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Case Report

Single-Incision Plus One Port Laparoscopic Total Pelvic Exenteration After Neoadjuvant Chemotherapy for Advanced Primary Rectal Cancer: A Case Report

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Limited data on laparoscopic and robotic total pelvic exenteration (TPE) for gynecologic, urologic, and rectal malignancies have been published in the literature. Single-incision laparoscopic surgery (SILS) has been successfully introduced for colon cancer. Here, we describe our experience of TPE with SILS + 1 port (SILS+1) for advanced rectal cancer. A 64-year-old man was referred to our hospital with anemia. Computed tomography (CT) revealed a rectal tumor that was contiguous with the seminal vesicle and bladder. Rectoscopy revealed an ulcerated, bleeding, and stricturing lesion in the rectum, which was defined as an adenocarcinoma with a moderate degree of differentiation on histologic examination. The patient received neoadjuvant chemotherapy using capecitabine, oxaliplatin, and bevacizumab. After 3 courses of chemotherapy, a rectovesical fistula was suspected from examination of CT images. CT demonstrated intramural gas in the urinary bladder, which suggested a diagnosis of emphysematous cystitis. Thus, we constructed a transverse loop colostomy. Two months after the last administration of chemotherapy, we performed SILS+1 TPE. The procedure involved a 35-mm incision in the right side of the umbilicus for the insertion of a single multichannel port, and insertion of a 12-mm port into the right lower quadrant. Total operating time was 751 minutes, and estimated blood loss was 1100 mL (including urine). SILS+1 TPE is a

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technically promising alternative method for the treatment of selected patients with advanced rectal cancer.

Key words: Single-incision laparoscopic total pelvic exenteration – Rectal cancer – Reduced port surgery

Single-incision laparoscopic surgery (SILS) has been successfully introduced for colectomy.[1–5] Total pelvic exenteration (TPE) is the only curative procedure for T4 rectal cancer that directly invades the urinary or gynecologic tract.[6] Cases of laparoscopic and robotic TPE for urologic or gynecologic malignancies have been reported,[7–10] and multiport laparoscopic TPE for advanced rectal cancer has been reported.[11] However, SILS plus 1 port (SILS+1) TPE for advanced primary rectal cancer has not been examined. In this report, we describe the SILS+1 TPE for advanced primary rectal cancer.

Patient and Methods

A 64-year-old man was referred to our hospital with anemia. Physical examination and urine and blood tests revealed hemoglobin of 5.7 g/dL. Computed tomography (CT) revealed a rectal tumor (Fig. 1a) that was contiguous with the seminal vesicle and bladder (Fig. 1b). Rectoscopy revealed an ulcerated, bleeding, and stricturing lesion in the rectum with 9 cm from anal verge, which was defined as an adenocarcinoma with a moderate degree of differentiation on histologic examination (Fig. 2). The level of carcinoembryonic antigen (CEA) was 25 ng/mL. The patient received neoadjuvant chemotherapy using capecitabine, oxaliplatin, and bevacizumab without radiotherapy. After 3 courses of chemotherapy, the patient had fecaluria. A rectovesical fistula was suspected from examination of CT images and magnetic resonance image (MRI). CT demonstrated intramural gas in the urinary bladder, which suggested a diagnosis of emphysematous cystitis (Fig. 3a). MRI demonstrated a rectovesical fistula (Fig. 3b). Thus, we constructed a transverse loop colostomy. Preoperative findings showed a rectal cancer with the staging of cT4bN2M0 stageIIIc. Two months after the last administration of chemotherapy, we performed SILS+1 TPE. This operation was performed by 2 colorectal surgeons who have experience of hundreds of laparoscopic operations.

Surgical technique

The patient was placed in the Trendelenburg semi-right lateral position under general anesthesia. The surgeon and cameraman stood on the right side of the patient. First, a Lap protector (LP; Hakko Co, Ltd, Tokyo, Japan) was inserted through a 35-mm incision in the right side of the umbilicus (using the urostomy site). Next, an EZ-access (Hakko) was mounted on the LP and three 5-mm ports were placed in the EZ-access. A 12-mm port was inserted into the right quadrant (Fig. 4). The operative procedures and instruments were the same as those for standard laparoscopic low anterior resection with a flexible 5-mm scope (Olympus Medical Systems Corp, Tokyo, Japan). Operations were performed using a surgical technique similar to the standard laparoscopic (medial-to-lateral) approach. The inferior mesenteric artery and the inferior mesenteric vein were both skeletonized and clipped and divided. Then, we dissected downwards from the mesenteric window to the pelvis on the right side of the rectum. The next step was to mobilize the sigmoid colon up to the splenic flexure. The descending colon and sigmoid colon was pulled anteromedially to clearly identify the left ureter. The rectum was posteriorly mobilized at first. The left ureter was dissected to the level of the ureterovesical junction, where it was clipped and divided. The same procedure was performed for the right ureter.

