Original Article

Comparison of modified Cherney incision and vertical midline incision for management of early stage cervical cancer

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Objective: The aim of this study was to compare operative feasibility and surgical outcome of the modified Cherney incision and vertical midline incision in patients undergoing radical hysterectomy and pelvic lymphadenectomy.
Methods: Between March 2005 and December 2007, retrospective data of 78 patients (n=17; modified Cherney incision, n=61; vertical midline incision) with early stage cervical cancer who received radical hysterectomy and pelvic lymphadenectomy were reviewed.
Results: Baseline characteristics of patients who underwent modified Cherney incision and vertical midline incision were similar except for age (mean±SD: 32.3±3.4 yr vs. 52.5±8.4 yr, p<0.001). Patients who received modified Cherney incision had earlier initiation of soft diet (mean±SD: 46.5±19.5 hr vs. 56.4±25.4 hr, p<0.016) and shorter hospital stay compared to those who received vertical midline incision (mean±SD: 18.0±4.8 days vs. 21.7±3.7 days, p<0.042). There was no difference in the number of dissected pelvic lymph nodes, hemoglobin change, postoperative pain, postoperative ileus, Foley indwelling duration, and perioperative complications.
Conclusion: Excluding the selection bias for age, there was no significant difference of the clinical outcome between the modified Cherney incision group and the vertical midline incision group. Modified Cherney incision can be cosmetically performed in young age women obtaining equal number of lymph nodes without increased operative morbidity compared to vertical midline incision.

Key Words: Cervical cancer, Radical hysterectomy, Cherney incision

INTRODUCTION

Cancer of the uterine cervix is the second most common cancer among women worldwide. There will be 11,150 new cases diagnosed and 3,670 deaths due to cervical cancer in the US this year. Although the incidence and mortality of cervical cancer has dropped steadily from 1940 through 1990, this decline has slowed since 1991. The death rate per 100,000 women has decreased from 3.49 to 2.48 between 1991 and 2003.[1]

This owes to the improvement in early screening of cervical cancer and the use of MRI or FDG-PET scanning which enables increased diagnostic accuracy for lymph node metastasis. Therefore radical hysterectomy with bilateral pelvic lymphadenectomy was applied as a primary treatment in early stage

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disease.

In the 1910s, gynecological oncologists have traditionally used the vertical midline or Maylard transverse muscle splitting incisions for their abdomino-pelvic operative procedure. The widespread use of synthetic suture materials has resulted in a reduction of wound dehiscence and hernias with midline incisions, but the vertical scar is a cosmetic disadvantage. With the Maylard incision, suture placement in the transversely incised muscle is difficult and traumatic, and subsequent healing of the muscle incision by fibrosis can result in impaired rectus muscle tone and unsightly bulging at the points of the points of muscle weakness along the wound.[2] Cherney first described a modification of the transverse incision in 1941. The primary advantage of this incision was to maximize exposure, particularly in deep pelvic dissections in obese patients. Other advantages were to decrease the risk of incisional hernias, minimize incisional discomfort, and enhance cosmesis.[3]

The aim of this study was to compare operative feasibility and surgical outcome of the modified Cherney incision and vertical midline incision in patients undergoing radical hysterectomy and pelvic lymphadenectomy.

MATERIALS AND METHODS

From March 2005 to December 2007, 95 patients with early stage cervical cancer who received radical hysterectomy and pelvic lymphadenectomy at Severance Hospital were reviewed.

All operations were performed by a single oncologist to eliminate the operator bias. Repeat incisions were made on the previous scar. Before operation, gynecologic physical exam, histopathologic exam, chest x-ray, pyelonephrogram, cystoscopy and colonoscopy were performed as a part of the staging work-up. Additional MRI or PET-CT scans were used when necessary. Patients were categorized by FIGO staging. Preventive antibiotics were administered for a short-term before and after operation. Data were collected from medical records on age, parity, BMI, medico-surgical illness history, clinical staging, co-existing disease, pathologic type, number of lymph nodes, operation time, complications, pain score (visual analogue scale), and mean hospitalization day. If the needs arose, neoadjuvant chemotherapy was provided for the patients with stage IIb or cervical mass larger then 4 cm. Body temperature above 38°C in 2 consecutive measurements at 4-hour intervals after 24 hours of operation was determined as febrile morbidity. Intestinal paralysis was diagnosed when small bowel function does not recover 48 hours after operation with bowel distension, lack of bowel sound, or abnormal abdominal plain X-ray.

