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ORIGINAL ARTICLE

Feasibility and morbidity of total laparoscopic radical hysterectomy with or without pelvic limphadenectomy in obese women with stage I endometrial cancer

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Abstract
Objective The aim of this study was to describe the feasibility and morbidity rates associated with total laparoscopic radical hysterectomy (TLRH) with or without pelvic lymphadenectomy for stage I endometrial cancer in obese women.
Patients and methods Obese patients with stage I endometrial cancer who underwent total laparoscopic radical surgery at the Department of Obstetrics and Gynecology of San Gerardo Hospital were compared to nonobese patients. The same group of obese patients was compared with patients who underwent radical laparotomic surgery. Obesity was defined as a body mass index more than 30 kg/m^2.
Results Between September 2003 and September 2007, 75 women underwent TLRH. Median age was 54 years and median body mass index was 28 kg/m^2. Thirty-seven women were obese.

There were no differences between nonobese and obese women in operative, time length of parametria and pelvic nodes removed and operative or late complications. Blood loss was significantly higher in obese patients.

Comparing retrospectively laparoscopy and laparotomy in obese women treated in our center, laparotomy was associated with decreased operative time, but also with increased blood loss, transfusion rate, duration of hospitalization and frequency of post surgical complications.
Conclusions Total laparoscopic radical hysterectomy (with pelvic lymphadenectomy) is a safe option in patients with endometrial cancer. Obesity is not a contraindication to perform a TRLH with no differences in surgical parameters between obese and nonobese population. TLRH show a significant decrease of complications compared to laparotomic radical surgery in obese women.

Keywords Laparoscopy · Endometrial cancer · Obesity · TLRH

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Introduction

Endometrial cancer is the most common gynaecologic cancer, with an incidence of almost 40,000 new cases per year in US [1].

Surgery is the cornerstone of the treatment and includes total abdominal hysterectomy (TAH), bilateral salpingo-oophorectomy (BSO) and endo or retroperitoneal staging according to histological patterns [2].

The advances of minimally invasive surgery have made this approach useful also in gynecologic oncology, including the treatment of both cervical and endometrial carcinoma. Many authors have reported their experiences about treatment of endometrial cancer by total laparoscopic hysterectomy (TLH) and laparoscopic-assisted vaginal hysterectomy (LAVH), showing a decrease of surgical complication, blood loss, transfusions and length of hospital stay, with an improvement of quality of life (QOL) parameters after TLH compared to abdominal hysterectomy [3–7].

At the moment, there are no reports about the feasibility of total laparoscopic radical hysterectomy and pelvic lymphadenectomy in obese women.

The purpose of this study was to evaluate the role of total laparoscopic radical hysterectomy (TLRH), with or

without pelvic lymphadenectomy in the treatment of endometrial cancer, to assess adequacy and morbidity rates associated with this surgery in obese women compared to "ideal", nonobese women and to compare laparoscopic and laparotomic radical hysterectomy in this set of patients.

Materials and methods

Between September 2003 and August 2007, 75 consecutive patients with endometrial cancer FIGO stage I, who matched the inclusion criteria, were treated by total laparoscopic radical hysterectomy (Piver-Rutledge type II) and salpingo-oophorectomy at the Department of Gynecologic Oncology of the San Gerardo Hospital [8].

Inclusion criteria were myometrial invasion less than 50% and no evidence of lymph node metastasis at the preoperative imaging study.

Patients were considered obese when BMI $\geq$30 kg/m^2, or severe obese in case of BMI more than 40 kg/m^2.

The decision of performing pelvic lymphadenectomy was based upon intra-operative histological analysis and preoperative MRI. According to our institution protocol pelvic lymphadenectomy includes external iliac, superficial and deep obturatory nodes in case of grade 1 with deep or grade 2 with more than one-third myometrial invasion tumor. Superficial and deep common iliac nodes were removed only in case of high grade tumours or cervical involvement or presence of bulky nodes.

