

# Laparoscopic total vaginectomy for isolated vaginal recurrence of cervical cancer or high-grade squamous intraepithelial lesion after hysterectomy: a retrospective, single-centre cohort study

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**Objective:** We conducted a retrospective study in which we evaluated the feasibility and effectiveness of total vaginectomy for isolated vaginal recurrence of cervical cancer that had been treated surgically. Such recurrence is uncommon, and there is no consensus regarding the treatment strategy. **Methods:** Included in our study were 6 patients who, between January 2012 and December 2019, had undergone laparoscopic vaginectomy for vaginal recurrence of cervical cancer or high-grade squamous intraepithelial lesion that had been treated by hysterectomy. **Results:** The patients ranged in age from 49 to 78 years (median, 68 years). Vaginectomy time ranged from 128 to 385 minutes (median, 176.5 minutes), and estimated blood loss ranged from 40 to 310 mL (median, 105 mL). Patients' hospital stay ranged from 7 to 29 days (median, 14 days). Two intraoperative complications occurred: a grade 1 small bowel injury in 1 patient and a grade 1 bladder injury in another. An abdominal abscess developed postoperatively in 1 patient. **Conclusions:** Local control was achieved in 5 of the 6 patients. Our data support both the feasibility and effectiveness of laparoscopic total vaginectomy for isolated vaginal recurrence of cervical cancer or high-grade squamous intraepithelial lesion after hysterectomy.

## Keywords

Vaginectomy; Total vaginectomy; Vaginal recurrence; Cervical cancer; Laparoscopy

## 1. Introduction

In Japan, the annual incidence of cervical cancer (including high-grade squamous intraepithelial lesion [HSIL]) is approximately 20,000, with approximately 3000 women dying of the disease each year [1]. We sometimes encounter vaginal recurrence after initial surgery for cervical cancer or HSIL, but the incidence is quite low. While there is no established treatment strategy for isolated vaginal recurrence of either of the two entities, non-operative therapy is often selected for treatment of vaginal vault recurrence. Radiation therapy is generally used, and in cases of intraepithelial recurrence, laser

ablation or topical injection of 5-fluorouracil (5-FU) may also be used [2].

Although vaginectomy is considered an effective treatment for vaginal recurrence of either cervical cancer or HSIL, there are only a few reports of vaginal resection for recurrent cervical cancer, and most are of vaginal resection by vaginal and/or open approach [3–5]. There are few reports of laparoscopic vaginal resection for recurrent cervical cancer or HSIL. We conducted a retrospective single-centre study in which we examined the feasibility and effectiveness of laparoscopic vaginal resection for cervical cancer or HSIL that has recurred in the vagina.

## 2. Materials and methods

### 2.1 Patients

Our study group comprised 6 patients who underwent laparoscopic total vaginectomy for isolated vaginal recurrence of cervical cancer or HSIL at Cancer Institute Hospital (Tokyo, Japan) between January 2012 and December 2019. The recurrences had been detected within 4 to 71 months after hysterectomy had been performed for the cervical cancers and HSILs. We identified the 6 patients by reviewing departmental records. All 6 patients had undergone hysterectomy for cervical cancer or HSIL, and all were of Eastern Cooperative Oncology Group (ECOG) performance status 0. Four of the patients had undergone hysterectomy at our hospital, and 2, having undergone hysterectomy elsewhere, had been referred to us for the vaginal recurrence. The study was approved by the Ethical Review Committee of Cancer Institute Hospital and was conducted in accordance with the Declaration of Helsinki.

### 2.2 Surgical procedure

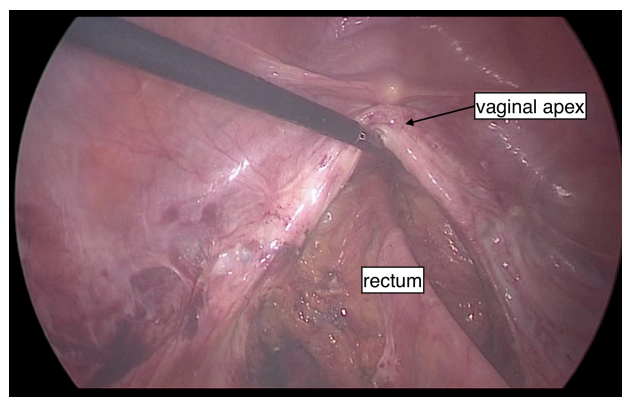
The patients were fully informed of the nature of the surgery and any possible intraoperative and postoperative

complications. Laparoscopic total vaginectomy was begun by putting the patient under general anaesthesia, placing the patient in the Trendelenburg position, and inserting a Foley catheter. The surgery was performed via 4 ports, with 1 12-mm trocar placed in the umbilicus and 3 5-mm trocars placed in the lower abdomen. The abdomen was thoroughly explored to ensure that there were no disseminated lesions.

