

Laparoscopic surgery compared to traditional abdominal surgery in the management of early stage cervical cancer

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Summary

The purpose of the study was to compare laparoscopic total radical hysterectomy with classic radical hysterectomy regarding parametrial, and vaginal resection, and lymphadenectomy. *Methods:* Laparoscopic or laparotomic total radical hysterectomy with advantages and disadvantages was offered to the patients diagnosed as having operable cervical cancer between 2007 and 2010. Lymph node status, resection of the parametria and vagina, and margin positivity were recorded for both groups. Data were collected prospectively. Statistical analysis was performed with the SPSS statistical software program. *Results:* Totally, 53 cases had classical abdominal radical hysterectomy and 35 laparoscopic radical hysterectomy, respectively. Parametrial involvement was detected in four (11.4%) cases in laparoscopic radical surgery versus nine (16.9%) in laparotomic surgery. All the cases with parametrial involvement had free surgical margins of tumor. Also there were no significant statistical differences in lymph node number and metastasis between the two groups. *Conclusion:* There is no difference in anatomical considerations between laparoscopic and laparotomic radical surgery in the surgical management of cervical cancer.

Key words: Cervical cancer; Laparoscopy; Radical hysterectomy.

Introduction

Early stage of cervical cancer except IB2 is treated by radical hysterectomy plus pelvic and/or paraaortic lymphadenectomy. Classic abdominal radical surgery is the standard of care. Laparoscopic total radical hysterectomy has been applied to cervical cancer management for less than 20 years and fewer than 2,000 cases have been reported. Up to now, gynecologic oncology centers have reported their experience on laparoscopic radical abdominal hysterectomy from different countries [1, 2]. Also this is the first large study about laparoscopic radical hysterectomy compared to open abdominal radical hysterectomy from Turkey.

Adequate radical resection of parametrial and paravaginal tissue, and lymph node status are the most important aspects of radical cervical cancer surgery. Also it is an important question to know whether it is possible to remove parametrial-vaginal tissue as in classic surgery. In the literature there are a few studies comparing the two types of surgery and most of these studies are retrospective analyses [3-6]. On the other hand, parametrial resection is only defined theoretically. Thus we compared total radical laparoscopic hysterectomy with classic radical hysterectomy prospectively and especially resection of the lateral and deep parametrium.

Materials and Methods

This study was prospectively designed to compare two types of surgical techniques according to patient preferences. The cases diagnosed as having cervical cancer by cervical biopsy and who underwent laparoscopic or classic radical hysterecto-

my between 2007 to 2010 were enrolled in the study. The research project was approved by a suitably constituted Ethics Committee of the institution. FIGO Stages I-IIA, except IB2, cases in good health status were submitted to surgical treatment. Staging of the patients was performed with gynecologic examination under anesthesia. All the cases were informed about the advantages and disadvantages of the two types of surgeries. All cases were operated according to their preference for laparoscopy or laparotomy. Intraoperative and postoperative complications, surgical margins, and lymph node status were recorded. All the cases gave written informed consent. The women accepted as inoperable during gynecological examination under anesthesia (Stage IIB or higher) or submitted to surgery but discovered as inoperable during the operation (metastatic nodes discovered by frozen section or macroscopic parametrial invasion or intraabdominal disease) were excluded from the study. Data were collected prospectively.

Technique

All patients had bowel preparation, started prophylactic antibiotic (cephoxitin) medication one hour before surgery, and were on low-molecular weight heparin for two weeks beginning from the day before surgery. Two types of surgery were performed using the same principle and technique in the intraabdominal part. First of all, the patients were evaluated looking for parametrial invasion, extracervical or intraabdominal disease for operability. Abdominal radical hysterectomy was performed as described by the classic technique.