The external iliac artery and vein were exposed at the lateral border of the lateral pelvic lymph node dissection. The hypogastric nerves were divided bilaterally at their bifurcations from the superior hypogastric plexus. The lymphatic tissue was dissected laterally along the surface of the internal obturator muscle, dorsally along the sciatic nerve, and down to the levator ani muscle. The obturator nerve and vessels were preserved. The surface of the internal iliac vein was exposed, and the superior and inferior vesical arteries were divided at their origins. The main trunk of the internal iliac artery was preserved. The planes of rectorectal and lateral dissection were connected with the dissection of the pelvic splanchnic nerves. The anterior bladder

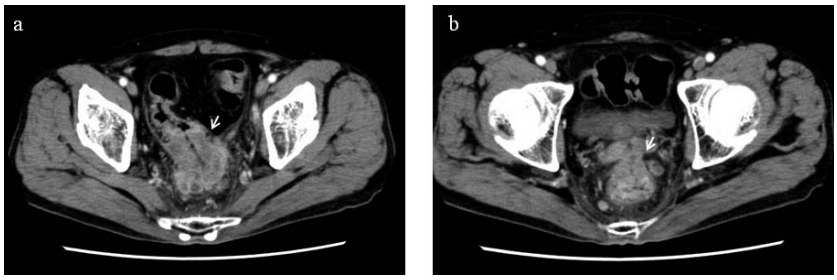

Fig. 1 Computed tomography (CT) revealed the rectum tumor (a) that was contiguous with the seminal vesicle and bladder (b). Arrow indicates advanced rectal cancer.

should always be dissected after transecting the lateral and posterior rectum. The reason is that because only 2 clamps are used in our SILS+1 TPE technique, we can use gravity traction by leaving the anterior anatomy until as late as possible.

Dorsal dissection was then performed in the avascular plane between the bladder and the parietal pelvic fascia. The dorsal dissection was carried out to the level of the levator ani muscle. The peritoneum was incised up to the medial umbilical ligaments, and the vas deferens was divided. Retzius' space and the paravesical space were opened to the level of the endopelvic fascia. In our SILS+1 TPE technique, the patient must be placed in the right lateral position when the left endopelvic fascia is incised because there is no traction by assistants. This allows us to use the gravity effectively and tract the bladder to the right side more easily, leading to the operation becoming easier. The puboprostatic ligament was divided, and the dorsal vein complex (DVC) was exposed. After transfixing ligation of the DVC with 2–0 vicryl intracorporeally, the urethra and DVC were divided (Fig. 5). The rectum was then transected normally using endoscopic linear stapler (Endo GIA; Covidien LLC, Mansfield, Massachusetts) with a purple cartridge inserted from the right lower quadrant 12-mm port. The specimen was retrieved and an ileal conduit reservoir was extracorporeally constructed through the incision in the right side of the umbilicus. An additional 10-mm incision was needed because of the size of the specimen. Total operating time was 751 minutes, and estimated blood loss was 1100 mL (including urine). The final operative view is shown in Fig. 6. Although postoperative urinary tract infection occurred, no postoperative anastomotic stenosis or hydronephrosis was observed.

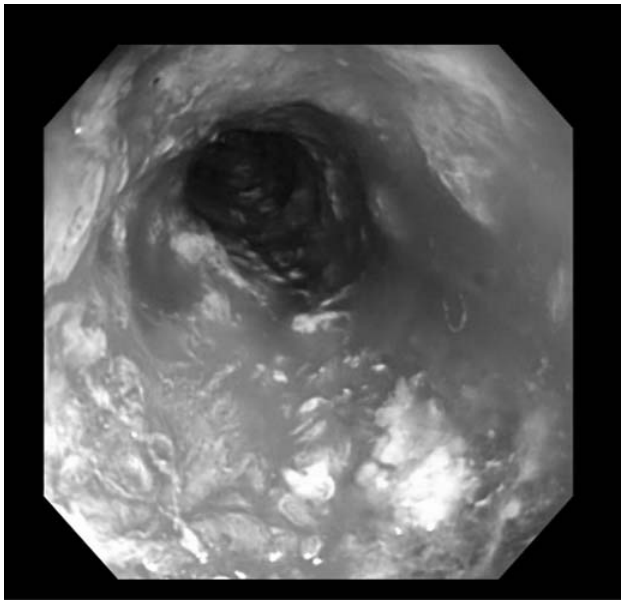

Fig. 2 Rectoscopy revealed an ulcerated, bleeding and stricturing lesion at the rectum.

