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Case Report

Robotic anal preserving posterior pelvic exenteration combined with the transanal-vaginal approach

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Robotic surgery is increasingly being applied for rectal cancer and its feasibility and safety have been reported. However, problems associated with advanced robotic surgery such as pelvic exenteration include lengthy operation time and difficulty in controlling unexpected bleeding. A 47-year-old woman had undergone laparoscopic left hemicolectomy for descending colon cancer three years previously (pT3N0M0 pStageII). And had undergone bilateral oophorectomy for ovarian metastases one year previously. Follow-up CT detected a peritoneal metastasis in the pelvic space. After seven courses of systemic chemotherapy, she received robotic anal preserving posterior pelvic exenteration combined with the transanal-vaginal approach. The postoperative course was uneventful. There is no evidence of recurrent disease 8 months after surgery. In conclusion, robotic anal preserving posterior pelvic exenteration combined with the transanal-vaginal approach is a safe and feasible minimally invasive approach for the treatment of advanced rectal malignancies.

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Key words: posterior pelvic exenteration, robotic surgery, transanal approach

Introduction

Recent advances in multimodal treatment have enabled pelvic exenteration (PE) to include en-bloc removal of the rectum, reproductive organs, and bladder for R0 resection[1]. However, patients who undergo PE often experience excessive stress, long operation time, and blood loss that result in high morbidity and mortality rates[2]. Laparoscopic PE has been proposed as a less invasive alternative to open PE[3]. A recent study has reported the increasing use of robotic surgery for rectal cancer and described its feasibility and safety, due to the advantages of its advantages of surgery such as tremor filtration, 360° motion of the robotic wrist, and 3D view[4]. However, there are several challenges in robotic PE, including long operation time and difficulty in controlling bleeding[5]. We have previously reported the use of combined transabdominal and trans-perineal endoscopic PE to reduce operation time and blood loss[5].

Case Presentation

A 47-year-old woman had pointed out elevated tumor markers including CEA of 11.0 ng/mL. She had undergone laparoscopic left hemicolectomy three years previously for descending colon cancer that was pathologically pT3N0M0

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pStageII. In follow-up ovarian metastasis was pointed out, and bilateral oophorectomy was performed one year previously. CT revealed a peritoneal metastasis in the pelvic space (Fig. 1a), which showed abnormal uptake on PET-CT (Fig. 1b). The patient underwent systemic chemotherapy (FOLFIRI+Ramucirumab). After seven courses of systemic chemotherapy, tumor markers had decreased to within normal ranges. CT revealed shrinkage of the main tumor. PET-CT showed no abnormal uptake other than in the main tumor. We then performed robotic anal preserving posterior PE combined with the transanal-vaginal approach.

The trans-abdominal component was performed using the following five ports: 12-mm ports placed at the umbilicus and right upper quadrant, and 8-mm ports placed at the right lower quadrant and the upper right and left quadrants. The recurrent tumor was located posterior to the uterus and involved the ileum. Medial to lateral retroperitoneal resection was performed initially. After mobilization of the descending colon, rendezvous to trans anal space in posterior rectal space (Fig. 2a). The ureters were mobilized at the level of the ureterovesical junction,

