of Helsinki. Hospital records of the patients including the demographics, operative technique, length of hospital stay, histopathological data, operative and short-term postoperative outcomes were analyzed.

Our exclusion criteria for a robotic resection are similar to the general concepts of laparoscopic surgery (10). The patients were evaluated with colonoscopy and abdominopelvic computed tomography preoperatively to decide the operative strategy. A histologic evaluation had been performed for all the patients before the surgery if needed. In rectal cancer patients ERUS and/or MRI were performed additionally. The patients who had extraperitoneal rectal tumors staged as cT3-T4 or any cN positive were treated by 5-week neoadjuvant chemoradiation therapy (NCRT). Surgery was planned within 6–8 weeks after completing NCRT. Total mesorectal excision (TME) was done for the tumors located within 1 to 8 cm proximal from the

puborectal ring whereas partial mesorectal excision (PME) was performed for the tumors located above 8 cm from the puborectal ring.

The patients underwent a standard bowel preparation protocol comprising a fiber free diet for two days and 90 ml Na-phosphate soda one day before the surgery except a patient with Crohn's disease. All patients received venous thrombosis prophylaxis 12 hours before the operation and antibiotic prophylaxis after the induction of general anesthesia. After the induction of general anesthesia, a prophylactic broad-spectrum antibiotic was given to all patients. We only inserted a povidone-iodine suppository for the transvaginal assisted single port right colectomy a day before surgery. None of the other patients received any suppository or any other antiseptic procedure until the surgery. There were various technical changes as a result of the differences between the types of surgical approaches. The patients received one of the following operations: transvaginal assisted totally laparoscopic single port transumbilical right colectomy, robotic low anterior resection, laparoscopic total colectomy. Transvaginal extraction of the specimen was performed with the same technique after the resection of the tumors had been completed in all patients.

Robotic low anterior resection

The da Vinci robotic system was used for the surgery. Medial to lateral (vascular approach) technique was used in all operations. The principles of the oncologic surgery were also considered. The operative steps of the surgery were similar to the open or laparoscopic approaches (7).

Transvaginal assisted totally laparoscopic single port transumbilical right colectomy

The SILS™ Port (12 mm, Covidien AG, Norwalk, Connecticut, USA), a 5-mm flexible laparoscope with an integrated camera (EndoEYE LS, Olympus®, Orangeburg, New York), using the HD-TV EXERA 2 System (LTF-VH, Olympus®, Orangeburg, New York) and ultracision (Harmonic Scalpel Ace®, Ethicon Endo-Surgery, Cincinnati, USA) were used in the surgery. The detailed operative technique of transvaginal assisted single port transumbilical right colectomy has been described previously (8).

Laparoscopic total colectomy and total hysterectomy

The operation had two steps.

Step 1. Laparoscopic total hysterectomy

This part of the procedure was performed by an experienced gynecologist for myomatous uterus. Four ports

were used for laparoscopic abdominal hysterectomy. A 10 mm umbilical port for laparoscope, two 5 mm ports for accessory instruments in the left and right iliac fossa, and one more 5mm port on the right lateral side for ultracision (Harmonic Scalpel Ace[®], Ethicon Endo-Surgery, Cincinnati, USA). These port sites were not the usual places (locations) for total hysterectomy. They were also planned for a total colectomy. All the ligaments and vessels were ligated intracorporeally. Then, a posterior colpotomy was performed and the specimen was retrieved from the vagina. A tampon was then inserted into the vagina to prevent gas leakage out of the abdominal cavity.

Step 2. Laparoscopic total colectomy

The 5mm port on the right iliac fossa was replaced with a 12mm port for the endoscopic stapler. The entire colon was mobilized medial to lateral approach. All colonic vessels were high ligated. The Endo GIA stapler was used to transect mid-rectum. Then the vaginal tampon was removed. A wound protector (Alexis[®], Applied Medical, CA, USA) was inserted from the vagina to the abdominal cavity to protect the wound sites. The entire colon was pulled up through the vagina. The terminal ileum was prepared and the anvil of the circular stapler was inserted. A purse-string suture was placed and tightened over the anvil of the stapler and the ileum was returned to the abdomen.