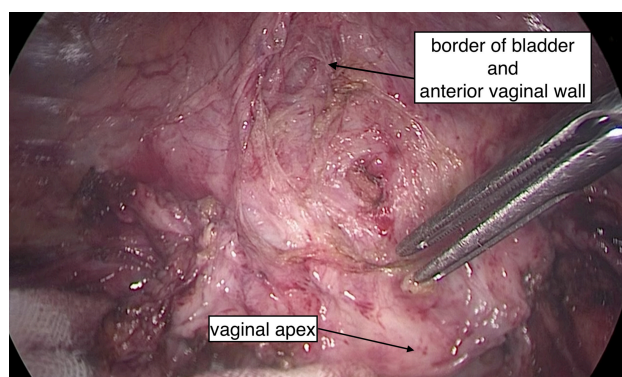
Once hysterectomy is performed, the boundaries of the vagina, bladder, and rectum become unclear. In these 6 cases, therefore, we began to develop the retroperitoneal space from the cephalic side and then further developed the space by using the rectum and ureter as landmarks. We developed the pararectal space along fascia propria of the rectum and then developed the retrorectal space until the surface of the levator ani muscle was exposed. The rectum was retracted, and the rectovaginal septum was dissected from both sides. The vagina was lifted by means of a spatula that had been inserted and then retracted ventrally to expose the wall between the vagina and the rectum (Fig. 1). Separation of the posterior vaginal wall from the rectum was performed close to the muscular layer of the rectum, and this dividing surface was continued to the perineal body. To separate the bladder and the anterior vaginal wall, the vaginal apex was identified by using the spatula, the bladder was pulled through the vaginal apex (Fig. 2), and each ureter was dissected from the cephalic side to a point near the orifice. Because the peri-ureteral area is relatively free from adhesion and fibrosis, we try to identify the surrounding internal iliac vessels by identifying the ureter from the cephalic side. On the ventral side of the vagina, the dissection plane was aligned with the layer of muscle surrounding the bladder. The paravaginal space was developed, and the paracolpium was resected, preserving the bladder branch of the inferior hypogastric plexus. The vaginal canal was dissected from the bladder and rectum to the surface of the lever of the levator muscles (Fig. 3). After the vaginal separation was advanced to the levator muscle, the vaginal operation was begun. A Lone Star retractor system (Cooper Surgical, Trumbull, CT) was used to secure the operative field, and adrenalin (1 : 1,000,000 dilution) was injected into the surrounding vaginal submucosa, which was then dissected from the vaginal side. The vagina was dissected to the point of attachment to the levator muscle, the wall between the rectum and vagina was confirmed by means of rectal examination, and the vagina was then removed vaginally (Fig. 4). The defect in the levator muscle was closed by suturing it from the vaginal side.

### 2.3 Data analysis

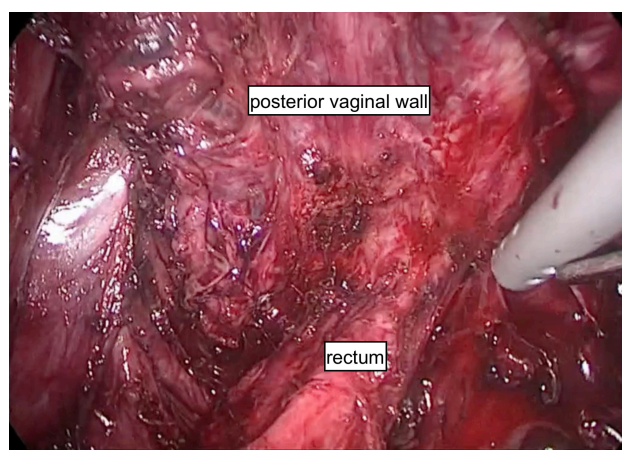
For the purpose of the study, we assessed patients' clinical characteristics, including age, International Federation of Gynecology and Obstetrics cancer stage, histologic type of the cervical cancer, type of surgery performed for the cervical cancer, margin status, whether or not adjuvant therapy had been performed, time between the hysterectomy and vaginectomy, whether or not non-surgical treatment had been performed for the vaginal recurrence, and histologic



