

## Totally Laparoscopic Colectomy for Colorectal Cancer with Natural Orifice Specimen Extraction Combined with Reduced-Port Surgery: Japanese Experience

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Natural orifice specimen extraction surgery (NOSES) has become an alternative approach for the treatment of colorectal cancer without additional incisions on the abdominal wall. However, previous studies showed that multiport technique was used when carrying out NOSES. We applied reduced-port surgery (RPS) technique in performing totally laparoscopic colectomy with transanal specimen extraction (TASE) and transvaginal specimen extraction (TVSE) from 2012. The points of our procedures are as follows: (1) In TASE cases, we attached the multiport access platform into the navel and inserted two to three ports in it to reduce the number of abdominal incisions. (2) In TVSE cases, we attached the same platform to the transvaginal route for transvaginal assistance and smooth specimen extraction. (3) We used needlescopic devices as far as possible. The technique is rather complicated and requires advanced surgical skills. We documented two examples of this ultimately minimal invasive surgery.

### 1 Indications

TASE was indicated for patients with colorectal cancers located in the sigmoid or rectosigmoid colon. TVSE was indicated for menopausal women who previously underwent vaginal delivery with colorectal cancers located from the cecum to the upper rectum. Both procedures were performed for the tumor covered less than half of the colon circumference and clinical stage T3 or lower. However, our opinion is that NOSE with RPS should be indicated only for patients with primary tumors of clinical stage Tis and T1. As the complicated procedures lead to longer operation time, we had better operate with multiport technique in advanced

**Table 40.1** Indications of NOSES

	T1≥	T2, 3	T4a≤
C-D	TVSE	LAC	
S, RS	TVSE/TASE		
Ra	TVSE/TASE or LAC		LAC
Rb- P	LAC (With TaTME)		

LAC laparoscopic assisted colectomy, TaTME transanal total mesorectal excision

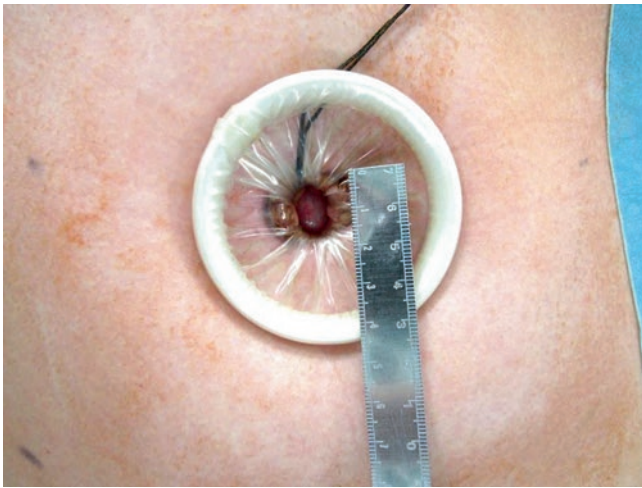
cases. What is important is to select the optimal operation method for the individual patient. We decide it according to the location and depth of the tumor (Table 40.1). Because of the difficulty of colon washing, we do not adopt TVSE with intracorporeal functional end to end anastomosis to advanced right-sided colon cancer to avoid a potential risk of cancer cell dissemination.

### 2 Technique

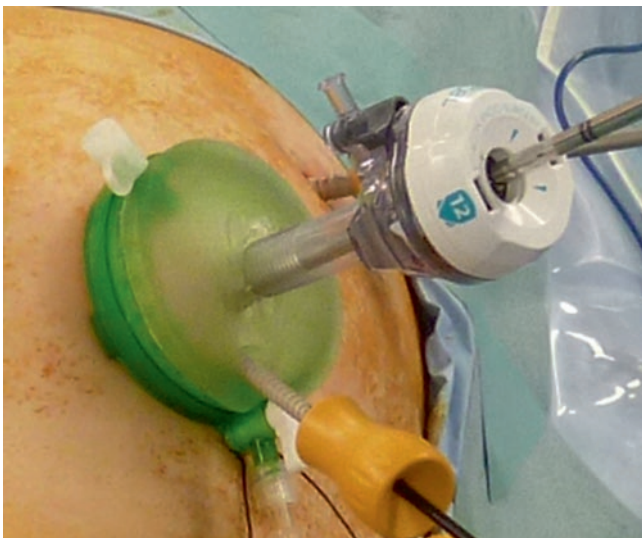
#### 2.1 Totally Laparoscopic Sigmoidectomy with TASE (NOSES IV)+ RPS