Discussion

The use of minimally invasive surgery is widely accepted, and the number of ports has been reduced to decrease parietal trauma and improve cosmetic results. Reports of SILS in colon and rectal surgery have recently emerged in the literature.[1–5] For T4b rectal cancer invading neighboring organs such as the bladder, laparoscopic surgery remains controversial.[12] Cases of laparoscopic and robotic TPE for urologic or gynecologic malignancies have been reported,[7–10] and multiport laparoscopic TPE for advanced rectal cancer has been reported.[11] Many surgeons have attempted to reduce the number of ports in laparoscopic surgery. Reduced port surgery aims to reduce the size and number of ports for preserving the view afforded by the laparoscope, while making the surgery less invasive. Some reports have successfully mentioned its advantages in reducing the number of laparoscopic ports,

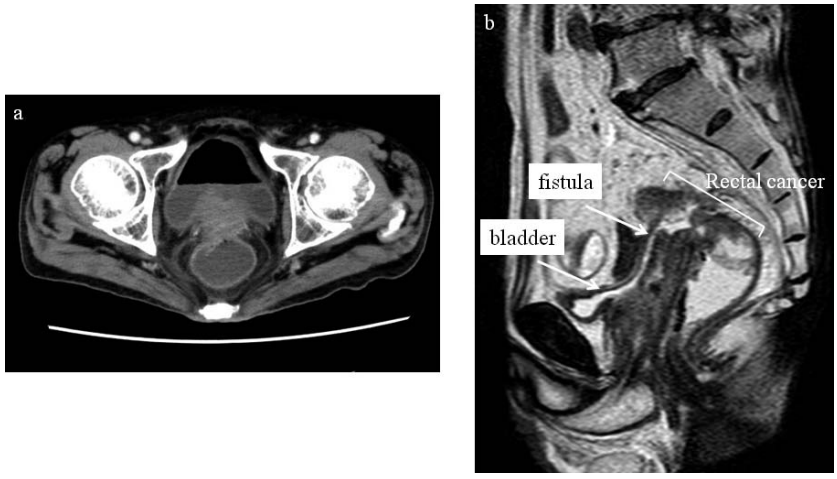

Fig. 3 (a) A rectovesical fistula was suspected (air fluid level was appeared). (b) A rectvesical fistula was appeared. Arrows indicates fistula.

including better cosmetic results, reduced postoperative pain, and shorter recovery time.[13–17] To our knowledge, this is the first reported case of SILS+1 TPE for advanced rectal cancer.

In our institution, SILS for colon cancer and SILS+1 for rectal cancer following lateral pelvic lymph node dissection have been standardized. Almost all procedures were performed with an operator's 2 hands and a cameraman. We also have experience with multiport laparoscopic TPE. Also, complex procedures such as Boari flap were successfully performed with SILS (manuscript submitted). With regards to the TPE procedure, ligation of DVC is the critical point for TPE. In a reported case of multiport laparoscopic TPE, ligation of the DVC was performed under direct visualization.[11] In other reported cases, the DVC was ligated intracorporeally.[7–10] In these multiport or robotic surgeries, 3 or 4 arms made it possible to ligate the DVC in the fine operative field. In our SILS+1 TPE, ligation of DVC could be carried out intracorporeally with the surgeon's 2 arms, demonstrating the possible advantage of solo surgery. There is a merit in our SILS+1 TPE technique that because only 2 clamps are used, the operative field can be changed freely by the decision of the operator himself. However, at the same time, there is a demerit that there is no traction by assistants. Posture change and sequence of dissecting the structure become important to resolve this problem. We believe that by giving attention to the above two points, the natural anatomic position and gravity of the structure can be used effectively and the surgery can be performed with only 2 clamps.