**Fig. 1. View of the vagina and rectum, as seen during laparoscopic vaginectomy.**



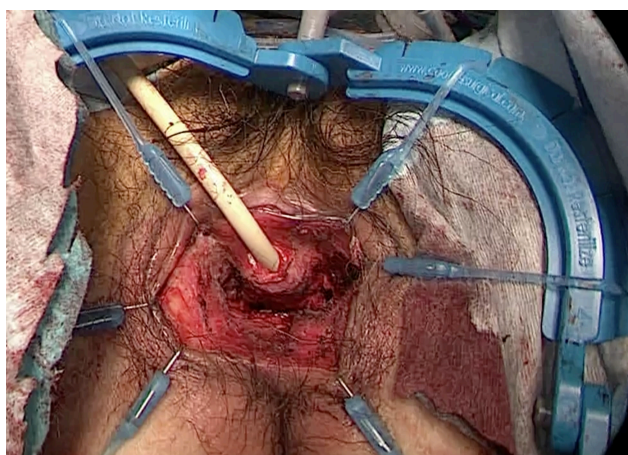
**Fig. 2. View of the vagina and bladder, as seen during laparoscopic vaginectomy.** The vaginal apex is identified by using the spatula, and it is retracted to the dissected border of the bladder and anterior vaginal wall so that the bladder can be pulled through the vaginal apex.



**Fig. 3. Laparoscopic view of the border of vagina and rectum.** Dissection between the rectum and vagina was carried out to the level of the levator muscles.

type of the recurrent cancer. In addition, we assessed intraoperative and postoperative outcomes of the total laparoscopic vaginectomy, including any complications.





**Fig. 4.** A Lone Star retractor system (Cooper Surgical, Trumbull, CT) was used to secure the operative field.

### 3. Results

Clinical characteristics of the 6 patients and details of their cases are shown on Table 1. The 6 patients ranged in age from 49 to 78 years (median, 68 years). Cervical cancer of stage Ia1, Ia2, or Ib1 had been diagnosed in 1 patient each, and CIS (stage 0) had been diagnosed in the other 3 patients. The stage Ia1 and Ib1 tumours were both squamous cell carcinomas, and the stage Ia2 tumour was an adenocarcinoma. Two of the patients had undergone abdominal modified radical hysterectomy, 2 had undergone simple extrafascial hysterectomy, 1 had undergone laparoscopic total hysterectomy, and 1 had undergone laparoscopic radical hysterectomy. All had undergone concomitant bilateral salpingo-oophorectomy, and pelvic lymph node dissection had been performed in 1 patient. There was 1 patient with a pathologically positive vaginal surgical margin and this patient had undergone postoperative brachytherapy. One patient had undergone laser vapourisation soon after the recurrence had been detected. No intervention was performed prior to surgery for the recurrent cancer in the other 5 patients.

The surgical margin was positive in 1 case, and the patient was treated with brachytherapy. Time between the hysterectomy and vaginectomy ranged from 4 to 71 months (median, 24 months). One patient had undergone laser ablation before the surgical intervention, but the lesion did not resolve, and thus total vaginectomy was performed.

The total vaginectomy variables are summarised in Table 2. Operation time ranged from 128 to 385 minutes (median, 176.5 min), blood loss volume ranged from 40 to 310 mL (median, 105 mL), and the resection margins were negative in all cases. There were 4 cases in which the appropriate excision margin was determined in advance, the vaginal mucosa was incised circumferentially with a monopolar electrocautery device, and a vaginal cuff was created by suturing together the edges of tissue where the vaginal stump was attached to the vagina [6]. A ureteral catheter was inserted in 2 patients. The Foley catheter was removed after

a median of 10 days (range, 1 to 11 days), and 1 patient required clean intermittent catheterization. Patients' hospital stay ranged from 7 to 29 days (median, 14 days). Intraoperative complications occurred in only 2 patients: small bowel injury in 1 and bladder injury in the other. The small bowel injury occurred at the time of insertion of the first trocar and was due to widespread adhesion between the small bowel and the peritoneum that had resulted from insertion of an abdominal mesh during hernia repair surgery. Upon injury, partial small bowel resection and functional end-to-end anastomosis were performed, and there were no resulting complications. The bladder injury occurred during vaginal manipulation, and it was repaired simply by suturing the injured area. Postoperative complications included pelvic abscess in 1 patient, which was treated with antibiotics and improved with computed tomography-guided abscess puncture and drain placement. Follow-up time after vaginectomy ranged from 3 to 48 months (median, 30.5 months). One of the 6 patients suffered an intrapelvic recurrence, with time to recurrence being 24 months. In that case, the recurrent tumour was in contact with the posterior wall of the bladder, the rectum, and the ileum. Total pelvic exenteration was performed, as required for complete removal of the tumour. Nineteen months later, the patient suffered another peritoneal recurrence, and radiation therapy was performed. The patient has done well since.

