

Advantages of Laparoscopy Versus Laparotomy in Extremely Obese Women (BMI>35) with Early-stage Endometrial Cancer: A Multicenter Study

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Abstract. *Background: The aim of the present study was to demonstrate the advantages of laparoscopy versus laparotomy for treatment of extremely obese women with early-stage endometrial cancer. Materials and Methods: Seventy-five extremely obese patients with Body Mass Index >35 kg/m² and clinical stage I endometrial cancer underwent hysterectomy and bilateral salpingo-oophorectomy, and in all cases we performed systematic pelvic lymphadenectomy by laparoscopy (mean BMI of 38±7.3 kg/m²) or laparotomy (mean BMI of 39±8.1 kg/m²). Results: In two (4.4%) patients of the laparoscopy group we observed a port site haematoma that was resolved without a second surgery. In three patients of the laparotomy-group, we observed dehiscence of the abdominal suture with surgical site infection that was re-sutured. Conclusion: Laparoscopy can be considered a safe and effective therapeutic procedure for managing early-stage endometrial cancer in extremely obese women with a lower complication rate, lower surgical site infection and postoperative hospitalization.*

Several studies showed that laparoscopic treatment of endometrial cancer offers many advantages compared to the open-approach (1), primarily considering the less postoperative pain, better visibility of the operative field, and

shorter hospital stay as the main benefits (2); postoperative complications after laparoscopy seems to be reduced or similar (3), likely related to the expertise of the operating surgeons and the patient's comorbidities.

The advantages of laparoscopic surgery have made it increasingly attractive as an alternative to traditional approaches for treatment of gynaecological malignancies, especially endometrial cancer (3, 4). Many patients with endometrial cancer present with comorbidity such as obesity, hypertension, and diabetes (4). Abdominal surgery therefore exposes patients to an increased risk of complications (5). Vaginal hysterectomy has been demonstrated as an attractive alternative for these patients, but this approach does not allow for exploration of the abdominal cavity, peritoneal washing, and lymph node dissection (6).

Laparoscopic techniques overcome these disadvantages. However, this procedure does not seem to modify the incidence of recurrence or overall survival (1, 7).

The aim of the present study was to retrospectively compare the safety, complication and recurrence rate of total laparoscopic hysterectomy with lymphadenectomy and laparotomic hysterectomy with lymphadenectomy for early-stage endometrial carcinoma in a series of 75 extremely obese women (Body Mass Index >35).

Patients and Methods

Between November 2004 and December 2013, we performed a multicentre study of all complications after treatment of 75 consecutive extremely obese patients with clinical stage I endometrial cancer who underwent laparoscopic (45 cases) or laparotomic (30 cases) hysterectomy with pelvic and aortic lymph node dissection (Table I).

For the purpose of the study, 75 patients with clinical stage I endometrial cancer (disease limited to the uterine corpus) were

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selected. The staging of the patients was carried-out according to the FIGO (International Federation of Gynecology and Obstetrics) staging system (8).

All the patients who underwent laparoscopy were informed that laparotomy would be carried-out if difficulties were encountered with the laparoscopic approach. All women gave their informed consent.

Preoperative work-up consisted of gynaecological and rectal examination, ultrasonographic and hysteroscopic assessment with endometrial biopsy, chest X-ray radiograph, and Magnetic Resonance Imaging scan to exclude suspicion of metastatic disease.

Patients with evidence of more advanced clinical stage based on routine preoperative workup including clinical examination and radioimaging studies, patients treated with prior pelvic radiotherapy/chemotherapy, and patients with no available follow-up information were excluded.

The choice between laparoscopy or laparotomy was made preoperatively according to the surgeon's or the patient's preference and was based on patient's characteristics.

Although the surgeons involved in the current protocol were competent in both procedures, and we considered most patients as suitable candidates for laparoscopy or laparotomy, in our Departments, a number of patients were specifically self-referred requesting a laparoscopic approach for the treatment of endometrial cancer.

Exclusion criteria for the two groups were ovarian lesions, obvious metastasis beyond the uterus, contraindications for general anaesthesia, and systemic infections.

