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Case Report

Single-Incision Plus One-Port Laparoscopic Abdominoperineal Resection With Bilateral Pelvic Lymph Node Dissection for Advanced Rectal Cancer: A Case Report

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With regard to laparoscopic and robotic abdominoperineal resection (APR) for primary rectal malignancies, limited data have been published in the literature. Single-incision laparoscopic surgery (SLS) has been successfully introduced for treating colorectal cancer. Here we describe our experience of APR with SLS plus one port (SLS + 1) for treating advanced rectal cancer. A 65-year-old man underwent the procedure, which involved a 35-mm incision in the left side of the umbilicus for the insertion of a single multichannel port as well as the insertion of a 5-mm port into the right lower quadrant. The sigmoid colon and rectum were mobilized from the pelvic floor using a medial and lateral approach. After the rectum with the mesorectum was completely mobilized according to the total mesorectal excision, the sigmoid colon was intracorporeally transected. The specimen was removed through the perineal wound. Terminal colostomy was fashioned at the left lower trocar site. Lateral pelvic lymph node dissection was bilaterally performed. There were no perioperative complications. The total operating time was 592 minutes, and the estimated blood loss was 180 mL. To our knowledge, this is the first reported case of SLS + 1 APR with lateral pelvic lymph node dissection for treating rectal cancer. We conclude that SLS + 1 APR is a technically promising alternative method for treating selected patients with advanced rectal cancer.

Key words: Single-incision laparoscopic surgery – Abdominoperineal resection – Rectal cancer – Reduced port surgery

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Multiport laparoscopic surgery (MLS) is being increasingly adopted worldwide for treating colon disease. MLS has been associated with less pain, quicker return of gastrointestinal function, better pulmonary function, shorter hospital stay, and better postoperative quality of life than open surgery.[1] In the case of distal rectal cancer, some studies comparing MLS with open surgery for abdominoperineal resection (APR) have reported that MLS offered advantages to patients, such as less blood loss, rapid oral intake of solid foods, and shorter hospital stay, and it was equivalent to open surgery in terms of long-term outcomes.[2,3] Recently, single-incision laparoscopic surgery (SLS) has been successfully introduced for colectomy.[4–8] However, in the case of mid-to-low rectal procedures, such as low anterior resection with total mesorectum excision, it can be technically complicated. Only a few reports have been published on single-incision laparoscopic low anterior resection.[9–13] In addition, minimally invasive surgery, such as SLS plus one port (SLS + 1), for treating advanced rectal cancer has been reported to be safe and feasible.[14] Lateral pelvic lymph node dissection (LPLD) continues to be performed in Japan for treating advanced rectal cancer; it aims to minimize local recurrence and improve survival. According to advocates of LPLD, the overall incidence of metastases to lateral lymph nodes ranges from 8.6% to 27.0%, and such nodes are not cleared in patients who undergo total mesorectal excision only.[15–17] However, SLS + 1 APR for advanced primary rectal cancer has not been examined to date. Here we describe SLS + 1 APR with LPLD for treating advanced primary rectal cancer.

Patient and Methods

A 65-year-old man with a body mass index of 28.1 was referred to our hospital with rectal bleeding. Physical examination and urine and blood tests revealed no abnormality. Computed tomography revealed a rectal tumor that was not contiguous with the seminal vesicle and bladder (Fig. 1a). Rectoscopy revealed an ulcerated, bleeding lesion in the very low rectum (1.5 cm from the dentate line), which was defined as an adenocarcinoma with a moderate degree of differentiation on histologic examination (Fig. 1b). The carcinoembryonic antigen level was 1.4 ng/mL. The operation was performed by two colorectal surgeons who were highly experienced in MLS or SLS procedures.