1. The patient was positioned in the modified lithotomy position.
2. A GelPOINT® Mini advanced access platform (Applied Medical, Rancho Santa Margarita, CA, USA) was placed through a 1.5–2 cm-long minilaparotomy in the navel (Fig. 40.1). A 12-mm port for a laparoscope or linear stapling device and a 3-mm port for the assistant's forceps were placed in the GelPOINT (Fig. 40.2). The assistant's forceps were used to obtain adequate exposure. The third

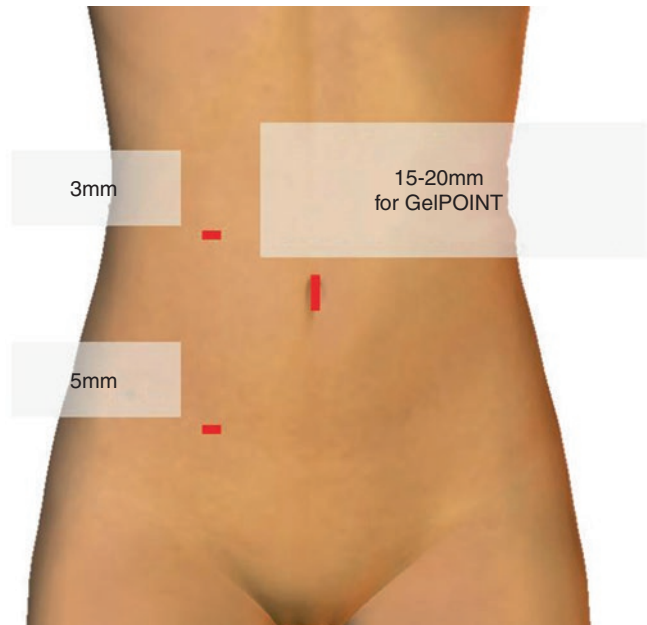
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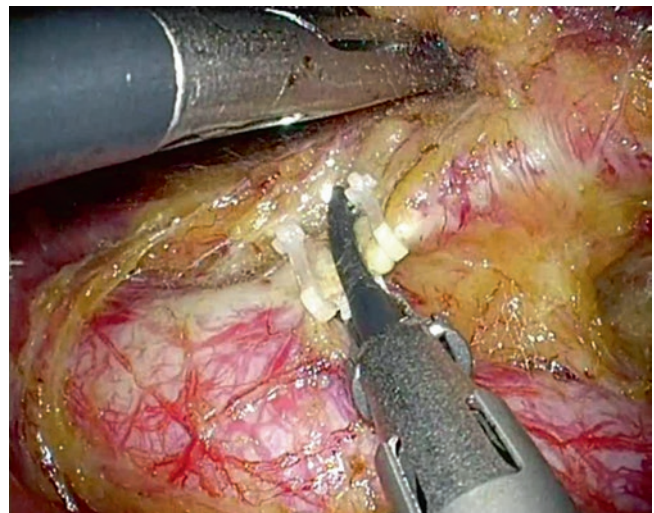
**Fig. 40.1** A GelPOINT® Mini placed through a 1.5–2 cm-long mini-laparotomy in the navel



**Fig. 40.2** Placement of 12- and 3-mm ports in the GelPOINT



**Fig. 40.3** Port placement



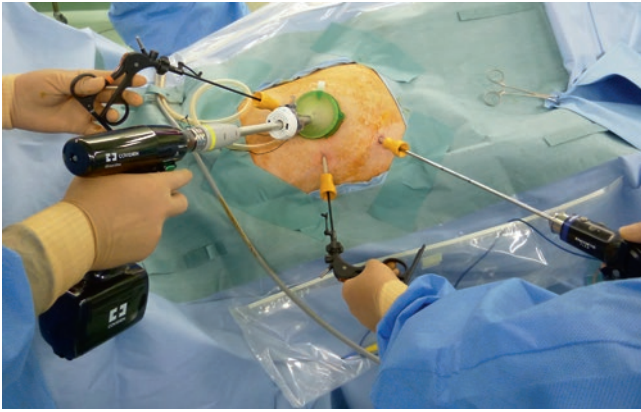
**Fig. 40.4** The inferior mesenteric artery was ligated at its point of origin from the aorta

and the fourth ports were a 5-mm surgeon's operating port in the right lower quadrant, and a 3-mm surgeon's left-hand port in the right middle abdomen (Fig. 40.3).