Patients were not considered candidates for the laparoscopic approach and underwent laparotomy when any of the following criteria were present: a bulky uterus ≥ 12 -week size or where vaginal removal of the uterus would require morcellation; documented significant cardiopulmonary disease defined as a history of cardiac failure, myocardial infarction, unstable angina, or poorly-controlled pulmonary obstructive disease, or contraindicating prolonged Trendelenburg position. Prior abdominal surgery was not considered a contraindication for the laparoscopic approach.

According to the FIGO staging system, all patients underwent surgical staging consisting of inspection of the intraperitoneal cavity, peritoneal washing, total hysterectomy, are bilateral salpingo-oophorectomy; in all cases we performed systematic bilateral pelvic lymphadenectomy.

Para-aortic lymphadenectomy with the superior border of the dissection being the inferior mesenteric artery would be performed in all cases with positive pelvic lymph nodes discovered at frozen-section evaluation, in patients with poorly-differentiated tumours with myometrial invasion greater than 50% (stage IB).

Vaginal cuff brachytherapy alone was prescribed for patients with FIGO stage IA G2 or G3. Adjuvant whole-pelvic radiation was recommended for patients with surgical stage IB and II in combination with vaginal cuff brachytherapy. Chemotherapy was offered only to patients with FIGO stage III-IV disease in combination, in some cases, with radiotherapy.

The patients' characteristics reported were age, weight, BMI, stage, histological type, tumour grade, operative time, estimated blood loss, perioperative blood transfusions, number and status of lymph nodes obtained, myometrial invasion, length of hospital stay, time to resumption of normal bladder function, intraoperative and postoperative complications, overall survival and disease-free survival.

The technique utilized for laparoscopic hysterectomy with lymphadenectomy has been described in a previous report (5), while

in the abdominal (laparoscopic) hysterectomy, abdominal access was obtained through a vertical midline skin incision and the hysterectomy consisted of an extrafascial total hysterectomy. Both fallopian tubes were coagulated before the insertion of the uterine manipulator in the LPS group.

Information regarding patients was obtained from the hospital records and direct reports from the patients. We confirmed information and status on patients by direct telephone interviews.

Follow-up visits were scheduled monthly for the first three months, then every three months for the first two years, every six months for three years, and yearly thereafter. The mean duration of follow-up was 48.5 months (range=3-97 months).

Statistical analysis. Fisher's exact test and the χ^2 test were used for statistical analysis. Variables with normal distribution are expressed as mean and 95% Confidence Interval \pm standard deviation. Nonparametric variables are expressed as the median and range.

Disease-free survival (DFS) was defined as the period from surgery until the date of first recurrence. Overall survival (OS) was calculated from the date of surgery to the date of death. Data on living patients were collected at the last follow-up visit.

Statistical analysis was performed using the Statistical Package for Social Science for Windows (SPSS, Inc., Chicago, IL, USA). A *p*-value less than 0.05 was considered statistically significant.

Results

Table I lists the characteristics of women with endometrial carcinoma on the basis of the surgical approach used and the complications experienced, while Table II shows the intraoperative data for each group.

There were no significant differences regarding mean age, mean weight, mean BMI, parity, comorbidities, surgical staging, surgical stage, grade and post-operative treatment.

Two cases of moderate subcutaneous emphysema occurred at the time of pneumoperitoneum creation managed by waiting 10 min before continuing the operation.

In three patients of the laparotomy-group, we observed a dehiscence of the abdominal suture with surgical site infection in the first week after surgery; these were re-sutured with interrupted sutures with no sequelae. Postoperative fever was reported in 6 (20%) patients of the laparotomy group and in 2 patients of the laparoscopy (4.4%) group ($p < 0.01$).

No case of port-site metastasis, no vascular injury and no wound complications were detected.

In all cases, the laparoscopic procedures were successfully completed without conversion to laparotomy (Figure 1) and no patient of either group required an intraoperative or postoperative blood transfusion. The catheter was removed one day after the surgical procedure.

In two (4.4%) patients of the laparoscopy group, we observed a port site haematoma, diagnosed in the first 24 h after surgery as a net haemoglobin decline, which resolved spontaneously without a second surgery.