Surgical technique

The patient was placed in the Trendelenburg semi-right lateral position under general anesthesia. The surgeon and cameraman stood on the patient's right side. First, a Lap protector (Hakko Co Ltd, Osaka, Japan) was inserted through a 30-mm incision in the left side of the umbilicus (using the colostomy site). Following this, an EZ-access (Hakko) was mounted on the Lap protector, and three 5-mm ports were placed in the EZ-access. A 5-mm port was inserted into the right quadrant (Fig. 2a). The operative procedures and instruments were the same as those used for standard laparoscopic low anterior resection with a flexible 5-mm scope (Olympus Medical Systems Corp, Tokyo, Japan). All procedures were performed using a surgical technique similar to the standard laparoscopic (medial-to-lateral) approach. The inferior mesenteric artery and inferior mesenteric vein were skeletonized, clipped, and divided (Fig. 2b). Following this, dissection was performed downward 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 were anteromedially pulled. The rectum and mesorectum were mobilized through the avascular plane between the intact mesorectum anteriorly and Waldeyer fascia posteriorly by sharp dissection and were extended down to the level of the levator muscle. The hypogastric nerve and pelvic parasympathetic plexus were protected. The rectum and whole mesorectum were mobilized from the prostate, and the sphincter was intracorporeally dissected, as much as was possible. With the help of the perineal surgeon, the rectum and whole mesorectum were completely mobilized. The proximal sigmoid colon was transected using an endoscopic linear stapler (Endo GIA, Covidien LLC, Mansfield, Massachusetts) with a purple cartridge.

Perineal phase

Having completed most of the dissection laparoscopically, the perineal phase of the operation was commenced in a standard manner. Division of the skin and subcutaneous fat allowed a window to be posteriorly made in the fascia by laparoscopically dissecting down under direct vision onto the perineal surgeon's fingers. The remaining peritoneal dissection was completed, the specimen was delivered through the perineal wound, and the wound was closed in layers.

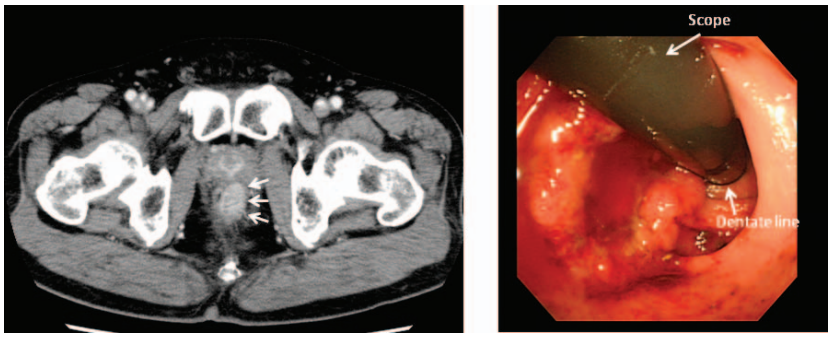

Fig. 1 (a) Computed tomography revealed the rectal tumor. The arrow indicates advanced rectal cancer. (b) Rectoscopy revealed an ulcerated, bleeding lesion in the very low rectum.

LPLD

In brief, the surgical landmarks for identification before incising the peritoneum are shown in Fig. 2c. When developing the space of Retzius, the peritoneum was incised from a point lateral to the medial umbilical ligament, extending inferolaterally across the vas deferens. Identification of important landmarks, such as the ureter, internal iliac vessels, and hypogastric nerves, could thus be made easy. The operator's second arm was used to medially retract the bladder and apply tension to the superior vesical artery, thereby separating the bladder from the lateral nodal packet. In this process, taping or retraction of the ureter was unnecessary (Fig. 2d). The fatty tissue surrounding the common iliac lymph node and external iliac nodes was dissected. The lymphatic tissue surrounding the internal iliac vessels was also dissected. The obturator packets were carefully dissected en bloc to expose the obturator nerve. The nerve was preserved and distally dissected toward the obturator foramen. The obturator nerve and all pelvic vessels were completely skeletonized. A final view of the left LPLD is shown in Fig. 3a. Terminal colostomy was created at the incision in the left side of the umbilicus. The final operative view is shown in Fig. 3b.