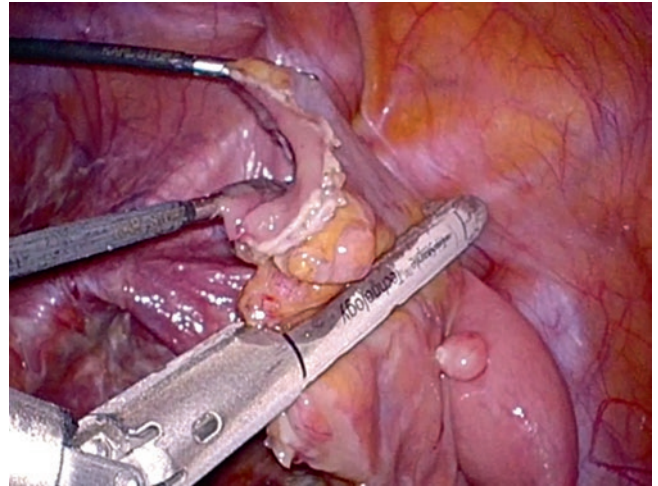
3. The inferior mesenteric artery was ligated at its point of origin from the aorta (Fig. 40.4). After irrigation with 2 liters of diluted povidone-iodine solution, the rectum was transected. Then, the proximal colon was also transected to achieve colectomy. As we needed to insert linear stapler through the navel to transect the colon and rectum, we changed the position of a laparoscope to the 5-mm port in the right lower quadrant (Fig. 40.5).
4. We inserted a "special retractor" through the navel. The transected rectum stump was then opened using laparoscopic coagulation shears. A long Babcock grasper was carefully inserted transanally and one of a pair of retrac-

tor's rings was held and pulled out of the anus. The anvil head attached to the circular stapling device was inserted into the abdominal cavity (Fig. 40.6). Then the specimen was extracted transanally (Fig. 40.7). The retractor was also delivered transanally. Re-close of the rectal opening with a linear stapler through the navel was often difficult. In such cases, adopting the stapler longitudinally will bring good results (Fig. 40.8).

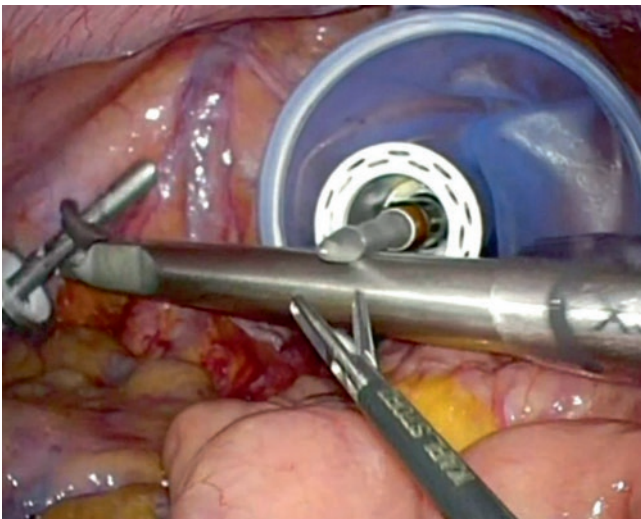
5. The proximal colon was clamped with a detachable clip to set intracorporeal purse-string sutures (Fig. 40.9). The anvil head was inserted into the proximal colon. We used an Endo-loop to fix the anvil (Fig. 40.10). An end to end



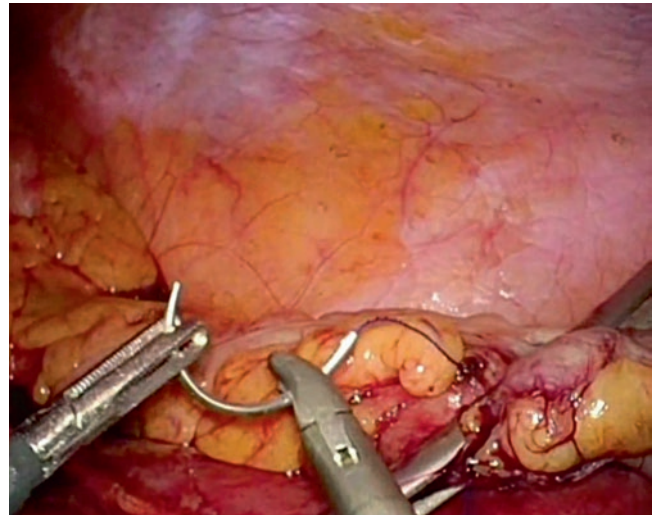
**Fig. 40.5** The rectum was transected by a linear stapler inserted through the navel