Table I. *Intraoperative data.*

Intraoperative data	Laparoscopy (N 45)	Laparotomy (N 30)	<i>p</i> -Value
Blood loss (ml; mean±Standard deviation) (95% CI)	65±15, 22-95	125±32, 50-270	<0.01
Median haemoglobin decline (g/dl)	0.8 range 0.2-2.4	1.6 range 0.3-2.9	<0.01
Operative time (min; mean±SD) (95% CI)	166±21, 116-208	143±25, 117-197	0.08
Dehiscence of the suture	0	3 (10%)	<0.01
Postoperative fever (%)	2 (4.4%)	6 (20%)	<0.01
Port-site haematoma	2 (4.4%)	0	<0.01
Bladder injury	1 (2%)	0	0.07
Hospital stay (days; mean±SD) (95% CI)	3.1±0.4 range 2-9	6.3±1.1 range 2-10	<0.01
Postoperative haematoma	1 (2%)	0	0.07
Recurrence (no.) (%)	4 (8.8%)	2 (6.6%)	0.08
Time of postoperative ileus (h; mean±SD) (95% CI)	21±5, range 8-39	33±8, range 11-41	<0.01

CI=Confidence interval; SD=standard deviation.

Table II. *Patients' characteristics*

Patients	Laparoscopy (N 45)	Laparotomy (N 30)	<i>p</i> -Value
Age (years; mean±SD) (95% CI)	60±11 39-81	63±14 43-84	0.075
Mean BMI (kg/m ² ; mean±SD) (95% CI)	38±7.3 35-64	39±8.1 35-56	0.06
Grading (no.)			
I	14 (30%)	10 (33%)	0.081
II	23 (51%)	14 (46%)	0.075
III	8 (19%)	6 (22%)	0.061
Stage (no.)			
IA	14 (32%)	8 (28%)	0.067
IB	24 (54%)	17 (56%)	0.073
II	3 (6%)	2 (6%)	0.061
IIIA	0	1 (5%)	0.07
IIIB	0	0	N.S.
IIIC	4 (8%)	2 (6%)	0.08
Pelvic lymph nodes (no; mean ± SD) (95% CI)	23.5±5.8 16-39	19.2±5.4 17-38	0.073

CI=Confidence interval; SD=standard deviation; BMI: body-mass index.

One case of bladder injury occurred in the laparoscopy group at the time of utero-vesical fold incision that was laparoscopically sutured.

In one patient of the laparoscopy group, we observed a postoperative haematoma that was diagnosed in the first 24 h after surgery as a net haemoglobin decline; this was resolved with haemostasis performed with bipolar forceps by laparoscopy after the cavity was adequately drained, without conversion to laparotomy.

Two weeks after surgical procedure, we observed lymphorrhea at pelvic examination as profuse discharge of lymphatic fluid that was leaking from the cuff in 5 (11.1%) patients in the laparoscopy-group and in 3 (10%) in the

laparotomy-group ($p=0.08$). In all cases, this condition resolved spontaneously after 30-45 days.

One case of pelvic lymphocyst was reported; it should be noted that there was no routine postoperative radiological assessment to determine the incidence of lymphocysts in this series. Imaging evaluation was performed only in symptomatic patients.

Although postoperative fever was reported in 6 (20%) patients of the laparotomy group and in 2 patients (4.4%) of the laparoscopy group ($p<0.01$), there was no statistical difference in the rate of other complications in either group.

No patients of the either group had positive pelvic lymph nodes discovered at frozen section evaluation.



Figure 1. Laparoscopic procedures were successfully completed without conversion to laparotomy and no patient required an intraoperative or postoperative blood transfusion.