Results

In our case, APR plus Japanese D3 dissection[18] and bilateral LPLD and colostomy were performed with SLS + 1, with a blood loss of 180 mL and a total surgical time of 592 minutes. The time for right lateral dissection was 126 minutes, and that for left lateral dissection was 99 minutes. The total number of dissected lymph nodes was 63, and the number of dissected lateral lymph nodes was 39 (16 right pelvic lymph nodes and 23 left pelvic lymph nodes).

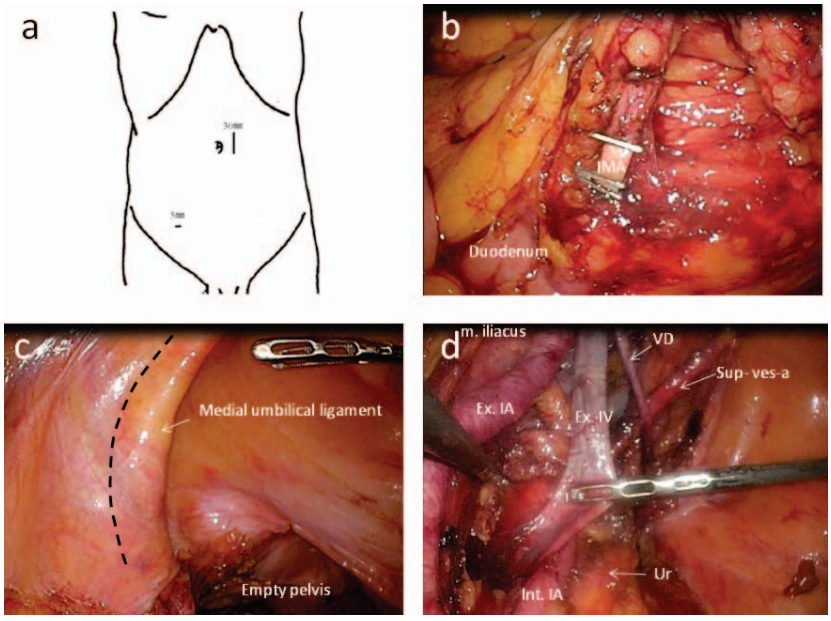

Fig. 2 (a) Position of incision for SLS + 1 APR. (b) The inferior mesenteric artery (IMA) was skeletonized, clipped, and divided. (c) The dotted line indicates the surgical landmarks for left-side LPLD. (d) Operative view of left-side LPLD. Ex-IA, external iliac artery; Ex-IV, external iliac vein; Int. IA, internal iliac artery; m iliacus, musculus iliacus; Sup-ves-a, superior vesical artery; Ur, ureter; VD, vas deferens.

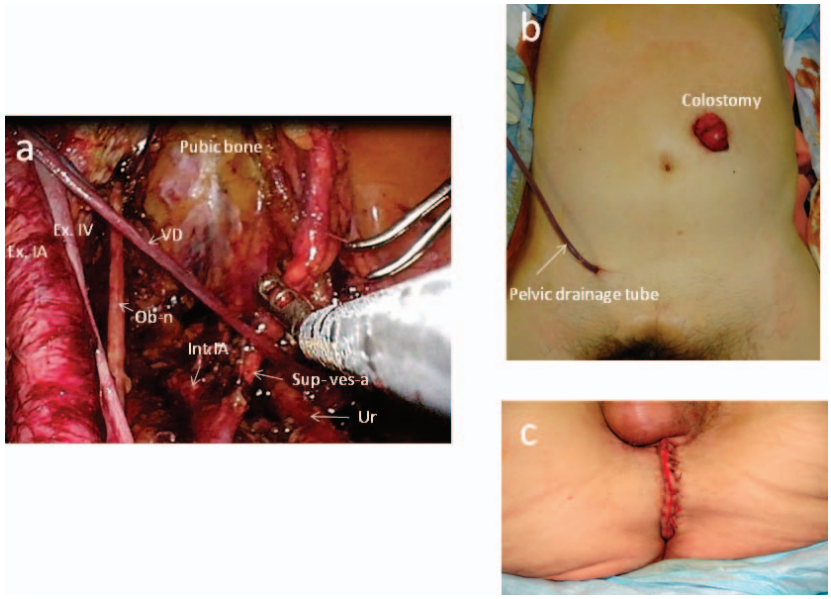

Fig. 3 (a) A final view of the left-side LPLD. (b and c) The final view of SLS + 1 APR with LPLD. Ob-n, obturator nerve.