### 4. Discussion

Vaginal recurrence is the most common type of local relapse in cases of cervical cancer, and there is no consensus regarding a treatment strategy [4]. Partial excision and local administration of 5-FU have been reported. The response rates for laser ablation and 5-FU administration have been reported to be 61% and 40%, respectively, and the recurrence rate is high [7]. Radiation therapy has been reported to be effective for local control, especially for small tumours [8], but complications after radiotherapy, such as urinary problems and vaginitis, can occur [9]. Surgery is generally considered appropriate in cases of relapse after non-operative therapy, and Berek *et al.* reported that total pelvic exenteration can be considered for cervical cancer that recurs after radiation therapy. However, they concluded that it should be considered as a last resort, due to the potential for serious complications [10].

Benedetti Panici *et al.* [5] reported the effectiveness of vaginal vaginectomy for recurrent cervical cancer. They performed radical hysterectomy in patients with stage I–III cervical cancer and then performed vaginectomy in 29 patients with vaginal recurrence. There were no intraoperative complications, but 7 patients (24%) suffered early postoperative complications, including postoperative haemorrhage ( $n = 2$  [7%]), vesicovaginal fistula ( $n = 1$  [3%]), and abscess and dehiscence ( $n = 4$  [7%]). Late complications occurred in 6 patients, vaginal stenosis in 3 (10%), urinary incontinence in 2 (7%), and ureteral stenosis in 1 (3%). Five-year overall survival was 70.5%, and progression-free survival was 59.4%.

**Table 1. Patients' clinical characteristics, including histologic features and treatment of the primary cervical and recurrent vaginal tumors.**

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Age (years)	66	78	70	54	49	74
Stage (FIGO 2008) of the cervical cancer	1a1	1b1	NA	NA	1a2	NA
Histologic type	SCC	SCC	CIS	CIS	ACA	CIS
Surgery for the cervical cancer	mRH + BSO	mRH + BSO + PLA	TAH + BSO	TAH + BSO	TLRH + BSO	TLH + BSO
Vaginal margin	–	+	–	–	–	–
Adjuvant therapy	None	None	None	None	None	None
Time between hysterectomy and vaginectomy	4 months	71 months	17 months	31 months	6 months	34 months
Treatment for recurrence before vaginectomy	None	Brachytherapy	None	None	None	Laser ablation
Histologic type of the recurrent cancer	SCC	SCC	CIS	CIS	ACA	CIN3

NA, not available; FIGO, International Federation of Gynecology and Obstetrics; SCC, squamous cell carcinoma; CIS, carcinoma *in situ*; ACA, adenocarcinoma; mRH, modified radical hysterectomy; BSO, bilateral salpingo-oophorectomy; PLA, pelvic lymphadenectomy; TAH, total abdominal hysterectomy; TLRH, total laparoscopic radical hysterectomy; TLH, total laparoscopic hysterectomy.

**Table 2. Vaginectomy-related variables, per patient.**

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Operation time	178 min	385 min	182 min	128 min	175 min	169 min
Blood loss volume	100 mL	310 mL	110 mL	75 mL	40 mL	210 mL
Intraoperative complication	None	Small bowel injury	Bladder injury	None	None	None
Postoperative complication	None	None	None	Pelvic abscess	None	None
Recurrence after vaginectomy	Pelvic wall	None	None	None	None	None
Treatment for recurrence after vaginectomy	TPE	None	None	None	None	None
Time from vaginectomy to recurrence	24 months	NA	NA	NA	NA	NA
Final status	AWD	NED	NED	NED	NED	NED

TPE, total pelvic exenteration; NA, not applicable; AWD, alive with disease; NED, no evidence of disease.

There were 7 recurrences, with a median time of 13 months between vaginectomy and recurrence. Benedetti Panici *et al.* gave the following selection criteria for vaginectomy: a tumour  $\leq 2$  cm in diameter, no prior radiation therapy, no prior lymph node metastasis, no palpable paravaginal invasion, and no evidence of metastasis on positron emission tomography. They concluded that vaginal resection is effective in patients with a small tumour and who have not undergone radiation therapy.