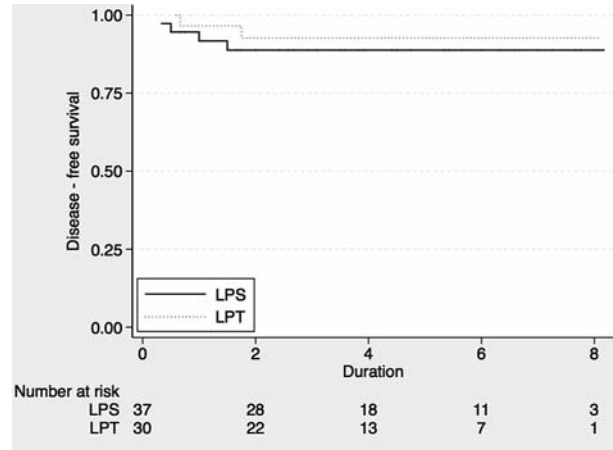


Figure 3. No significant difference was found between the two groups when disease-free survival rate was compared. LPS: Laparoscopy; LPT: laparotomy.

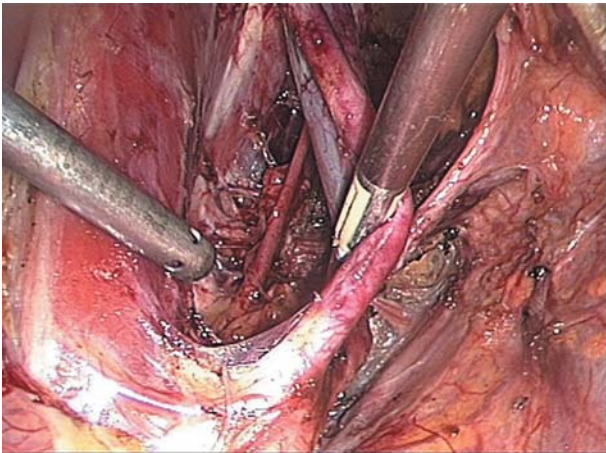


Figure 2. The obturator fossa is entered laterally and the obturator nerve and vessels are skeletonized, before removing superficial and deep obturator lymph nodes.

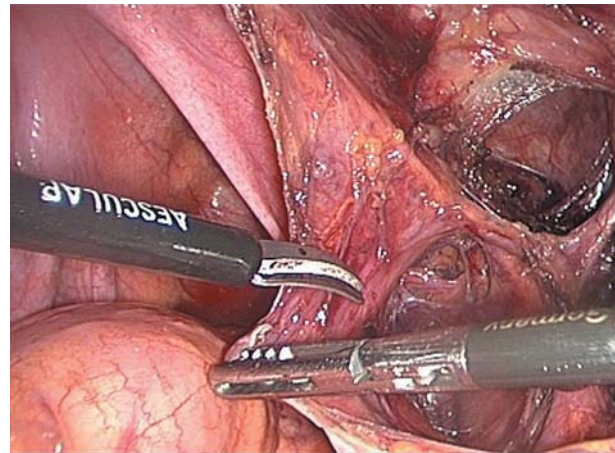


Figure 4. Dissection of the medial pararectal space by introducing endoshears and bipolar forceps into the areolar tissue medially to the ureter.

One patient in the laparoscopy group and two in the laparotomy group had positive pelvic lymph nodes (Figure 2) discovered at final histological examination.

Thirty-nine out of 75 (53%) patients received adjuvant treatment: 16 (22%) underwent brachytherapy-only; 20 (26%) had combined brachytherapy and radiotherapy and 3 (5%) had chemotherapy combined with radiotherapy. There was no significant difference between the two groups with respect to adjuvant treatment.

After a median follow-up of 15.5 (range=1-28) months, the total recurrence rate of the entire population was 8% (N=6): 9 out of 45 (8.8%) patients of the laparoscopy group had a recurrence (two vaginal recurrences, one intestinal recurrence, one liver recurrence); two out of 30 (6.6%) patients of the laparotomy group had a recurrence.

Disease free-survival shows no significant difference between the two groups (log-rank test, $p=0.08$): 88.1% of the patients are free of disease in the laparoscopy group *versus*

93.4% in the laparotomy group. No significant difference was found between the two groups when the recurrence rate was compared ($p=0.08$) (Figure 3).

Discussion

Many patients with endometrial cancer present with comorbidity such as obesity, hypertension, and diabetes. Abdominal surgery, therefore, exposes patients to increased risk of complications (9).

The role of minimally-invasive surgical staging in the management of extremely obese patients with apparent early endometrial cancer continues to evolve. Recently, several studies concluded, as others, that the postoperative complications after laparoscopic treatment are reduced or similar (5, 9-12).