Bladder training was started from the 8th postoperative day and Foley catheter was removed on either the 11th or 13th postoperative day. This includes the period of reinsertion of catheter due to voiding dysfunction.

1. Surgical technique

The same incision technique as Pfannenstiel is used for skin, subcutaneous, and aponeurosis of oblique abdominis muscle, by cutting them transversely in a curvilinear fashion.

The original Cherney incision is known to expose the lower flap of both rectus sheaths and cutting them all, and making a transverse peritoneal incision with ligation of the deep inferior epigastric vessels.

Our technique was a modification of the traditional Cherney incision, by cutting only the unilateral rectal sheath. A vertical peritoneal incision was made to preserve the deep inferior epigastric vessels (Fig. 1). This technique also provides maximal incision width for surgical exposure.

Statistical analysis was done using t-test, X2 test and Fisher Exact test, and p-values less than 0.05 were considered significant.

RESULTS

Vertical midline incision was performed in 61 cases and the modified Cherney incision was made in 17 cases. Mean ages were 52.3 ± 8.0 years, and 34.3 ± 6.5 years, respectively. This showed significant difference between the two groups (p-value <0.001).

BMI was 24.2 ± 7.6 kg/m^2 and 20.4 ± 8.1 kg/m^2, respectively, showing no significant difference. The difference in previous chemotherapy history, previous laparotomy history and co-existing medical illness-such as diabetes mellitus, pulmonary disease, cardiovascular disease was not significant between the two groups. Patients with clinical stage under Ib2 was 54.1% and those at Ib2 or above was 45.9% in the Vertical midline incision group. In the modified Cherney incision group, they were 58.8% and 41.2% respectively. There was no difference in distribution of clinical stage in the two groups (Table 1).

Mean operation time was 187.4 ± 55.2 minutes in the vertical midline incision group, and 192.3 ± 46.4 minutes in the modified Cherney incision group, also without significant difference. One case of external iliac vein laceration occurred in each group and primary repair was performed. The mean number of dissected lymph nodes was 34.2 ± 2.1 in the vertical midline incision group, and 32.5 ± 4.2 in the modified Cherney incision group. This was also of no significant difference.
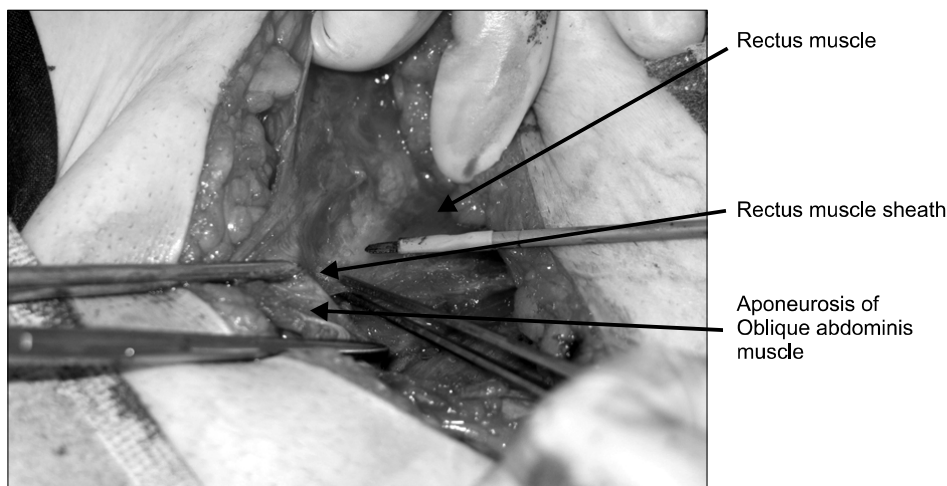

Rectus muscle

Rectus muscle sheath

Aponeurosis of Oblique abdominis muscle

Fig. 1. Anatomical feature for modified Cherney incision.