In the laparoscopy group, patients were placed in the lithotomic position. After dilatation of the cervix with a Hegar dilator (no. 8), an uterine manipulator (Clermont-Ferrand, Karl Storz, Tuttlingen, Germany) was inserted. An infraumbilical 1 cm vertical or transverse incision was performed and a Verres needle was inserted for the created pneumoperitoneum. After the pneumoperitoneum was created a 10 mm trocar and 0 degree laparoscope were introduced. Under direct vision of the laparoscope, two 5 mm and one 10 mm trocars were inserted as seen

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in Figure 1. Intraabdominal pressure was adjusted as 12-13 mmHg, and then patients were placed in a head-down position at 25-30 degrees. The abdominal cavity including the pelvis was evaluated carefully for extracervical metastatic disease. Pararectal and paravesical spaces were developed by incision of the lateral peritoneum and round ligament. Pelvic lymphadenectomy including the bilateral common iliac, external iliac, internal iliac and obturator lymph nodes was performed. In cases with tumor diameter 3-4 cm, paraaortic lymphadenectomy until the left the renal vein was added. Lymph nodes were removed with an endobag. After completion of lymphadenectomy, the posterior peritoneum was cut. Bilateral ureters were dissected and lateralized until the Web channel. The anterior peritoneum was incised and the bladder was separated from the cervix. The uterine artery and superior vein were cut and ureteral dissection was completed without scrapings the ureter and cutting the vesicouterine ligament until the bladder. Sacrouterine/rectouterine ligaments were coagulated and cut with ligasure or bipolar cutting forceps. After that, deep uterine veins were coagulated or clipped and cut at the lateral pelvic wall (Figure 1). The last step was coagulating and cutting the paravaginal tissue and vagina. Specimens were removed vaginally and the vaginal cuff was closed by the abdominal or vaginal route.

Statistical analysis were performed using the SPSS 18 statistical software program. Independent-samples t-test was used for statistical analysis and $p < 0.05$ was accepted as statistically significant.

Results

Totally 88 patients were submitted to radical surgery. Fifty-three (60.2%) of these patients had classical radical hysterectomy and 35 (39.7%) cases laparoscopy, respectively. Mean age was 51.4 in the laparotomy group and 49.2 in the laparoscopy group. There were no statistical differences between the two groups for other demographic characteristics (Table 1). Mean lymph node number did not differ between the groups, although metastases to lymph nodes were common in the laparotomy group but without statistical significance (Table 2). Parametrial involvement was also the same (16.9% vs 11.4% in the laparoscopy group, $p = 0.478$). All cases had free surgical margins of tumor. Adjuvant treatment (chemoradiation-CT/RT) was given to 17 (32.0%) patients in the laparotomy group and seven (20.0%) in the laparoscopy group ($p = 0.159$). Totally 13 (24.5%) units of redblood cells (RBCs) were transfused in the laparotomy group and eight (23.5%) in the laparoscopy group with no statistical difference. Mean operative time was longer in the laparoscopy group (190 minutes vs 250) ($p = 0.001$). There was no difference in total complication rates (Table 1). Postoperative intraabdominal bleeding developed in one case of the laparoscopy group which required laparotomy. This case had hypertension, diabetes mellitus and chronic hepatitis B infection. There were no bleeding sites during laparotomy. The patient was discharged postoperatively without any problems and is well without any complications now. There were three recurrences in the laparotomy group and none in the laparoscopy group. There was no difference between the two groups for mean follow-up period (Table 2).

Table 1. — Characteristics of the cases.

Characteristics	Laparotomy (n = 53)	Laparoscopy (n = 35)	p
Mean age	51.4 (31-79)	49.2 (28-60)	0.487
Mean gravida	3.4 (1-8)	3.8 (1-9)	0.738
Pathology			
Squamos	35 (66.0%)	26 (74.2%)	0.417
Nonsquamos	18 (33.9%)	9 (25.7%)	
Mean operative time (minutes)	190 (90-310)	250 (180-500)	0.000
Transfusion			
(Total RBC units)	13 (24.5%)	8 (22.8%)	0.892
Parametrial invasion	9 (16.9%)	4 (11.4%)	0.478
Postoperative complications	3 (5.6%)	2 (5.7%)	0.992
Infection	1 (1.8%)	—	
Self catheterization	2 (3.7%)	1 (2.8%)	
Postoperative bleeding	—	1 (2.8%)	

Table 2. — Lymph node status, adjuvant treatment and recurrence.