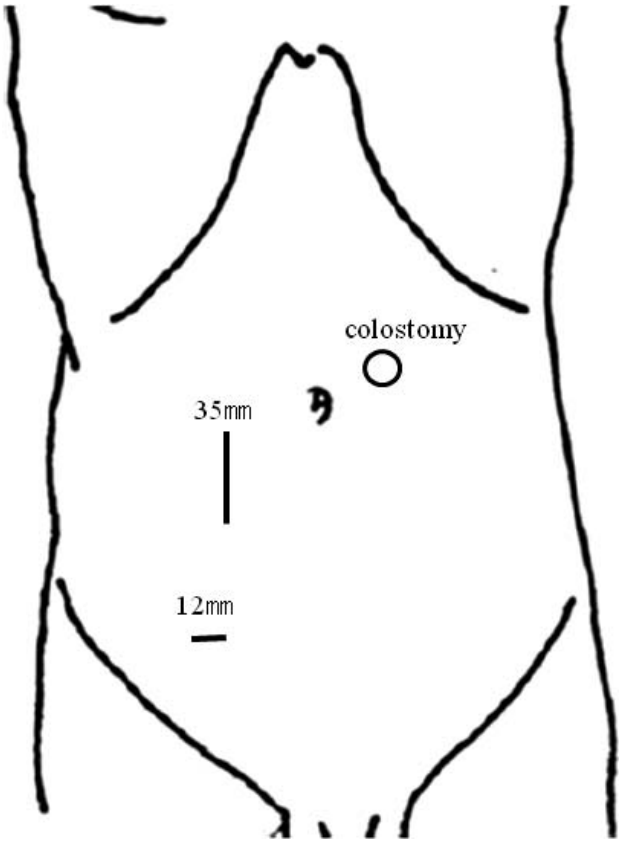

Fig. 4 Position of incision for SILS+1 TPE.

Discussing a surgical time, blood loss, Kaufmann *et al* have reported that they performed robotic radical anterior pelvic exenteration in females in 12 patients, with a median total surgical time of 384 ± 90 minutes with median console and diversion times of 282 ± 54 and 150 ± 90 minutes respectively.[9] Mukai *et al* performed multiport laparoscopic TPE and reported a surgical time of 831 minutes

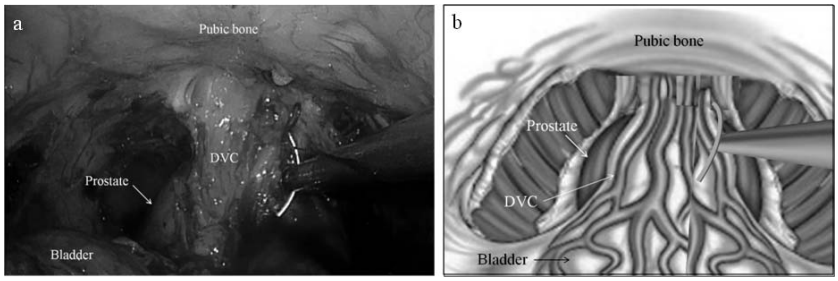

Fig. 5 The ligation of the DVC (a). A schematic image of DVC ligation (b).

(including reconstruction of bilateral V–Y advancement of the gluteus maximus musculocutaneous flap, a blood loss of 600 mL.[11] Our results with SILS +1 TPE compare favorably with those of robotic or multiport laparoscopic TPE.

In the case of pelvic exenteration involving the anus, the specimen can be retrieved through the perineum scar site. However, the anal sphincter and anal canal could be preserved with a safe surgical margin in the present case, and we used the urostomy site for specimen retrieval and mounting the Lap protector. This technique offers the clear advantage that the final view appears to be almost "scarless."

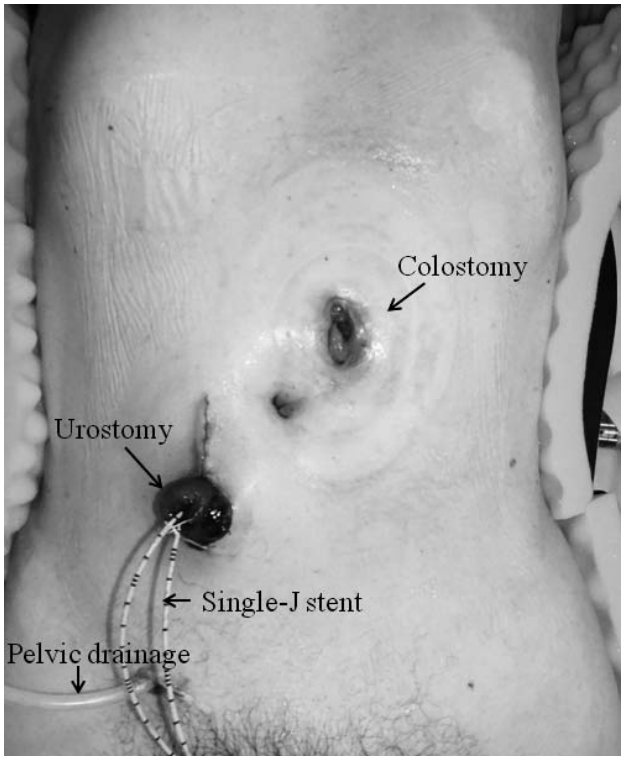

Fig. 6 Final view of SILS+1 TPE appears to be almost "scarless."

