The short term feasibility of abdominoperineal resection with prostatectomy for locally advanced rectal cancer: open and laparoscopic cases report

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Abstract Total pelvic exenteration is often selected for advanced rectal cancer with prostatic invasion. The aim of this study was to evaluate the short term feasibility of the abdominoperineal resection with prostatectomy for locally advanced rectal cancer. We performed abdominoperineal resection with prostatectomy for 3 patients with locally advanced rectal cancer, including 2 patients by totally laparoscopic procedure. Patients' background, intra- and postoperative factors and short-term prognosis were evaluated. All patients underwent complete resection of primary tumor with negative surgical margins. We could perform the surgery by both open and laparoscopic procedure in collaboration with urologist. There was no operation related mortality. One patient who was treated by open procedure had urinary anastomotic leakage. No patient had recurred, but one patient died of other disease. Our experience suggests that open or laparoscopic abdominoperineal resection with prostatectomy could be an alternative to total pelvic exenteration for the patients with rectal cancer invading the prostate. The collaboration with the urologist would be important to perform quality-controlled surgery.

Keywords Rectal cancer · Laparoscopic surgery · Radial prostatectomy · Circumferential resection margin

Introduction

Total pelvic exenteration (TPE) is often performed for locally advanced rectal cancer invading the prostate, seminal vesicle, or the urinary bladder to keep the circumferential resection margin (CRM) [1–3]. However, TPE requires two stomas for both urinary and fecal diversion, which highly compromise the quality of life (QOL) of the patients. If the CRM is ensured, resection of rectum with prostatectomy is reported as an alternative to TPE for the patients with rectal cancer invading only the prostate, and for the patients with the double cancer in the rectum and the prostate [4, 5].

On the other hand, laparoscopic rectal resection is the standard procedure for rectal cancer [6], and laparoscopic prostatectomy is also routinely performed for prostate cancer [7]. In our institute, we carefully examined the indication and performed abdominoperineal resection with prostatectomy (APR-P) for the patients with locally advanced rectal cancer from 2012. We collaborated with urologist for safe and appropriate surgery. Recently, we performed this operation by totally laparoscopic procedure. We previously reported the precise surgical procedure of APR-P elsewhere [8]. In this report, we showed the short term feasibility of the open and laparoscopic APR-P.

Cases report

We performed APR-P in 3 patients between February 2012 and September 2013. All patients had rectal cancer, which was diagnosed to invade only the prostate by preoperative computed tomography (CT) and magnetic resonance imaging (MRI). No one had distant metastasis. Patient backgrounds were shown in Table 1. The mean patients' age at the surgery was 78 years (range 68–85). The mean

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Table 1 Patient's background

Patient no.	Age (years)	BMI	Past history	Preoperative therapy	Preoperative stage
1	68	24.3	–	–	T4 N2 M0
2	80	22.0	DM	–	T4 N2 M0
3	85	24.7	DM, OMI, OBI	–	T4 N3 M0

BMI body mass index, *DM* diabetes mellitus, *OMI* old myocardial infarction, *OBI* old brain infarction

body mass index was 22.7 kg/m² (range 22.0–24.7). Patient no. 2 had severe diabetes mellitus, so the intensive insulin therapy was needed preoperatively. Patient no. 3 had diabetes mellitus, old myocardial infarction and old brain infarction. The patient had melena from the primary tumor. The patient and the family hoped to have curative surgery rather than the palliative stoma creation or chemotherapy. In Japan, preoperative chemo-radiation was not a standard for rectal cancer. Instead, curative resection with lateral lymph node dissection (LLND) followed by adjuvant chemotherapy was recommended. We did not perform preoperative chemo-radiation for these patients.

Surgical procedure: open and laparoscopic procedure

We performed open APR-P for 1 patient. At the open APR-P, the left colon was mobilized and the lymph nodes around the inferior mesenteric artery were transected. The posterior and lateral sides of the rectum were mobilized by total mesorectal excision (TME) method to the levator ani. We preserve hypogastric nerve and pelvic nerve plexus during the mobilization.

At this point, the operating surgeon was changed to the urologist. We think that the most important point of the APR-P is to keep the CRM. We should not dissect rectum from the prostate to avoid exposing the tumor. The surgeon should stop the dissection of the anterior wall of the rectum after he cut the peritoneum at the peritoneal reflection or expose the seminal vesicles (Fig. 1). The resection line is shown in Fig. 2. The urinary bladder was mobilized by dissecting the Retzius space to the prostate (Fig. 2, line-a). At the anterior side of the prostate, we ligated the dorsal vein complex in advance to handle the vein hemorrhage. With the help of the urethral bougie, we opened the urethra between the urinary bladder and the prostate (Fig. 2, line-b). We could see the neuro-vascular bundle (NVB) at the bilateral side of the prostate. If CRM is ensured, we could preserve the NVB, but we could not in all patients. Removing the seminal vesicles from the urinary bladder, the dissection line led to the peritoneal reflection. Next, with the help of the urethral bougie, we cut the urethra at the peripheral side of the prostate (Fig. 2, line-c). By these procedures, the dissection around the prostate was finished.