**Fig. 40.8** Re-close of the rectal opening longitudinally with a linear stapler



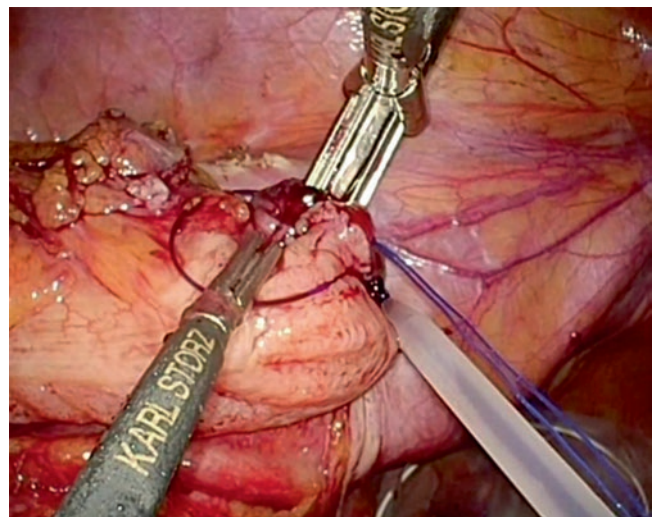
**Fig. 40.6** The anvil head was inserted into the abdominal cavity



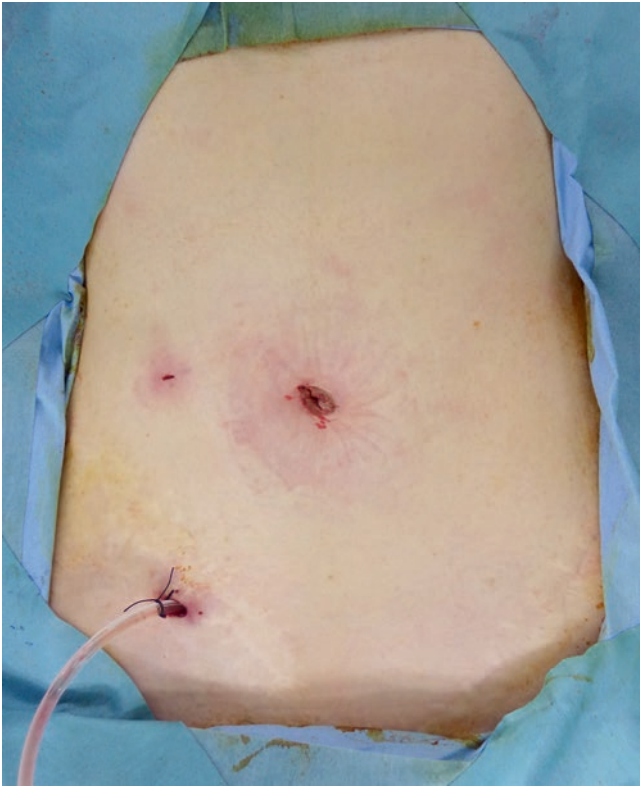
**Fig. 40.9** Intracorporeal purse-string sutures at the proximal colon



**Fig. 40.7** The specimen was extracted transanally



**Fig. 40.10** The anvil head was fixed by an endo-loop



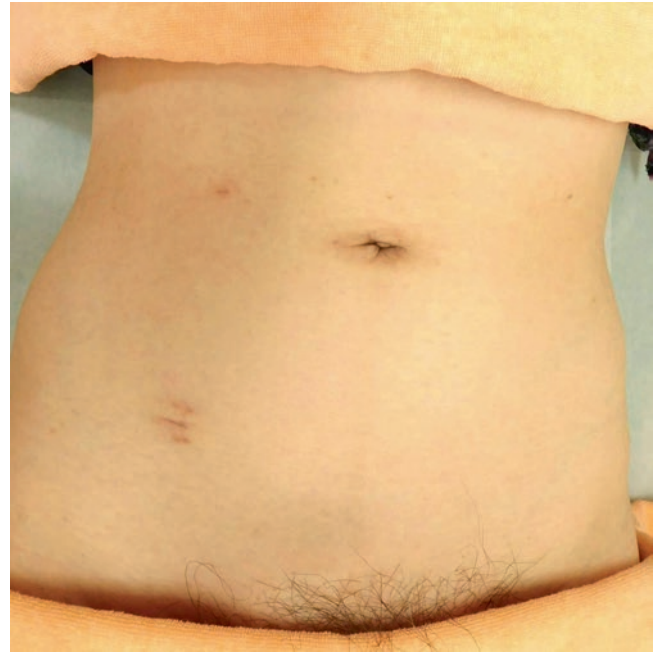
**Fig. 40.11** A pelvic drain was inserted using the incision for a 5-mm port

colorectal anastomosis was then performed by using circular stapler. After irrigating the pelvic cavity with 3 liters of saline, a pelvic drain was inserted (Fig. 40.11).