A study of 8 patients who underwent total vaginectomy by laparotomy for vaginal recurrence of cervical cancer was conducted at our institution [3]. All 8 patients had undergone hysterectomy and then underwent radiation therapy for the recurrent cancer. Time for the vaginectomy ranged from 172 to 590 minutes (median, 244.5 minutes), and the estimated blood loss volume ranged from 49 to 1890 mL (median, 362.5 mL). Intraoperative complications occurred in 2 patients: rectal injury in 1 and bladder injury in the other. Postoperative complications developed in 4 patients: vaginal vault bleeding in 1 and vesicovaginal fistula in 3. The indication for vaginectomy was limited to recurrence that was judged on preoperative evaluation to be superficially invasive. There were 5 recurrences, ranging in time from 2 to 22 months (median, 10 months) following the vaginectomy.

Choi *et al.* [11] reported performance of laparoscopic upper vaginal resection in 4 patients with vaginal intraepithelial neoplasia or superficially invasive vaginal carcinoma, show-

ing the efficacy and safety of the approach. Operation time ranged from 145 to 205 minutes (median, 162.5 minutes), and blood loss ranged from 20 to 100 mL (mean, 55 mL). Postoperative complications were vaginal bleeding in 1 patient who was taking oral warfarin and vesicovaginal fistula 2 patients. There was no postoperative recurrence.

Zhao *et al.* [12] reported a study of 52 patients who underwent vaginectomy for a high-grade squamous intraepithelial lesion that occurred following total hysterectomy. The vaginectomy was partial in 37 of the patients and total in 15 patients. The resection was performed laparoscopically in 20 patients. For the patients who underwent total vaginectomy, median operation time was 114 min (range, 56–580 minutes), and median blood loss volume was 100 mL (range, 50–1500 mL). Total vaginectomy did not result in any complications. Among the 52 study patients, the recurrence rate was 15.4%, and among the 15 patients who underwent total vaginectomy, the recurrence rate was 20%. The authors suggested that vaginectomy is more efficacious than nonoperative therapy, i.e., than laser ablation or 5-FU therapy.

Our study was of 6 total vaginectomies performed laparoscopically, with 1 performed in a patient and the other 5 having been performed for a first recurrence and in the absence of radiotherapy. Intraoperative complications included a bladder injury and an intestinal injury, but urinary tract and rectal function remained undisturbed. There was 1 recurrence. Operation time was longer and blood loss was greater

for the patient who had undergone radiotherapy than for the other 5 patients. The only postoperative complication encountered among our patients was that of a pelvic infection in 1 case; there was no vesicovaginal fistula. Radiotherapy can lead to severe tissue fibrosis and adhesions and/or anatomical deviation, suggesting that radiotherapy affects the quality of the surgery [13]. Recurrence of cervical lesions in the vagina is often multicentric [4], and thus we believe that total vaginal excision is prudent. Of the various possible approaches to vaginal excision, we prefer the intraperitoneal approach because it allows us to easily avoid the bladder mucosa and rectal mucosa.

The magnifying effect of laparoscopy and the deep visualisation achieved may facilitate vaginectomy involving structures close to the pelvic floor. We use a concomitant vaginal approach, which we believe makes the surgery safer because it allows direct palpation of the rectovaginal septum.

We have narrowed our indications for laparoscopic total vaginectomy to superficial vaginal recurrence because a circumferential resection margin is needed. At present, we consider vaginectomy to be contraindicated for cases in which a tumour has formed. According to the Japan Society of Gynecologic Oncology Guidelines 2017 for the treatment of uterine cervical cancer [14], surgical treatment of recurrent cancer is recommended only for local recurrence, i.e., central recurrence or recurrence inside the irradiation field; there is no mention of vaginectomy [14]. The indications for laparoscopic total vaginectomy will become clear as we gain experience and as prospectively collected data from our centre are compared with such data from other cancer centres in Japan.

## 5. Conclusions

We acknowledge that our study was limited by the small number of patients, and thus we cannot draw definite conclusions. Our findings suggest, however that laparoscopic total vaginectomy is particularly useful for vaginal recurrence of cervical cancer or HSIL, so long as no tumour has formed and radiotherapy has not been performed. Such surgery appears to be both clinically efficacious and safe.

## Author contributions

All authors contributed to the study conception and design. All authors participated in the data collection. KO and YA analysed the data. KO and YA drafted the manuscript, and all authors contributed to and approved the final version.

## Ethics approval and consent to participate

This study was approved by the institutional review board of Cancer Institute Hospital of JFCR. Ethics approval was waived, and written informed consent for patient participation and for publication of patient data was waived because of the retrospective nature of the study.

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## Conflict of interest

The authors declare no conflict of interest.

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