Fig. 1 The surgeon should stop the dissection of the anterior wall of the rectum not to expose the rectal cancer after cutting the peritoneum at the peritoneal reflection. *R* rectum, *UB* urinary bladder, *Broken line* peritoneal reflection

Fig. 2 Line of resection around urinary bladder and prostate in the abdominoperineal resection with prostatesctomy. *P* prostate, *T* tumor, *R* rectum, *UB* urinary bladder, *SV* seminal vesicle

The operating surgeon changed to the colorectal surgeon again. We cut the sigmoid colon at least 10 cm distant from the edge of the primary cancer. Next, we performed the perineal approach and finished the transanal resection of

the rectum. By these procedures, the rectum and the prostate including the tumor were removed from the anal wound.

Again, the operating surgeon was changed to urologist. The anastomosis between the urethra and the urinary bladder was done after the confirmation of the cancer free margins in the resected specimen. It is important to handle amputation stump gently and not to use the energy devices while dissecting around the urinary sphincter for the prevention of the urinary dysfunction. Finally, a diverting stoma was established at the left lower side of the abdomen by colorectal surgeon.

LLND was done in 2 patients. We removed the lymph nodes around bilateral common iliac artery, external iliac artery and internal iliac artery. The detailed procedure of LLND was reported elsewhere [9].

On the other hand, we performed laparoscopic APR-P for 2 patients. We previously reported about the laparoscopic surgical procedure of APR-P [8]. The first trocar was inserted in an umbilical incision and under the guide of laparoscopy other trocars were inserted in bilateral lower and upper side of the abdomen. The size of the first trocar and the right lower trocar were 12 mm and that of the others were 5 mm. Using these 5 trocars, we dissected the left colon, and the posterior and lateral side of the rectum.

Before dissecting the Retzius space by urologist, we added a 12 mm port in the middle lower side of the abdomen. Urologist performed the prostate dissection with this trocar. After colorectal surgeon performed the perineal approach and removed the sample, urologist reconstructed the urinary tract. The diverting stoma was established at the left lower trocar position.

Intraoperative characteristics are shown in Table 2. The mean operative time was 608 min (range 544–670). The mean blood loss was 2319 g (range 2073–2704), but the blood loss included the urinary volume while the urinary tract was opened. The patients had intraoperative blood transfusion by 0.4–1.2 L of red cell concentrates. No patients had postoperative blood transfusion. Patient no. 1 and patient no. 3 was performed LLND because they had

rectal cancer with lateral lymph nodes metastasis. Patient no. 2 and no. 3 received totally laparoscopic APR-P.

Histopathological findings

Histopathology, postoperative characteristics and short-term prognosis is shown in Table 3. Patient no. 1 and 3 were pathologically diagnosed with rectal cancer invading to only the prostate (Fig. 3a, c). Patient no. 2 was diagnosed as a case of rectal cancer invading the capsule of the prostate, but not the body of the prostate (Fig. 3b). Patient no. 2 had double cancer in rectum and prostate. All resected margins were examined pathologically and complete resection with negative CRM was achieved in all cases.

Post-operative management

The patients started the oral intake at 2 postoperative days (POD). We checked the urinary leakage by urography at 7 POD, and if there was no leakage, the urethral catheter was removed. The patient discharged from the hospital, when the patient was in good general condition and acquired the management of colostomy.

There was no operative mortality. Patient no. 1 was diagnosed as a minor vesico-urethral anastomotic leakage by urography at 7 POD. The leakage was soon cured and urinary catheter was removed at 22 POD. Patient no. 3 had surgical site infection under the skin at the lower middle side of the abdomen. The infection cured by opening and washing the wound. All patients discharged our hospital in good general condition.

Adjuvant therapy and follow-up

Adjuvant chemotherapy was standard for the patients with rectal cancer metastasized to the lymph nodes in Japan [10]. We performed adjuvant chemotherapy when the

Table 2 Intraoperative characteristics

Patient no.	Operative time (min)	Blood loss (g) ^a	Blood transfusion	Lateral lymph node dissection	procedure
1	544	2704	RCC 6 units ^b	–	Open
2	611	2180	RCC 4 units	–	Laparoscopy
3	670	2073	RCC 2 units	+	Laparoscopy

RCC red cell concentrates

^a Including urinary volume

^b RCC 1 unit contains red blood cells from 200 ml blood donation

Table 3 Histopathology, postoperative characteristics and prognosis

Patient no.	Tumor stage	Surgical margins (mm)	Oral intake (POD)	Urinary catheter removal (POD)	Hospital discharge (POD)	Complications	Adjuvant therapy	Postoperative urinary function	Prognosis
1	T4 N2 M0	Negative (5)	2	22	29	Urinary leakage (CD; Grade I)	mFOLFOX6	Spontaneous continence	30 mo ANR
2	T4 N2 M0	Negative (5)	2	7	13	None	UFT/LV	Spontaneous continence	21 mo ANR
3	T3 N3 M0	Negative (6)	2	7	30	SSI (CD; Grade II)	–	–	5 mo DOD

POD post operative days, SSI surgical site infection, CD Clavien Dindo classification, LV leucovorin, ANR alive with no evidence of recurrence, DOD died of other disease

Fig. 3 The specimen of the patients. *Broken* and *solid* lines represent the margin of the rectal cancer and the prostate cancer, respectively. **a** Patient no. 1. **b** Patient no. 2. **c** Patient no. 3. *P* prostate, *SV* seminal vesicle

patients had stage III or IV rectal cancer except for the patients who were not willing to receive chemotherapy or whose general conditions were not suit for chemotherapy. Patient no. 1 and 3 were treated by adjuvant chemotherapy. Patient no. 3 was not willing to receive the chemotherapy because of his age.