6. As a result, visible scars were 3-mm and 5-mm port incision (Fig. 40.12).

## 2.2 Totally Laparoscopic Ileocecal Resection with TVSE (NOSES VII)+ No Minilaparotomy

1. The patient was positioned in the lithotomy position to allow adequate exposure for the transvaginal procedure. The surgeon stood on the patient's left side, while the assistant sits between the legs (Fig. 40.13).
2. We inserted a 5-mm port in the navel using optical method. This was for surgeon's operating port. The second port was a 5-mm port for surgeon's left hand in the left lower quadrant (Fig. 40.14).
3. We developed a special instrument, namely "new vagi-pipe" to insert the GelPOINT mini into the abdominal cavity transvaginal without losing the pneumoperitoneum (Figs. 40.15 and 40.16). We made about 3cm-long transverse posterior colpotomy using a vessel sealing devices under new vagi-pipe guidance (Fig. 40.17). We can make



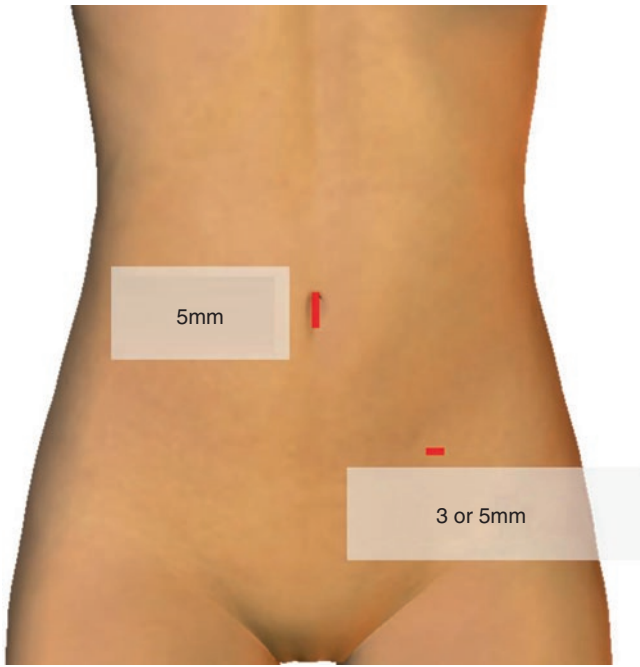
**Fig. 40.12** Visible scars were 3-mm and 5-mm port incision



**Fig. 40.13** The surgeon was on the patient's left side, while the assistant sat between the legs

a colpotomy at optimal position by the guidance. A GelPOINT's white ring was placed outside the vagina and covered with gel seal cap. We inserted a laparoscope, assistant's forceps, gauzes, and stapling devices through it. The view of laparoscope inserted through the vagina is quite natural as if the scope was inserted from suprapubic location.

4. Transverse colon was lifted and fixed on the abdominal wall with detachable clips (Fig. 40.18) and mesocolon was grasped and lifted by forceps inserted through the vagina (Fig. 40.19). Reduced-port surgery has several disadvantages such as the clashing of instruments, the lack