Malzoni *et al.*, in a prospective randomized study on 159 women with stage I endometrial cancer, compared the feasibility, safety and morbidity of laparoscopic with that of laparotomic hysterectomy with lymphadenectomy for early-stage endometrial cancer. They concluded that laparoscopy is a suitable procedure for the treatment of patients with early endometrial cancer without compromising the degree of oncological radicality required (5).

In a recent study, Lu *et al.* compared laparoscopic approach with the conventional laparotomic approach for the treatment of 272 patients with endometrial carcinoma in a prospective randomized trial. They concluded that laparoscopic surgery is a safe and reliable alternative to laparotomy in the management of endometrial carcinoma, with significantly reduced hospital stay and postoperative complications; however, it does not seem to improve the overall survival or the 5-year survival rate (11).

The Gynecologic Oncology Group LAP2 trial compared laparoscopy and laparotomy for comprehensive surgical staging of patients with stage I to IIA uterine cancer that were randomly assigned to laparoscopy (N=1,696) or laparotomy (N=920). Laparoscopy led to fewer moderate to severe postoperative adverse events than did laparotomy (14% vs. 21%, respectively; $p<0.0001$) but similar rates of intraoperative complications, despite having a significantly longer operative time (median, 204 vs. 130 min, respectively; $p<0.001$). Laparoscopic surgical staging for uterine cancer is feasible and safe in terms of short-term outcomes and results in fewer complications (12).

In this multicentre study, no significant difference in intraoperative complications was observed between groups, whereas postoperative complications were significantly less common in the laparoscopy than in the laparotomy group. Our study confirms that laparoscopy in extremely obese women is associated with safety and efficacy outcomes that are similar to those that have been reported for laparotomy for the treatment of endometrial cancer (13, 14). In fact, in

all cases, the laparoscopy procedures were successfully completed without conversion to laparotomy and no patient required an intraoperative or postoperative blood transfusion.

No case of port-site metastasis, no vascular injury and no wound complications were detected; no significant difference was found between the two groups when the recurrence rate was compared. Moreover, the laparoscopy permits better exposure of the operative field in association with the advancement of laparoscopic techniques, allowing better dissection of the pelvic spaces (Figure 4); however, it should be noted that laparoscopic procedures were always performed by the same surgical team (4, 7, 12). Therefore, it appears from the data of our study that laparoscopy may offer significant advantages over laparotomy in the comprehensive surgical management of extremely obese women with endometrial cancer, but it should be performed by an advanced laparoscopic gynaecologic oncologist.

Complete laparoscopic surgical staging is more difficult in the morbidly obese, and other patient factors, such as associated comorbidities, adhesive disease, large uterus, fatty mesentery and inability to tolerate steep Trendelenburg positioning, have limited widespread use of this approach in endometrial carcinoma (15). Obese patients with associated co-morbidities had the most to gain from a successfully completed minimally invasive procedure, but also offered the surgeon the greatest challenges in completing the surgery (16).

Our study confirms that the laparoscopic approach remains, in expert hands, the procedure better-related to the best short-term outcomes (13-19). In our study, laparoscopy was associated with a shorter duration of postoperative ileus, fewer cases of dehiscence of the suture with surgical site infection, reduced cases of postoperative fever, and reduced time of discharge when compared to laparotomy. The follow-up suggested that laparoscopic and laparotomic treatment of endometrial cancer have the same therapeutic efficacy.

Conclusion

Our data confirm that the use of minimally-invasive techniques in extremely obese women does not have an adverse impact on survival, and improves quality of life in the postoperative period, with reduced time-to-discharge.

The low rate of intraoperative and postoperative complications observed in the laparoscopy group highlights the feasibility, safety and efficacy of this surgical approach for these extremely obese patients. Further studies and cost-benefit analyses are required to determine if the use of laparoscopy improves outcomes over standard laparotomy, and if the advantages of this technique could be extended to a larger proportion of patients, although multicentre randomized trials and long-term follow-up are required to evaluate the overall oncological outcomes of this procedure.

Conflicts of Interest

The Authors declare that there are no conflicts of interest with regard to this study.

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