Region	Laparotomy (n = 53)	Laparoscopy (n = 35)	p
Mean pelvic nodes (n)	28.2 (10-46)	26.7 (12-72)	0.146
Metastasis	9 (16.9%)	3 (8.5%)	0.266
Mean paraaortic nodes (n = 37)	17.9 (4-37)	14.1 (10-18)	0.09
Adjuvant treatment (RT/CT)	17 (32.0%)	7 (20.0%)	0.159
Recurrence	3 (5.6%)	—	0.156
Mean follow-up (months)	30.3 (5-51)	29.0 (5-50)	0.382

Discussion

Although classical abdominal radical hysterectomy is still considered the standard treatment of early-stage cervical cancer, laparoscopic radical abdominal and assisted vaginal radical hysterectomy have been widely accepted with increasing experience and technology. The major advantages of minimally invasive surgery are less postoperative pain and bleeding, a shorter recovery time and hospitalization or lower rate of postoperative infection [7]. In addition, it is possible to detect details of pelvic structures as magnified features of laparoscopy. Parametrial, paravaginal tissues, vascular, lymphatic structures of the pelvis can be identified easily. Thus dissection of parauterine tissue and lymph nodes may be easier than laparotomy.

Surgical management of cervical cancer in early stages requires radical resection of parametrial and paravaginal tissues, and upper part of the vagina. In type III radical hysterectomy according to the Piver classification [8], the parametrium should be removed as much as possible laterally. Also in type C radical hysterectomy according to the Querleu and Morrow classification [9], the vascular area (C1) or nerves (C2) of the parametrium should be removed according to stage of disease. There are some questions about removing all tissue as defined original figure. Deep uterine veins are an important land mark for radical surgery as seen in the study figure. Up to now, there has been no showing resection of the parametrium

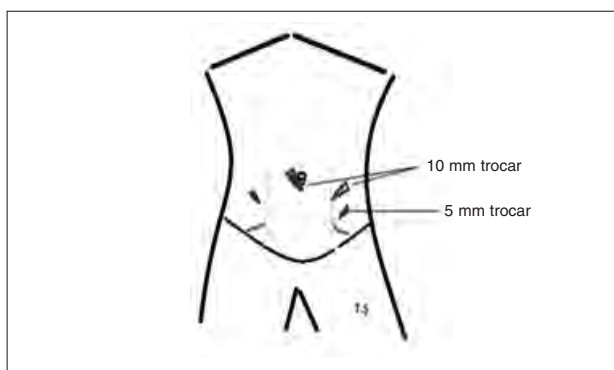


Figure 1. — Port insertion sites.

in this respect to our knowledge. In the many studies reported in the literature, this phase of the operation is defined just theoretically. In the current study, we performed lateral and deep parametrial resection. Also adequate vaginal resection is important for radicality. Vaginal resection was adequate for all the cases in the study.

Lymph node dissection is an important crucial step in radical surgery of cervical cancer. It may be therapeutic and prognostic. There are many studies in the literature reporting that laparoscopic pelvic and paraaortic lymphadenectomy can be performed as laparotomy [3-5] with more nodes in the laparoscopy group [10]. Also the number of lymph nodes is important for adequacy of lymphadenectomy. Twenty lymph nodes are accepted as the cutoff limit for pelvic or paraaortic lymphadenectomy [11, 12]. There are a few comparative reports having 20 or more lymph nodes yielded during laparoscopic total radical hysterectomy [3, 5, 10, 13]. In our study mean lymph node number for pelvic lymphadenectomy was 26.7. Metastatic lymph node number was more frequent in the laparotomy group but without statistical significance. This may due to more patients having larger tumors (3-4 cm) in the laparotomy group or may be an incidental finding. Level of paraaortic lymph node dissection is hardly a debated issue. Some centers do paraaortic lymph node dissection under the inferior mesenteric artery. In our practice for laparoscopy and laparotomy, we do paraaortic node dissection until the left renal vein. We believe if there is any indication for paraaortic lymphadenectomy (larger tumor, pelvic nodal metastasis and parametrial invasion), it should be performed until the left renal vein.

Recurrence rate indicates success of the treatment modalities. It affects the survival of patients directly. In our study, recurrence rate was 5.6% in the laparotomy group and none in the laparoscopy group. In the literature recurrence rate for laparoscopy varies between 0 and 16.3% [3, 14, 15]. Also in our study there were no patients with positive surgical margins in either group. Ghezzi *et al.* [16] reported 6.0% positive parametrial margins in the laparoscopic radical hysterectomy group and 6.2% in the laparotomy group with no statistical differences between the two groups.