Follow-up examinations were done every 3 months after surgery. We checked the clinical examination, tumor marker and radiological investigations including computed tomography from chest to pelvis. Two patients were alive with no evidence of recurrence. Unfortunately, patient no. 3 died of pneumonia at 5 months after surgery. Excellent urinary function without hydronephrosis was achieved in all patients, which was examined by urologist every 3 months after surgery.

Discussion

In this report, we showed the short term feasibility of APR-P for the patients with locally advanced rectal cancer. In America and Europe, preoperative chemo-radiation therapy (CRT) was often selected for this situation [11, 12]. A Phase III study reported that there was no difference on long term overall survival between preoperative CRT plus surgery and surgery alone for locally advanced rectal cancer, though there was a significant improvement of preoperative CRT on local control rate [13]. There has been no study demonstrating the significant improvement of preoperative CRT on overall survival. At this point, the strategy for locally advanced rectal cancer is controversial. Even in cases intended to be treated by preoperative CRT,

there are some patients who do not suit for CRT or some patients with rectal cancer remaining prostatic invasion after preoperative therapy. TPE is regarded as the standard procedure for such cases [1–3]. However, we think that APR-P is an appropriate procedure for such patients because it has been reported that APR-P is a less invasive and a functionally improved procedure than TPE. Moreover, it has reported that the patients treated by APR-P had relatively favorable outcomes with or without preoperative CRT [4, 5]. As long as the CRM is confirmed, APR-P seemed to be a good alternative to TPE for the patients with rectal cancer invading only the prostate, and for the patients with the double cancer in the rectum and the prostate.

CRM is reported to be significantly associated with prognosis and local recurrence rate in rectal cancer with or without preoperative chemo-radiation [14, 15]. There are some reports showing that the CRM of less than 1 mm was associated with higher local recurrence and low survival rates [16]. Other reports said that the cutoff value of CRM was 2 mm [15, 17]. In this report, all cases confirmed the negative surgical margins, and the CRMs were more than 5 mm. No patients had local recurrence. Preoperative examination about the CRM is thought to be important to get the negative surgical margins.

We previously reported the precise surgical procedure of the totally laparoscopic APR-P [8]. Though, laparoscopic prostatectomy is the standard procedure for prostate cancer, the safe and high quality prostatectomy is often difficult for colorectal surgeon. We performed totally laparoscopic APR-P in collaboration with urologists. We think that performing each own specialized surgery leads to the quality-controlled surgery. In this report, we could perform APR-P in safety for 2 patients whose age was even 80 or older. Laparoscopic surgery for rectal cancer and prostate cancer is reported to be a very useful procedure with less invasiveness and accuracy [6, 7]. We supposed that laparoscopic APR-P might be a less invasive and highly accurate procedure for locally advanced rectal cancer.

Laparoscopic vesico-urethral anastomosis is the key technique in APR-P. There were many reports about the safe and simple technique [18, 19]. We prefer 3-0 absorbable suture. First, we place a 6 o'clock posterior urethral suture involving perineal body and levator ani, and sewed them on perivesical Denonvilliers fascia as the reinforcement of the posterior wall. After single running suture, for secure anastomosis, we sew the bilateral side of the vesical wall on tendinous arch of the levator ani. Of course, it is necessary to handle the amputation stump kindly, and to reduce the use of the energy devices around the urethral sphincter.

APR-P seems to be a feasible surgical technique for the patients with locally advanced rectal cancer involving the prostate, and to be an alternative to standard TPE.

Moreover, we showed laparoscopic APR-P as safe and useful procedure when colorectal surgeon and urologist were collaborated. The indication of APR-P was the patients with rectal cancer involving the prostate or both the prostate and the seminal vesicles without urinary bladder invasion, or the patients with double cancers in rectum and prostate. Before APR-P was planned, we recommend careful preoperative and intraoperative examination to achieve the negative surgical margins. The precise staging using CT, MRI was useful. If the invasion to urinary bladder or the distant metastasis, such as liver metastasis or dissemination, was detected intra-operatively, APR-P should be converted. Though APR-P requires careful discussion for operative indication, we believe that APR-P, especially by laparoscopy, was the more minimally invasive and more QOL preserving surgery, without compromising local control. More experience and longer follow-up are needed to evaluate the versatility of this surgery.

Conflict of interest The authors declare that they have no conflict of interest.

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