Table 1. Patient characteristics

Variable	Vertical midline incision group (n=61)	Modified Cherney incision group (n=17)	p value
Age (year: mean±SD)	52.3±8.0	34.3±6.5	<0.001
BMI (kg/m^2: mean±SD)	24.2±7.6	20.4±8.1	NS
Cervical cancer stage			
Ia2-Ib1	33 (54.1%)	10 (58.8%)	NS
Ib2-IIb	28 (45.9%)	7 (41.2%)	NS
Previous chemotherapy history	9 (14.7%)	3 (17.6%)	NS
Previous laparotomy history	7 (11.5%)	3 (11.7%)	NS
Patient with concomitent disease*	12 (19.7%)	2 (11.8%)	NS

BMI: body mass index, NS: not significant
*cardiovascular disease, pulmonary disease, diabetes mellitus, etc

Table 2. Surgical outcomes

Variable	Vertical midline incision group (n=61)	Modified Cherney incision group (n=17)	p value
Operating time*	187.4±55.2	192.3±46.4	NS
Intraoperative complication	1	1	NS
Number of dissected pelvic lymph nodes*	34.2±2.1	32.5±4.2	NS
Histologic type			
Sqaumous carcinoma	54 (88.5%)	13 (76.5%)	NS
Adenocarcinoma	7 (11.5%)	4 (23.5%)	NS
Hemoglobin change (g/dL)*	2.2±1.1	2.1±0.9	NS
Time to begin soft diet (hr)*	56.4±25.4	46.5±19.5	<0.016
Postoperative hospital stay (day)*	21.7±3.7	18.0±4.8	<0.042
Foley indwelling time (day)*	14.1±2.8	13.4±3.2	NS
Pain score* (visual analogue scale)			
6 hr after surgery	5.4±0.7	5.0±0.4	NS
24 hr after surgery	4.0±0.8	4.2±0.6	NS

*mean±SD, NS: not significant

Squamous cell carcinoma was 88.5% and adenocarcinoma was 11.5% in the vertical midline incision group while 76.5% was squamous cell carcinoma and 23.5% was adenocarcinoma in the modified Cherney incision group. There was no significant difference.

In the vertical midline incision group, the mean postoperative hospitalization day and mean time until soft diet was 21.7±3.7 days and 56.4±25.4 hours. In the modified Cherney incision group, they were 18.0±4.8 days and 46.5±19.5 hours, respectively, showing significant difference (p-value<0.042, p-value<0.016). There was no significant difference between the two groups in terms of hemoglobin

Table 3. Postoperative complication

Variable	Vertical midline incision group (n=61)	Modified Cherney incision group (n=17)	p value
Febrile morbidity	12 (19.7%)	4 (23.5%)	NS
Transfusion	5 (8.2%)	2 (11.8%)	NS
Abdominal wall hematoma	0	0	NS
Ileus	16 (26.2%)	4 (23.5%)	NS
Complicated lymphocyst	3	1	NS
Wound complication	2	1	NS

NS: not significant

change, Foley indwelling duration, and postoperative pain score (Table 2).

Febrile morbidity was found in 12 cases (19.7%) in the vertical midline incision group and 3 cases (23.5%) in the modified Cherney incision group. There was no case of abdominal wall hematoma in either group. Transfusion was required in 5 and 2 cases, respectively, with no significant difference. Wound complications such as exudate or dehiscence was found in 2 cases of the vertical midline incision group, but it was of no significant difference. Bowel ileus was found in 16 cases and 4 cases, respectively, without significant difference. Three complicated lymphocyst cases were noted in the vertical midline incision group, but it was also of no significant difference. There was no intraabdominal hematomas in both groups (Table 3).

DISCUSSION

Cervical cancer can be treated by radical hysterectomy, radiotherapy or concurrent chemo-radiotherapy. But it is still an issue of controversy which is more effective. Compared to other treatments, radical hysterectomy has advantages of preventing recurrence by removing primary tumor, obtaining histopathologic information, treating those resistant to radiotherapy while sparing adjacent organs from radiation, and by preserving sexual function with intact maintaining ovarian function and vaginal structure in young age patients.

There are also some negative effects because the large vessels and ureters are exposed, heavy bleeding can be caused from pelvic lymph node and adjacent tissue dissection, and complications such as postoperative infection, fistula, vein thrombosis, pulmonary embolism or blood loss can occur.[4]

Radical hysterectomy and pelvic lymph node dissection are considered as the standard method of treatment for cervical cancer. Since this requires radical dissection and adequate central and lateral pelvis exposure, vertical midline incision was used for a long time. In general, gynecological oncologists start explo-laparotomy with either a vertical incision or transverse incision. Vertical incisions provides adequate exposure and fast exposure time, but leaves a scar which is a cosmetic

disadvantage.