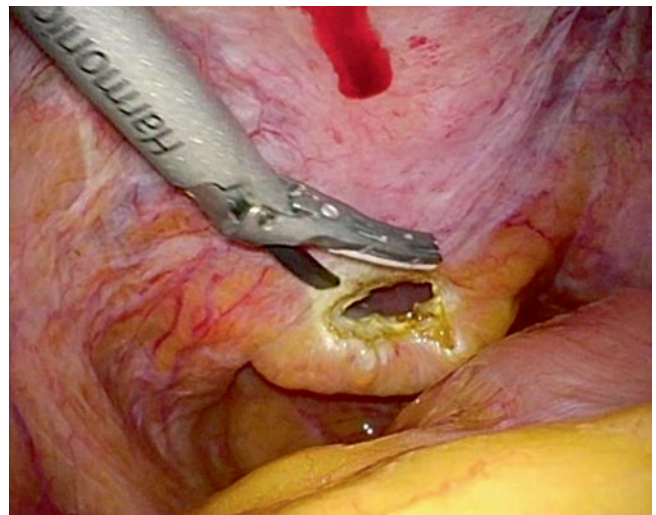
**Fig. 40.14** Port placement



**Fig. 40.15** New Vagi-Pipe



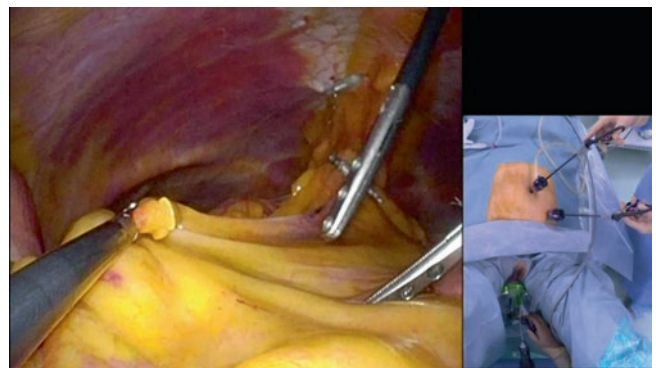
**Fig. 40.16** Insertion of a GelPOINT



**Fig. 40.17** Posterior colpotomy under new Vagi-Pipe guidance



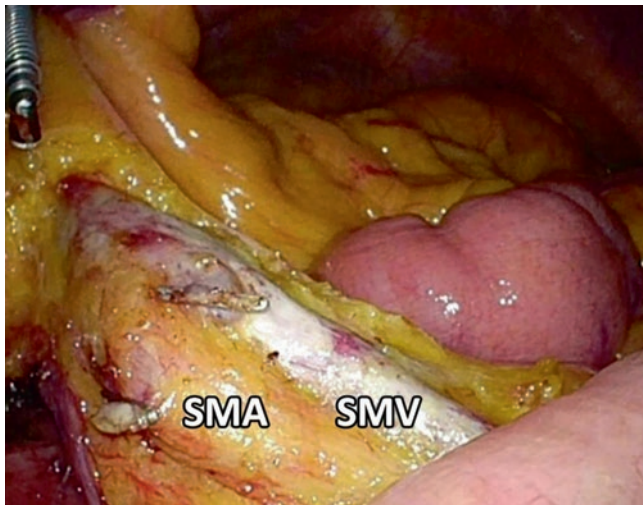
**Fig. 40.18** Transverse colon was lifted and fixed on the abdominal wall with detachable clips



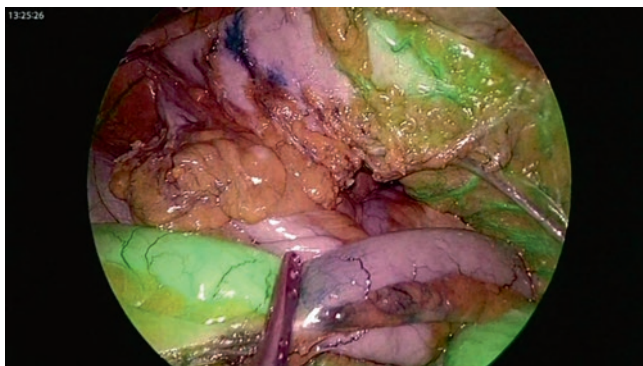
**Fig. 40.19** Mesocolon was grasped and retracted by forceps inserted through vagina

of tension, and inadequate exposure. Detachable organ retractor and transvaginal assistance can help resolve these problems.

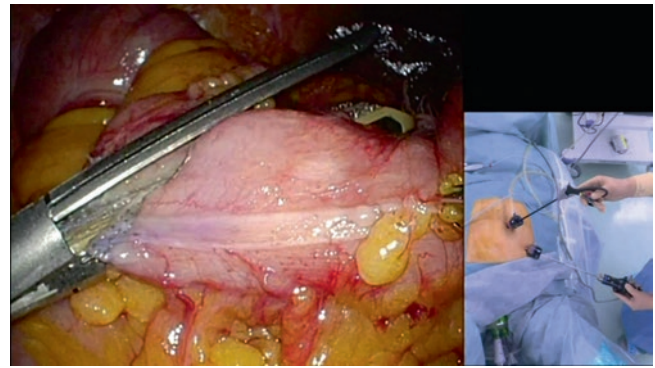
- Superior mesenteric vein and artery were exposed. Ileocolic vein and artery were ligated at its point of origin from SMV and SMA (Fig. 40.20). We must not reduce the quality of dissection in NOSES. The mesentery was divided under transvaginal assistance. We must operate marginal vessels very carefully to maintain good blood circulation. Recently, we can use an infrared laparoscope system with indocyanine green (ICG). The case in which the bowel wall is dyed with ICG within one minute, we judge it good circulation (Fig. 40.21). I believe this method is objective and promising. Then the colon and the ileum were transected by a linear stapling device inserted from the vagina (Figs. 40.22 and 40.23). Because of the appropriate distance from the vagina to the intestine, handling is not difficult. The specimen is extracted through the vagina (Fig. 40.24).