All patients received a bowel preparation preoperatively, a 3-days prophylactic antibiotic dose and antithrombotic prophylaxis with subcutaneous low-molecular weight heparin. Urethral catheter was removed 2 days after the intervention. Intermittent catheterization was performed by patients three times a day until residual urine volume less than 75 ml were regularly obtained for a minimum of 3 days.

Discharge of patients in absence of complications was planned 3 or 4 days after surgery. Postoperative controls planned for every patient consisted in transvaginal sonography and intravenous pyelogram after 30 days from the surgery. Follow up visits were scheduled every 3–4 months for the first 2 years, then every 6 months.

Patients characteristics, tumor staging, grading and histotypes, surgical operating time, blood loss, operative or post surgical complications, conversion to laparotomy, need for blood transfusion and length of hospital stay, has been considered for this analysis. Post-surgical complications were defined as an adverse event occurred within 30 days after surgery.

A retrospective comparison between the subgroup of obese women treated with TLRH and a group of obese women with comparable characteristics and operated with abdominal radical hysterectomy (TARH) during the last 6 years has been performed.

TLRH was performed following the technique previously described by other authors [9, 10]. Briefly, patients were placed in lithotomic position and a uterine manipulator was positioned (MU070, AB Medica, S.p.A., Lainate, Italy). The umbilical trocar was introduced according to the open technique thus obtaining pneumoperitoneum. With an intrabdominal pressure of 12 mmHg three 5 mm (two lateral and one sovrapubic) and one 10 mm left subcostal trocar were introduced under direct vision. Radical hysterectomy was performed using a plasmaKinetic tissue management system (Gyrus Medical, Maple Grove, MN) Fallopian tubes were closed with bipolar coagulation, paravesical and pararectal spaces developed using blunt dissection, uterine vessels were cut at their origin from hypogastric vessels and the ureter was unroofed and dissected out of the tunnel. Uterosacral and cardinal ligaments were isolated and resected as closest as possible to pelvic sidewalls. The bladder was mobilized inferiorly to ensure adequate vaginal margins. Finally, vaginal wall was transected using monopolar coagulation and all the specimens retrieved from the vagina. Vaginal cuff was sutured vaginally.

The decision of performing pelvic lymphadenectomy was taken according to the criteria described above. Pelvic bilateral lymphadenectomy was performed with blunt dissection and bipolar coagulation. After dissection lymph nodes were placed into a bag and retrieved through the 10-mm trocar site.

Results

Clinical and pathological characteristics of 75 patients considered in this study are summarized in Table 1, while operative parameters divided for obese and non-obese women are shown in Table 2.

According to the body mass index 37 women were defined as obese of which 15 showed severe obesity. All 75 patients considered in this analysis underwent successfully to a Piver type II radical hysterectomy. In only one case we converted surgery to laparotomic approach due to an anesthesiologic problem (hypercapnea) occurred after the creation of pneumoperitoneum.

No differences between obese and nonobese subgroups of women in terms of operative time and adequacy of surgical parameters (parametria length and number of lymph nodes removed) were observed. Blood loss was significantly higher in obese patients.

Pelvic lymphadenectomy was performed in 47 patients. No patients underwent lomboaortic lymphadenectomy.

No intraoperative surgical complication occurred and no patients required haemotransfusion. After surgery only

Table 1 Patients and tumors characteristics (*n* 75)

	n	%
Age (years)		
Median	54	
Range	28–77	
Body mass index (kg/m^2)		
Median	28	
Range	18–48	
Histology		
Endometrioid adenocarcinoma	72	96
MMMT	3	4
Grade		
1	28	37
2	39	52
3	8	11
Myometrial invasion		
Absent	8	11
<50%	57	76
>50%	10	13
LVSI		
Positive	8	11
Negative	67	89
Stage		
IA	8	11
IB	48	64
IC	7	10
IIA	4	5
IIB	4	5
IIIA	1	1
IIIB	0	0
IIIC	2	3
IV	0	0
Synchronous EOC	1	1