In conclusion, we have documented the safety and feasibility of SILS+1 TPE for advanced primary rectal cancer. This procedure is a technically promising alternative method for the treatment of selected patients with T4b rectal cancer. Further studies are needed to demonstrate the advantages of SILS+1 TPE over conventional laparoscopic surgery.

Acknowledgments

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References

1. Choi SI, Lee KY, Park SJ, Lee SH. Single port laparoscopic right hemicolectomy with D3 dissection for advanced colon cancer. *World J Gastroenterol* 2010;**16**(2):275–278
2. Ramos-Valadez DI, Patel CB, Ragupathi M, Bartley Pickron T, Haas EM. Single-incision laparoscopic right hemicolectomy: safety and feasibility in a series of consecutive cases. *Surg Endosc* 2010;**24**(10):2613–2616
3. 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**(1):75–81
4. Merchant AM, Lin E. Single-incision laparoscopic right hemicolectomy for a colon mass. *Dis Colon Rectum* 2009; **52**(5):1021–1024
5. Uematsu D, Akiyama G, Matsuura M, Hotta K. Single-access laparoscopic colectomy with a novel multiport device in sigmoid colectomy for colon cancer. *Dis Colon Rectum* 2010; **53**(4):496–501
6. Ishiguro S, Akasu T, Fujita S, Yamamoto S, Kusters M, Moriya Y. Pelvic exenteration for clinical T4 rectal cancer: a single institution over a 30-year period. *Surgery* 2009;**145**(2):189–195
7. Pomel C, Rouzier R, Pocard M, Thoury A, Sideris L, Morice P. Laparoscopic total pelvic exenteration for cervical cancer relapse. *Gynecol Oncol* 2003;**91**(3):616–618

8. Martínez A, Filleron T, Vitse L, Querleu D, Mery E, Balague G. Laparoscopic pelvic exenteration for gynaecological malignancy: is there any advantage? *Gynecol Oncol* 2011;**120**(3):374–379
9. Kaufmann OG, Young JL, Sountoulides P, Kaplan AG, Dash A, Ornstein DK. Robotic radical anterior pelvic exenteration: the UCI experience. *Minim Invasive Ther Allied Technol* 2011;**20**(4): 240–246
10. Ferron G, Querleu D, Martel P, Letourneur B, Soulié M. Laparoscopy-assisted vaginal pelvic exenteration. *Gynecol Oncol* 2006;**100**(3):551–555
11. Mukai T, Akiyoshi T, Ueno M, Fukunaga Y, Nagayama S, Fujimoto Y. Laparoscopic total pelvic exenteration with en bloc lateral lymph node dissection after neoadjuvant chemoradiotherapy for advanced primary rectal cancer. *Asian J Endosc Surg* 2013;**6**(4):314–317
12. Nagasue Y, Akiyoshi T, Ueno M, Fukunaga Y, Nagayama S, Fujimoto Y. Laparoscopic versus open multivisceral resection for primary colorectal cancer: comparison of perioperative outcomes. *J Gastrointest Surg* 2013;**17**(7):1299–1305
13. Chen WT, Chang SC, Chiang HC, Lo WY, Jeng LB, Wu C. Single-incision laparoscopic versus conventional laparoscopic right hemicolectomy: a comparison of short-term surgical results. *Surg Endosc* 2011;**25**(6):1887–1892
14. Ramos-Valadez DI, Ragupathi M, Nieto J, Patel CB, Miller S, Pickron TB. Single-incision versus conventional laparoscopic sigmoid colectomy: a case-matched series. *Surg Endosc* 2012; **26**(1):96–102
15. Champagne BJ, Lee EC, Leblanc F, Stein SL, Delaney CP. Single-incision vs straight laparoscopic segmental colectomy: a case-controlled study. *Dis Colon Rectum* 2011;**54**(2):183–186
16. Champagne BJ, Papaconstantinou HT, Parmar SS, Nagle DA, Young-Fadok TM, Lee EC. Single-incision versus standard multiport laparoscopic colectomy: a multicenter, case-controlled comparison. *Ann Surg* 2012;**255**(1):66–69
17. Poon JT, Cheung CW, Fan JK, Lo OS, Law WL. Single-incision versus conventional laparoscopic colectomy for colonic neoplasm: a randomized, controlled trial. *Surg Endosc* 2012; **26**(10):2729–2734