Transvaginal specimen extraction

The posterior colpotomy was performed with a 15-mm trocar to prevent the loss of gas from the abdominal cavity, under laparoscopic vision (Figure A). The specimen was put into an endobag (Endo Catch[™] II 15mm, Covidien, Dublin, Ireland), which was inserted through the vaginal port in order to prevent any possible contamination. After the specimen had been extracted, the vagina was irrigated with a povidone iodine solution. The rectosigmoid was pulled through the vagina (Figure B). A purse-string suture was placed and tightened over the anvil of the circular stapler (Figure C). The colon was then returned to the abdomen. The colpotomy was closed using a continuous 2/0 polyglactac acid suture. The colpotomy incision was inspected using laparoscopy for bleeding and the possibility of any bowel injury during the closure. The colorectal, the ileorectal and the ileocolic anastomoses were performed intracorporeally. A povidone iodine-soaked vaginal pack was placed into the vagina for 12 hours.

In the transvaginally assisted single port transumbilical right colectomy, patient initial posterior colpotomy was performed with a 12-mm trocar to prevent the loss of gas from the abdomen under laparoscopic vision initially



Figure A. Posterior colpotomy with 15mm trocar



Figure B. Specimen extraction

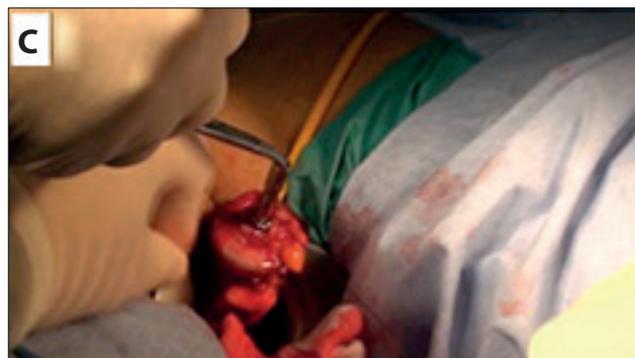


Figure C. Replacement of the anvil of the circular stapler

Because 5-mm instruments were inserted via the 12-mm vaginal port to achieve traction of the bowel segments and to expose the operative field during surgery. When the resection of the right colon had been completed, the 12 mm port was taken out and a 15-mm port was inserted to the posterior fornix (8).

In robotic rectal resection, colpotomy closure was performed intracorporeally with absorbable, continuous suture (Figure D). In other patients, it was performed transvaginally.

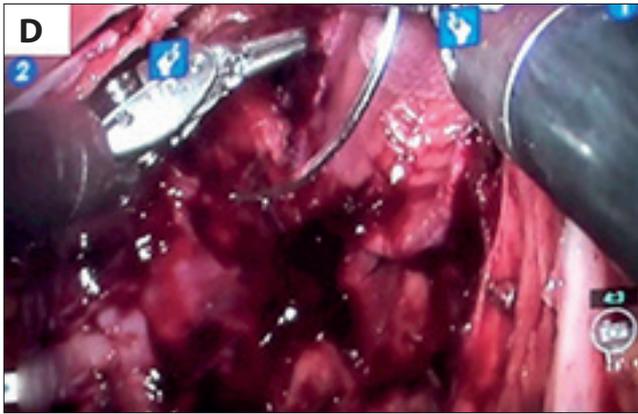


Figure D. Colpotomy closure

Results

Ten female patients underwent robotic or laparoscopic colorectal resection during a five-year period. The mean age was 45.5 (24-65) years. Six patients underwent robotic rectal resection for cancer, one patient underwent laparoscopic total colectomy for a transverse colon tumor, one patient underwent transvaginal assisted single port transumbilical right colectomy for Crohn's disease and two patients underwent laparoscopic rectal resection for endometriosis (Table 1). The specimens were extracted transvaginally. The posterior colpotomy was closed intracorporeally in eight of the patients and transvaginally in two patients. The mean colpotomy closure time was 14 (10-25) minutes.

The median postoperative hospital stay was 5 (4-9) days. In one patient, vaginal bleeding occurred from the posterior wall of the vagina on postoperative day 7 and a vaginal tampon was inserted for 6 hours and the bleeding was stopped. No hemoglobin drop was observed. One patient had urinary tract infection, it was treated with a proper antibiotic therapy. None of the patients had vaginal infections. Dyspareunia was questioned in outpatient clinic follow ups, no patients have complained about any problems in their sex lives. No other complications or mortality occurred during surgery and early postoperative follow up. Patients were followed up for 6 months or longer postoperatively.