MMMT mixed mesodermal mullerian tumor, *LVSI* lympho vascular space invasion, *EOC* epithelial ovarian cancer

three patients experienced low grade fever in the first day post surgery. In one case an acute renal insufficiency occurred three days after surgery, and it was medically treated. No cases of thromboembolic or cardiologic complications occurred and no patients had lymphorrea. Only one woman was admitted to the intensive care unit for 2 days because of a pulmonary distress (BMI 48).

Median length of hospitalization was 4 days (range 3–6 days).

Postoperative complications required second surgery in one patient, who underwent laparotomy with a segmental ileal resection 6 days after first surgery for a trocar-site hernia with ileum necrosis. Late complications were light monolateral leg paraesthesia in three women, two asymptomatic obturator lymphocyst, and two leg edema. No patients showed hydroureteronephrosis or any ureteral damage at the intravenous pyelogram 30 days after surgery.

Adjuvant therapies consisting of external radiotherapy (4), chemotherapy (5) and chemo-radiation (2) were administered.

To date, after a median follow up of 16 months (range 6–54), one non obese patient relapsed. She showed a left side wall relapse after 24 months and she has been treated with chemotherapy, surgery and external radiotherapy. She died of disease 49 months after primary surgery. No trocar-site metastases occurred.

Table 3 summarizes a comparison of surgical data and complications between the last 74 obese women with endometrial carcinoma treated with total laparoscopic or laparotomic radical hysterectomy in our institution during the last 6 years. A significant decrease of blood loss, transfusions, hospital stay, and post surgical complications can be noted in the laparoscopic subgroup without any differences in surgical parameters apart a longer operating time.

Discussion

In the last 15 years many retrospective studies showed that total laparoscopic or laparoscopic-assisted vaginal hysterectomy is associated with a significant decrease of surgical complication as postoperative pain, blood loss, necessity of transfusion and length of hospital stay compared with open surgery in case of endometrial cancer [3–7, 11–13]

Table 2 Surgical parameters

	Obese subgroup	Nonobese subgroup	*P*
No. of patients	37	38	
Mean BMI, kg/m^2 (range)	38 (30–47)	24 (18–29)	<0.001
Mean operative time, min (range)	228 (120–360)	227 (130–330)	0.9
Mean blood loss, ml (range)	188 (100–300)	155 (100–300)	0.03
No. of lymphadenectomy (%)	24 (65)	21 (55)	0.4
Median nodes removed (range)	17 (9–30)	18 (7–27)	0.8
Median parametrial length, mm (range)	18 (10–30)	19 (10–40)	0.8

Table 3 Comparison between laparoscopy and laparotomy

	LPS	LPT
No. of patients	37	37
Mean operative time, min (range)	228 (120–360)	170 (90–300)
Mean blood loss, ml (range)	188 (100–300)	490 (200–1400)
No. of lymphadenectomy (%)	24 (65)	21 (57)
Median nodes removed (range)	17 (9–30)	21 (12–31)
Median parametrial length, mm (range)	18 (10–30)	17 (15–40)
No. of hemotransfusion	0	2
Median hospital stay, days (range)	4 (3–6)	5 (5–30)
Post surgical complications	2	18
Wound infections	0	3
Wound dehiscence	0	1
Post incisional hernia	0	6
Intensive care admissions	1	3
Relaparotomies	1	5

Magrina, in a recent literature review, suggested that TLH demonstrated the same efficacy of TAH in the treatment of early stage endometrial carcinoma and due to the low morbidity should be considered the preferred surgical approach for well-trained oncologist surgeons [14].

Women with endometrial cancer frequently have a high BMI, being obesity one of the most important risk factor for the development of type I endometrial cancer particularly in post-menopausal women and associated with an estimated relative risk of EC of two–sevenfold [15, 16].