On the other hand, the transverse incision has greater cosmetic advantage with decreased postoperative pain, respiratory distress, and wound complications such as dehiscence or bowel hernia. However, it takes longer time until full exposure, causes more bleeding or intrafascial hematoma, and limits the operation field compared to vertical midline incision. The transverse incision is usually not the first choice of incision for radical hysterectomy and pelvic lymph node dissection due to limitation of adequate exposure. However, many of these decisions are made merely by personal favor or tradition.

It is a well known belief that adequate exposure of central and lateral pelvis is important for pelvic lymph node dissection or para-aortic lymph node dissection. But Delgado et al.[5] reported that the involvement outside pelvis is only 1-12% in early cervical cancer. Unlike other gynecologic cancers, pelvic metastasis and para-aortic lymph node metastasis are rare in early cervical cancer. Moreover, cervical cancer with intra-abdominal lesions are inoperative, and cytoreductive surgery does not have an advantage other than lymph node dissection. It is also reported by Choi et al.[6] that PET-CT scan has high sensitivity in detecting pelvic lymph node and para-aortic lymph node metastasis.

Therefore it is rarely required to expose the upper abdomen. Yet many materials including operation guides and textbooks only emphasize the advantage of vertical midline incision and discourage the use of transverse incision in gynecologic operations. These reports neglect the body size, cosmetic advantages, and other operation results. Most patients, especially younger age women are very interested in cosmetic effects. There are a number of papers which analyzed the advantages of the transverse incision over the midline incision in modified radical hysterectomy and pelvic lymph node dissection. Mann et al.[7], Photopolus et al.[8], and Helmkamp et al.[9] reported that they performed either the Maylard or Cheney incision in 40 to 80% of modified radical hysterectomies and pelvic lymph node dissection. Orr et al.[10] compared 113 cases of the vertical midline incision and 78 cases of transverse incision. The latter group showed significant decrease in operation time, blood loss, and transfusions. Mean hospitalization day was 5.6 days in the transverse incision group compared to 7.5 days in the vertical midline incision group. Park et al.[11] compared 61 cases of Pfannenstiel incisions and 62 cases of vertical midline incisions in performing radical hysterectomy and pelvic lymph node dissection. There was no significant difference in postoperative complications and number of obtained pelvic lymph nodes. De Lia et al.[12] reported that in operation of huge myomas, the Cheney incision (n=20) and vertical midline incision (n=20) showed no significant difference in postoperative complications.

The Cherney incision has been modified over time. Tobin et al. worked on preservation of the inferior epigastric vessels by adapting inferiorly based rectus abdominis musculocutaneous flap.[13] Greeson et al.[14] performed paraaortic lymphadenectomy up to the level of the third part of the duodenum by dissecting the peritoneum longitudinally in the midline after separation of the symphysis pubis and rectus muscle tendon in cervical and uterine cancer. Trott A et al.[15] separated a portion of rectus muscle tendon and symphysis pubis in the operation of huge pelvic masses. We modified the incision by unilateral separation of the rectus muscle sheath and preserving the deep inferior epigastric vessels for field exposure.

In our study, there were no significant difference in BMI, history of laparotomy, history of chemotherapy, clinical stage, operation time, pathologic cell type, number of dissected lymph nodes, postoperative change in hemoglobin, Foley indwelling time, and pre- or postoperative complications. Mean hospitalized day and time taken until soft diet were significantly low in the modified Cherney incision group.

Gynecological oncologists are not willing to make the transverse incision in gynecologic operations because of the limited exposure for the upper abdomen exploration and para-aortic lymph node dissection. But as mentioned earlier, the rate of para-aortic lymph node metastasis in early stage cervical cancer is very low. Therefore, pelvic lymph node dissection alone will be sufficient. Also the number of removed lymph nodes was not significant different between the two groups. This means that the modified Cherney incision is an adaptable method for lateral pelvic exposure.

The Modified Cherney incision was feasible without increase in postoperative complications while obtaining a comparable number of lymph nodes compared to the vertical midline incision in our study. Therefore, the modified Cherney incision may be beneficial in cosmetic aspects for young age women who require modified radical hysterectomy and pelvic lymph node dissection for the treatment of early cervical cancer. However, further prospective study of different styles of laparotomy and quality of life is necessary in this patient population.

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