Major intraoperative complications of laparoscopic

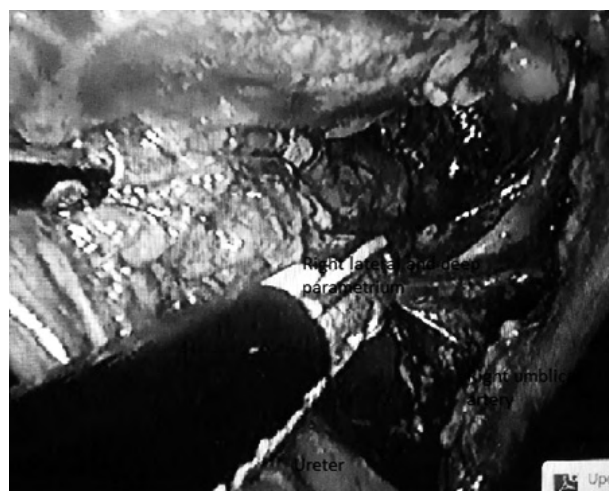


Figure 2. — Cutting, coagulating lateral and deep parametrium including deep uterine vein with ligature.

radical hysterectomy are reported in different ranges. Rates of these complications are no different from open abdominal surgery [5, 6]. The major intraoperative complications are vessel, bladder, rectal and ureteral injuries. Vessel injuries are more important and need emergency intervention by laparoscopy or laparotomy. A few cases need management with laparotomy. Bladder and rectal injuries are the other frequent organ complications of laparoscopic radical surgery. Intraoperative detection of these complications are mandatory. If they are not diagnosed intraoperatively, catastrophic results including septic shock may be unavoidable. Bladder and rectal injuries are usually managed by laparoscopy during surgery. Rarely is laparotomy performed. Campos *et al.* [17] reported that four (13.7%) cases had major intraoperative complications including one bladder, one ureteral and two rectal injuries. They managed ureteral and bladder injuries by laparoscopy. One rectal injury was corrected via the vaginal route. The last case with rectal injury was managed by open loop colostomy. Li *et al.* [5] reported eight (8.8%) cases with intraoperative complication as four iliac vein and four bladder injuries. They performed laparotomy for one iliac vein injury and one cystostomy case. In the study, there were no intraoperative complications in either group.

The most frequent postoperative complication of radical hysterectomy – either laparotomy or laparoscopy – is bladder dysfunction. There was no difference in the two types of surgery in our study. Bladder dysfunction usually relieves with time. Also, Li *et al.* [5] reported that the urinary retention occurrence rate was 32.2% with no difference using open radical hysterectomy. Chen *et al.* [15] found that 15.9% of patients had voiding dysfunction after one year of laparoscopic radical abdominal hysterectomy. Intraabdominal bleeding is a life threatening postoperative complication of radical surgery. Laparoscopic surgery reduces blood loss compared to open surgery and postoperative intraabdominal bleeding is encountered rarely. However, there was no difference in

blood transfusion rate in our study. This result arises from one case having postoperative intraabdominal bleeding which required transfusion of four units of RBCs in the laparoscopy group. This case had hypertension, diabetes and chronic hepatitis B infection. Laparotomy was performed and no detected bleeding area was diagnosed. Intraabdominal hematomas were evacuated and a drain was put in. No postoperative infection or thromboembolic process occurred in any case in the study.

The major disadvantage of laparoscopic surgery is operative time. Mean operative time for radical laparoscopic hysterectomy is reported as between 92 and 420 minutes [18, 19]. Also it is longer in radical laparoscopic surgery than laparotomy in the comparative studies with 196 to 371 minutes [3-6, 10]. Our result is comparable with the literature but longer than laparotomy in the laparoscopy group (250 vs 190 minutes). Operating time may be reduced by increasing experience, a standardized technique and using new technologies such as pulsed cautery.

Postoperative adjuvant treatment is given to cases having major risk factors as parametrial involvement, metastatic lymph nodes, positive surgical margins and deep stromal or serosal invasion. Totally 32% of laparotomy and 20% of laparoscopy groups had adjuvant therapy.

Conclusion

Laparoscopic total radical hysterectomy with advantages of minimally invasive surgery allows resection of the lateral and deep parametrium, vagina and lymph nodes as classic radical hysterectomy. Although this study was a prospective case control study, it is was not a randomized study. Prospective randomized studies are needed.

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