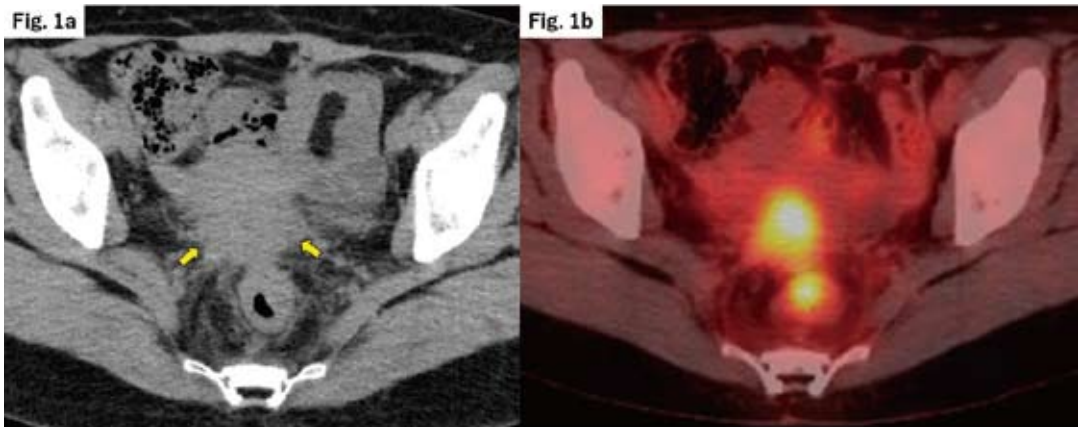

Figure 1. CT of the pelvis; A 40 ´ 30-mm irregular mass is seen on the posterior aspect of the uterus (Fig. 1a). PET-CT image; High uptake is observed in the area of recurrence (Fig. 1b).

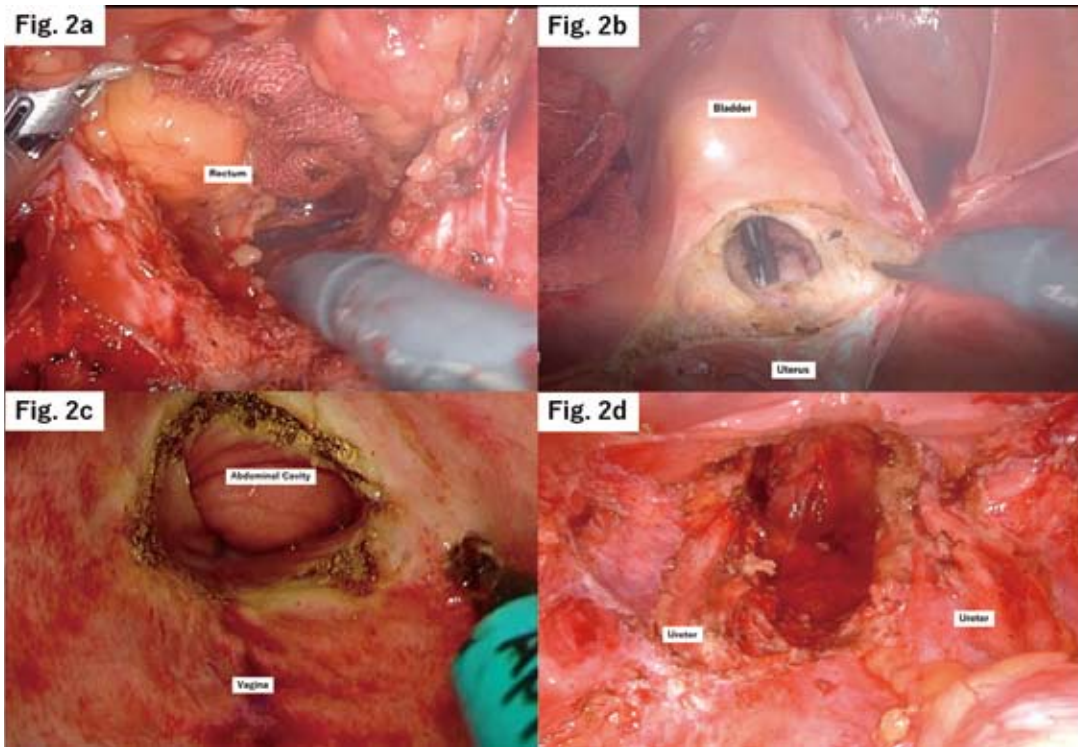

Figure 2. Intraoperative images; The abdominal cavity met with the pelvic cavity in a so-called "rendezvous" at the posterior rectal space (Fig 2a). Rendezvous at the anterior uterine space (Fig. 2b). Trans-vaginal view of rendezvous with the anterior uterine space (Fig. 2c). Pelvic image after tumor resection (Fig. 2d).