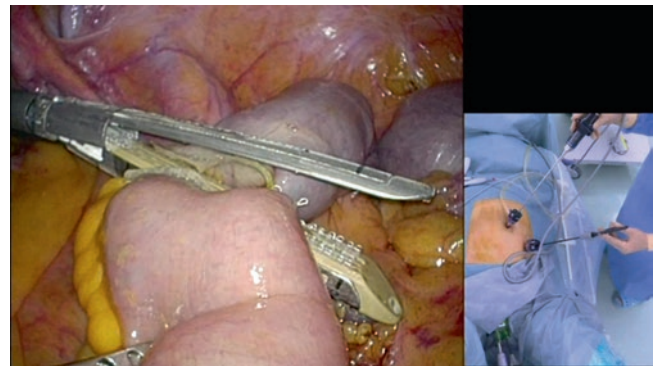
**Fig. 40.20** Ileocolic vein and artery were ligated at its point of origin from SMV and SMA



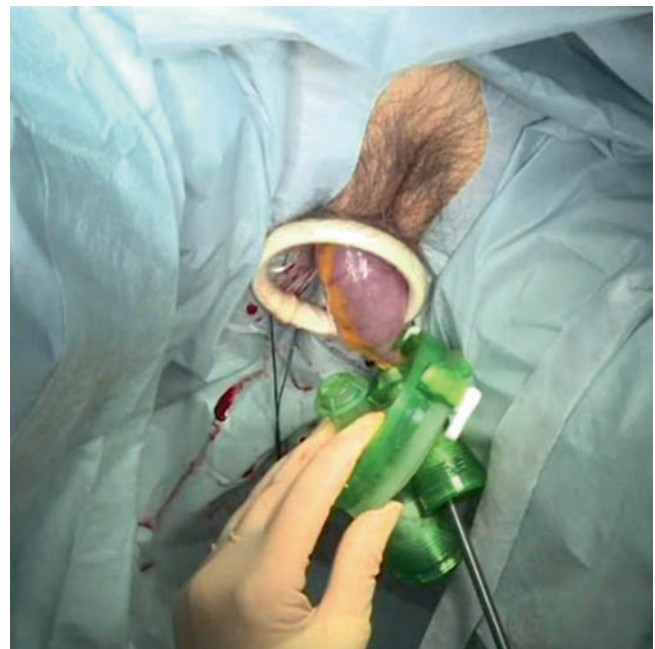
**Fig. 40.21** We can use an infrared laparoscope system with indocyanine green to evaluate the circulation of intestines