No infection at the surgical site or voiding dysfunction was observed.

Discussion

In recent years, many surgeons have adopted laparoscopic techniques. 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, including better cosmetic results, reduced postoperative pain, and shorter recovery time; however, there are some technical complexities, such as instrument crowding and insufficient counter-traction.[19–23] In the case of distal rectal cancer, some studies comparing MLS with open surgery for APR have reported that MLS offered advantages to patients, including less blood loss, rapid oral intake of solid foods, and shorter hospital stay, and it is equivalent to open surgery in terms of long-term outcomes.[2,3] However, reduced-port surgery, including SLS + 1 APR, has not been discussed to date. To our knowledge, this is the first reported case of SLS + 1 APR with LPLD for treating advanced rectal cancer.

At our institution, SLS for treating colon cancer and SLS + 1 for treating rectal cancer following LPLD have been standardized. We also have experience with SLS + 1 TPE (unpublished result), and we have successfully performed complex procedures, such as Boari flap with SLS (unpublished result).

In SLS + 1 APR, the procedures from the mobilization of the sigmoid colon to the mobilization of the rectum are the same as those performed for standard low anterior resection. In MLS, the rectum is retracted using a pair of forceps inserted through an assistant's port located in the left lateral abdomen, to produce a wider view of the posterior or anterior aspect of the rectum. In single-incision surgery, there is no port in the left lateral abdomen; therefore, an assistant inserts another pair of forceps through a port located in the left side of the umbilicus (an incision site that is to be used as a stoma later) and lifts the rectum ventrally to facilitate the separation of the posterior aspect of the rectum. Similarly, an assistant lifts the bladder ventrally using forceps to facilitate the separation of the anterior aspect of the rectum. The insertion of an additional pair of forceps through the port in the left side of the umbilicus enables the separation procedure to be as feasible as that in case of MLS.

To facilitate an APR procedure, it is necessary to separate off the levator ani muscles as distally as possible at the intra-abdominal stage of the operation. If the abovementioned procedure is not effectively performed, more time would be required to match the layer separated from the abdomen with the layer separated from the perineal area, and the achievement of a sufficient surgical margin may be affected.

To perform bilateral LPLD with SLS + 1, as performed at our institution, the location of a port to

be created should be carefully selected in the left side of the umbilicus before starting the surgery. Because this incision site is to be used as a stoma after completing the surgery, the site requires preoperative marking. The closer the marking is to the midline, the easier it is for the operator to perform LPLD. Our experience shows that the performance of LPLD in the left side tends to be difficult if the marking is extremely toward the left.

Surgical time, blood loss, and number of dissected lymph nodes are discussed below. Tan *et al*[3] reported that they performed MLS APR for treating rectal cancer in 16 patients, with the median surgical time being 300 minutes (range, 120–510 minutes) and the median number of dissected lymph nodes being 12 (range, 4–29). Inomata *et al*[2] performed MLS APR for treating rectal cancer in 24 patients, with the median surgical time being 372.1 minutes, median blood loss being 244.6 mL, and median number of dissected lymph nodes being 11.8. These two reports described APR without LPLD. Based on these reports and the time required for bilateral LPLD performed by us, the results of our SLS + 1 APR with bilateral LPLD seem to be within the acceptable range. This technique offers the clear advantage that the final view appears to be almost "scarless."

In conclusion, we have documented the safety and feasibility of SLS + 1 APR with LPLD for treating rectal cancer. This procedure is a promising alternative for treating some patients with rectal disease. Further studies are required to prove the advantages of SLS + 1 APR with LPLD over conventional laparoscopic APR for treating rectal cancer.

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