after which we dissected the peritoneum of the anterior uterine space (Fig. 2b). In the trans-perineal component, the rectum was closed using a double purse-string suture. After setting the GelPOINT Path® (Applied Medical, Rancho Santa Margarita, CA) system, three ports were installed. We usually maintain pneumoperitoneal pressure at 12 mmHg during the transperineal approach. First, dissection was carried out through the rectal wall to the mesorectal fascia. Anteriorly, the transverse perineal muscle and branches of the internal pudendal vessels were resected, after which the GelPOINT Path® was inserted into the vagina. The vaginal wall was dissected circumferentially, followed by rendezvous with the abdominal cavity in the anterior space (Fig. 2c). The tumor was extracted through the abdominal incision (Fig. 2d). Finally, we performed bowel reconstruction by the single stapling technique followed by covering ileostomy creation. The operation time was 351 min and blood loss was 70 mL (Fig. 3).

The gross findings were of a hard 30 mm x 30 mm ulcerated mass (Fig. 4). Pathologically, the mass was a metastatic tumor from colon cancer, and the margin was negative. The postoperative course was uneventful. At 8 months after surgery, there is no evidence of recurrent disease.

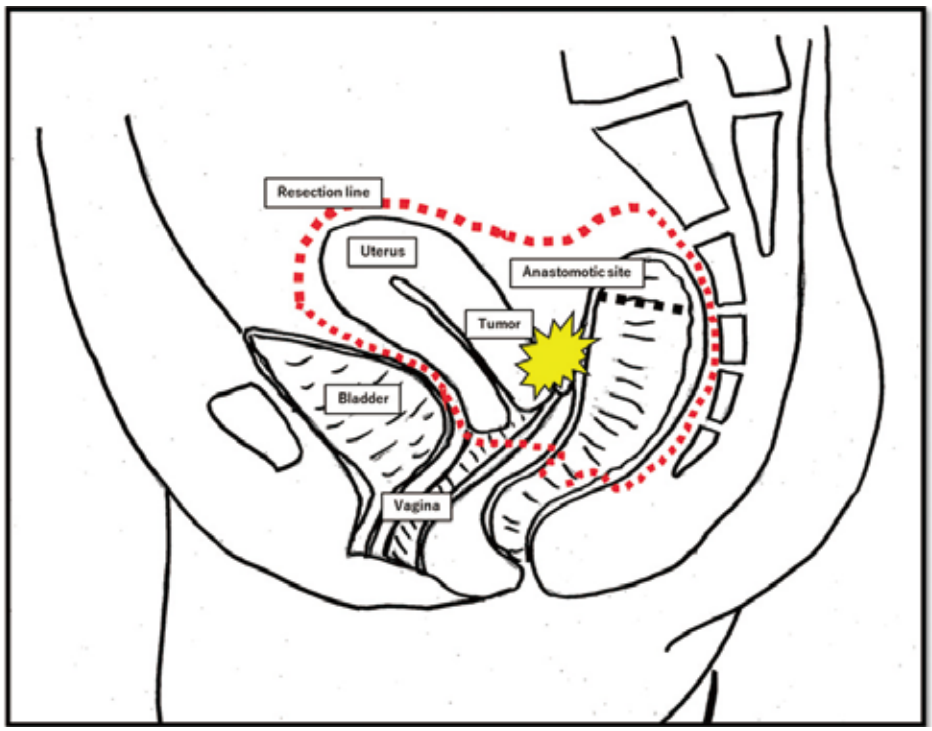

Figure 3. A schema of the surgical resection line.

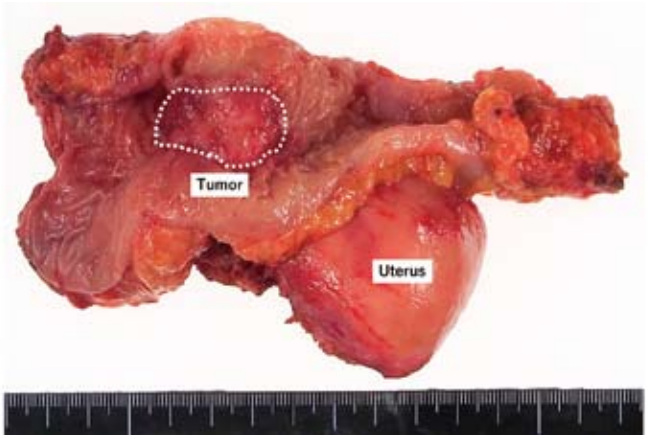

Figure 4. Macroscopic finding of the resected specimen.