**Fig. 40.22** The colon was transected by a linear stapling device inserted from the vagina

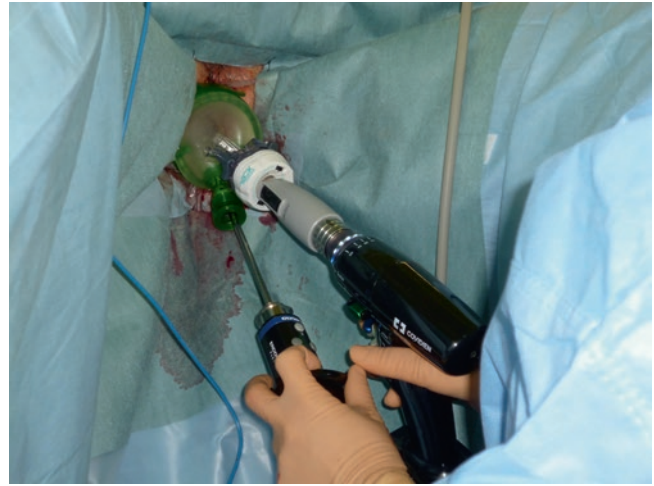


**Fig. 40.23** The ileum was transected by a linear stapling device inserted from the vagina

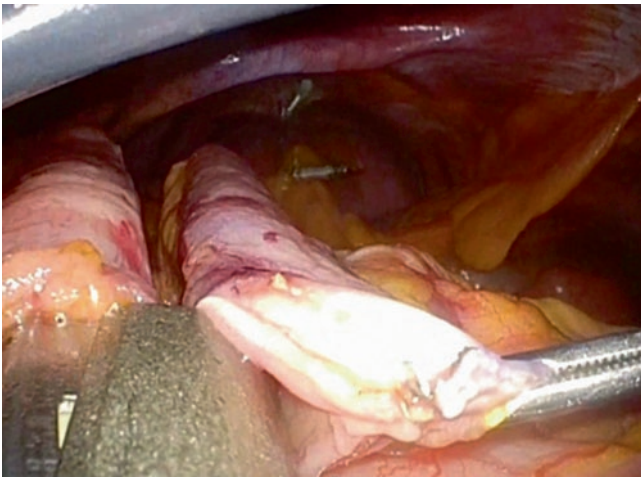


**Fig. 40.24** The specimen was extracted through the vagina

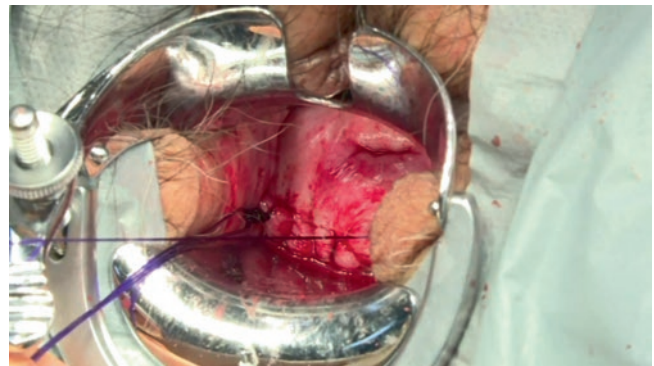
6. The next step was the intracorporeal functional end to end anastomosis (Figs. 40.25 and 40.26). The assistant must play a very important role in this step. He or she had to manipulate both a laparoscope and a stapling device through the vagina simultaneously (Fig. 40.27). This needs good skills.
7. We always irrigate the abdominal cavity with 3 liters of saline. Gauzes and a GelPOINT were removed and the posterior colpotomy was closed by single-layer running sutures (Fig. 40.28). We have not experienced postoperative complications related to posterior colpotomy.
8. Visible scar was only 5-mm in the left lower quadrant (Fig. 40.29).



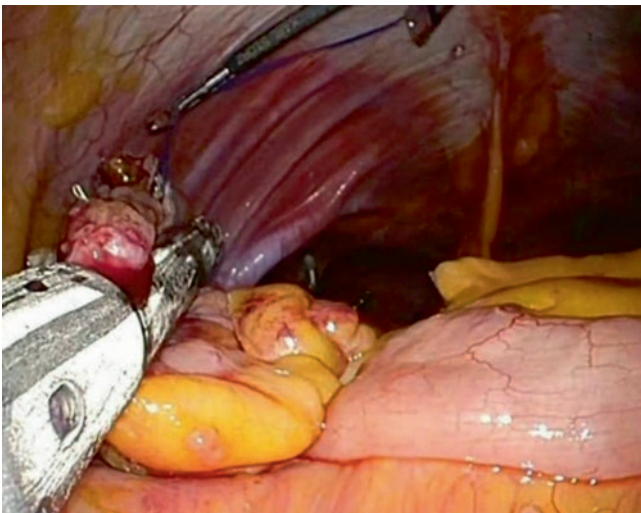
**Fig. 40.27** The assistant manipulated both a laparoscope and a stapling device through the vagina simultaneously



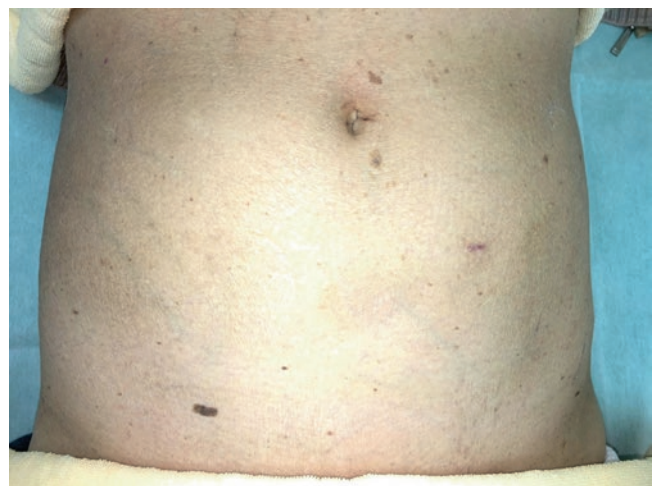
**Fig. 40.25** Intracorporeal functional end to end anastomosis



**Fig. 40.28** Posterior colpotomy was closed by single-layer running sutures



**Fig. 40.26** Closure of the entry hall



**Fig. 40.29** Visible scar was only 5-mm in the left lower quadrant

### 3 Conclusion

NOSES with RPS acquired less wound pain, less wound-related complications, better comprehensive quality of life, and satisfactory cosmetic outcomes.

What are the elements of the ideal operation? First of all, cure as well as safety. Functional preservation is also impor-

tant. Painless and scarless may not be as important as the above. However, these relate directly to the patient's satisfaction. And only laparoscopic surgery can pursue and achieve these. Therefore, I will carry on with practice and investigation of colorectal surgery with NOSES.