Discussion

The operative approach for minimally invasive colorectal surgery has progressed substantially in last decades. Reducing the trocar size (needlescopy) and number of ports (single port) are logical solutions for less invasive and scarless minimal invasive surgery. However, their applicability and overall value in clinical practice is questionable. Decreased wound size is associated with less wound related complications, less pain and enhanced cosmesis (11-12). SE is the final step of every laparoscopic surgery. The incision for SE can be done by enlarging a trocar site incision or creating a new one. An additional incision augments pain, risk of wound infection and hernia formation (13). Making an incision can be complicated in some patients who have

Table 1. The characteristics of the patients.

	Age	Diagnosis	Operation	Histopathology	Tumor size (cm)	Hospital stay (day)	Complications	NCRT
1	29	Crohn's disease	Transvaginal assisted single port right colectomy	Fibrosis and polymorphonuclear cell infiltration	-	4	-	-
2	54	Rectal cancer	Robotic low anterior resection and diverting ileostomy	Adenocarcinoma	6	4	-	-
3	24	Rectal cancer	Robotic low anterior resection and diverting ileostomy	Adenocarcinoma	2	4	-	+
4	65	Rectal cancer	Robotic low anterior resection	Adenocarcinoma	2	5	-	+
5	52	Rectal cancer	Robotic low anterior resection	Adenocarcinoma	5	5	-	-
6	43	Rectal cancer	Robotic low anterior resection	Adenocarcinoma	2	6	Vaginal bleeding	-
7	65	Rectal cancer	Robotic low anterior resection and diverting ileostomy	Adenocarcinoma	0.8	4	-	-
8	55	Transverse colon cancer, myomatosis uteri	Laparoscopic total colectomy, laparoscopic total hysterectomy	Adenocarcinoma	4	9	-	-
9	35	Endometriosis	Laparoscopic low anterior resection, diverting ileostomy	Endometriosis	4	5	UTI	-
10	33	Endometriosis	Laparoscopic low anterior resection, diverting ileostomy	Endometriosis	3	4	-	-

NCRT: Neoadjuvant chemoradiotherapy

large phlegmonous diseases or obesity. Furthermore, SE from a limited area like suprapubic incision may harm the specimen's pathologic quality. The transvaginal approach, which is a way of NOSE, has been used for several years for specimen removal in minimally invasive gynecologic procedures to avoid abdominal wall incisions (14,15). Reduced trauma of the abdominal wall, shortened the length of the skin incision, low or no wound related complications such as evisceration, infection, incisional hernia, causes less pain, represents a faster recovery period and less intraabdominal adhesion could be achieved with NOSE (5,16,17). No wound infection, no mortality, no enterovaginal fistula or no other complications or patient complaints were observed after surgery in our series. In addition to its use for SE, the vagina allows retraction, manipulating, clipping, stapling and sutures during surgery by insertion of a trocar at the beginning of surgery (8).

There are various factors that may complicate the use of vagina as an extraction site. Previous pelvic surgery or radiation could complicate the transvaginal SE. However, we have not faced any difficulty in NCRT received rectal cancer patients while using vaginal way to take the resected specimen out of the abdominal cavity. The complications related

with colpotomy for the removal of pelvic masses from the vagina are extremely low (14). In our patients, we did not observe any catastrophic complication after transvaginal SE. However, the complications of transvaginal SE could be dyspareunia, infection, infertility, bleeding, rectovaginal fistula, trauma to pelvic structures and the risk of pelvic adhesion. One of our patients had vaginal bleeding which was stopped immediately after insertion of a vaginal tampon.

Retrospective nature and low patient number are the drawbacks of our study. Obviously, comparative and prospective randomized trials with higher patient numbers are needed to figure out the role of using transvaginal way in minimally invasive colorectal surgery.

Conclusion

Transvaginal SE could provide an excellent cosmetic body image which may be important for especially young women and could make patients feel less traumatized after/ following the surgery by presenting a scarless abdomen after these types of major resections. This technique could reduce the complications related with additional skin incision and could upgrade the quality of totally laparoscopic procedures besides presenting better cosmesis.