Discussion

PE is a complex surgery employed for the treatment of advanced pelvic malignancies and recurrent disease. The procedure is traditionally performed by the open approach and is associated with high mortality and morbidities[6]. The perioperative mortality rate has recently shown a gradual decrease from 20%−30% to less than 5% due to improvements in radiological imaging, as well as advances in surgical devices and perioperative care[2,7]. However, the high rate of postoperative complications (55%−78%) indicates that the invasiveness of PE remains problematic[2]. Usually, PE includes removing the urinary bladder which is termed 'total PE'. In the present case, the recurrent tumor infiltrated the uterus, but not the urinary bladder. For this reason, we selected posterior PE that preserved the urinary bladder.

Laparoscopic surgery is commonly employed for pelvic malignancies because of its reduced invasiveness compared with open surgery[3]. Previous studies that have examined the feasibility and safety of laparoscopic PE reported several advantages of the technique, including less blood loss, reduced postoperative pain, and faster bowel recovery compared with the open approach[8]. However, laparoscopic PE can be difficult in the case of the narrow pelvis, bulky tumor, recurrent disease, and obesity, because of the restricted maneuverability of the instruments in the deep pelvic space[9].

The robotic approach is an innovation in rectal surgery. It has the advantages of providing enhanced three-dimensional and magnified views of enclosed spaces, tremor filtration, and increased dexterity in a fine-precision surgical instrument, all of which make it ideal for surgery in the confirmed pelvic space[5]. Indeed, a recent literature review of robotic PE for the treatment of urological and colorectal malignancies found that robotic PE is highly feasible and demonstrates acceptable perioperative and oncological outcomes[5].

Despite its success, several controversies remain. Robotic surgery is usually associated with prolonged operation time in terms of both overall operation time and console-specific time[5]. Furthermore, as in our case, recurrent cancer is one of the major indications for PE. This is a risk factor for margin-positive resection due to the presence of severe adhesion and fibrosis around the tumor[10]. In our case, there was severe adhesion of the anastomotic site of primary surgery to the pelvic floor, which was difficult to dissect even with the robotic approach.

To overcome these restrictions, we developed the surgical technique, which combines the trans-abdominal endoscopic approach with the trans-perineal (anal/vaginal) approach[5]. The trans-perineal approach enables surgeons to perform deep pelvic dissection despite the aforementioned obstacles. In surgery for recurrent cancer using the trans-perineal approach, dissection can be started from a new area unaffected by the primary surgery. The multidirectional approach could help maintain a proper dissection layer, resulting in reduced intraoperative bleeding and successful R0 resection. In addition, the dissection time and total operation time are shorter in multidirectional cooperative surgery. When we perform posterior PE, it is crucial to avoid injury to the ureters. Multidirectional views from the trans-abdominal and trans-vaginal approaches enable dissection around the ureters to be performed more safely.

Although the combined transabdominal-transperineal approach has the restriction that it increases the number of surgeons, surgical assistants, and expert scrub nurses that are required, robotic surgery minimizes the need and roles for an assistant. Accordingly, robotic surgery could help popularize PE in the combined transabdominal-perineal approach. In conclusion, robotic anal preserving posterior pelvic exenteration combined with the transanal-vaginal approach is a safe and feasible minimally invasive approach for the treatment of advanced rectal malignancies.

List of abbreviations
PE, pelvic exenteration
CEA, carcinoembryonic antigen
CA19-9, carbohydrate antigen 19-9

Declarations

Ethics approval

Not applicable.

Consent for publication

Written, informed consent was obtained from the patient for publication of this case report.

Competing interests

None.

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