References

- Jacobs M, Verdeja JC, Goldstein HD. Minimally invasive colon resection. *Surg Laparosc Endosc* 1991;1:144-50.
- Zorron R. Natural orifice surgery applied for colorectal disease. *World J Gastrointest Surg* 2010;2:35-8. [\[CrossRef\]](#)
- Chukwumah C, Zorron R, Marks JM, Ponsky JL. Current status of natural orifice transluminal endoscopic surgery (NOTES). *Curr Probl Surg* 2010;47:630-68. [\[CrossRef\]](#)
- Palanivelu C, Rangarajan M, Jategaonkar PA, Anand NV. An innovative technique for colorectal specimen retrieval: a new era of "natural orifice specimen extraction" (N.O.S.E). *Dis Colon Rectum*. 2008;51:1120-4. [\[CrossRef\]](#)
- Ooi BS, Quah HM, Fu CW, Eu KW. Laparoscopic high anterior resection with natural orifice specimen extraction (NOSE) for early rectal cancer. *Tech Coloproctol*. 2009;13:61-4. [\[CrossRef\]](#)
- Karahasanoglu T, Hamzaoglu I, Baca B, Aytac E, Kirbiyik E. Impact of increased body mass index on laparoscopic surgery for rectal cancer. *Eur Surg Res* 2011;46:87-93. [\[CrossRef\]](#)
- Karahasanoglu T, Hamzaoglu I, Baca B, Aytac E, Erguner I, Uras C. Robotic surgery for rectal cancer: Initial experience from 30 consecutive patients. *J Gastrointestinal Surg* 2011 2012;16:401-7. [\[CrossRef\]](#)
- Karahasanoglu T, Hamzaoglu I, Aytac E, Baca B. Transvaginal assisted totally laparoscopic single-port right colectomy. *J Laparoendosc Adv Surg Tech A*. 2011;21:255-7. [\[CrossRef\]](#)
- Hamzaoglu I, Karahasanoglu T, Baca B, Karatas A, Aytac E, Kahya AS. Single -port laparoscopic sphincter-saving mesorectal excision for rectal cancer: report of the first 4 human cases. *Arch Surg* 2011;146:75-81. [\[CrossRef\]](#)
- Chapter in book 4: Bowers SP, Hunter JG. Contraindications to Laparoscopy. In Whelan RL, Fleshman JW, Fowler DL, eds. *The SAGES Manual of Perioperative Care in Minimally Invasive Surgery* (Whelan, the Sages Manual) New York: Springer, 2006 pp 25-32.
- Lacy AM, Garcia-Valdecasas JC, Delgado S, Castells A, Taurá P, Piqué JM et al. Laparoscopy-assisted colectomy versus open colectomy for treatment of non-metastatic colon cancer: a randomised trial. *Lancet* 2002;359:2224-9. [\[CrossRef\]](#)
- Mamazza J, Schlachta CM, Seshadri PA, Cadeddu MO, Poulin EC. Needlescopic surgery. A logical evolution from conventional laparoscopic surgery. *Surg Endosc* 2001;15:1208-12. [\[CrossRef\]](#)
- Zornig C, Emmermann A, von Waldenfels HA, Felixmuller C. Colpotomy for specimen removal in laparoscopic surgery. *Chirurg* 1994;65:883-5.
- Ghezzi F, Raio L, Mueller MD, Gyr T, Buttarelli M, Franchi M. Vaginal extraction of the pelvic masses following operative laparoscopy. *Surg Endosc* 2002;16:1691-6. [\[CrossRef\]](#)
- Boni L, Tenconi S, Beretta P, Cromi A, Dionigi G, Rovera F et al. Laparoscopic colorectal resections with transvaginal specimen extraction for severe endometriosis. *Surg Oncol* 2007;16:5157-60. [\[CrossRef\]](#)
- Ihedioha U, Mackay G, Leung E, Molloy RG, O'Dwyer PJ. Laparoscopic colorectal resection does not reduce incisional hernia rates when compared with open colorectal resection. *Surg Endosc* 2008;22:689-92. [\[CrossRef\]](#)
- Winslow ER, Fleshman JW, Birnbaum EH, Brunt LM. Wound complications of laparoscopic vs open colectomy. *Surg Endosc* 2002;16:1420-5. [\[CrossRef\]](#)