Traditional abdominal surgery in obese patients can be complicated with a significant increase of operating time, blood loss and need of blood transfusion. Moreover, post surgical complications such as wound dehiscence and infection, ileus or bowel obstruction are more common in these patients, being the reported frequency up to 40% in some casistics. Cardiovascular failure have been also reported due to the common co-morbidities like hypertension, diabetes and cardiologic damage Even the risk of deep vein thrombosis and pulmonary embolism due to long bed stay after surgery is increased [16–22].

A less invasive surgical approach could be helpful in this setting of women, in order to minimize the risk of intraoperative complications and post-surgical life-threatening events. Vaginal surgery has demonstrated many advantages in terms of reduction of operative time and surgical and anesthesiological morbidity. However, its role is restricted by the possibility of performing a complete abdominal and nodal staging, and limited by anatomical difficulties such as deep and redundant vagina with vaginal descent in obese multiparous women or narrow vagina in nulliparous women.

Laparoscopy could be considered a valid option in obese women, even if traditionally difficulties in peritoneal access, Trendelemburg positioning, preumoperitoneum creation and anesthesiological complications, impaired exposure of pelvic organs and difficulties in performing an adequate lymphadenectomy have been considered restrictions for a laparoscopic approach in this setting of patients [23].

Many authors have recently published their experiences about the role of laparoscopy in obese or heavily obese women affected by uterine gynecologic malignancies [18–21, 24–29]. In two of the largest studies Eltabback and Obermair reported that that 88 and 89.4% of obese women underwent successfully laparoscopic surgery in case of endometrial cancer stage I. They reported similar surgical outcomes except for a longer operative time but with a significant decrease of postoperative complications and a better QOL score in the laparoscopic group compared to women treated with laparotomy.

In our Department we started to perform TLRH both in cervical and endometrial cancers in 2003. Radical hysterectomy in patients with clinical stage I endometrial cancer is not considered by now the standard treatment and consequently could be seen as an over treatment [2]. The decision of performing radical hysterectomy in these patients raised from a retrospective analysis of data in our Centre. No vaginal cuff relapse and only one centropelvic relapse have been shown after abdominal radical hysterectomy in case of more than 120 cases of stage IB-IIB (all tumor grade) endometrial cancer untreated with any adjuvant therapies (unpublished data). In order to better evaluate the role of radical surgery compared with extrafascial hysterectomy an Italian multicentric trial (ILIADE) recruited more than 540 patients with endometrial cancer. The trial has been closed in 2004 and results are awaited within the next year.

We started treating laparoscopically endometrial cancer patients after the publication of small randomised clinical trials, showing no difference in terms of survival rate

[30, 31] and, in particular, based on the preliminary results of the GOG multicenter study, LAP-2, that randomised patients between laparoscopy versus laparotomy, showing no differences between the two surgical approaches.

Our results in terms of blood loss, frequency of blood transfusion, post surgery hospitalisation and adequacy of lymphadenectomy are consistent with the other published series on TLH and LAVH in endometrial cancer [3, 11, 12, 14, 17, 21, 27, 29]. We can observe only an increase of the operative time compared to TLH. When we performed an analysis of operative time in the first 40 cases and the subsequent 35 cases we found a significant decrease of median operative time, that was 250 and 200 min, respectively, despite of the increased number of lymphadenectomy performed in the second subgroup (53 and 65%, respectively). This data suggest the technical improvement of surgeons throughout the years, after an initial long learning curve [32].

It is remarkable that only one woman underwent laparotomic conversion, while in literature conversion rate is reported in almost 0–5% of the cases and up to 10–12% in obese patients [11, 12, 14, 18, 27].

We did not observe any differences about the feasibility and adequacy of radical hysterectomy and lymphadenectomy in obese or nonobese subgroup, with similar surgical parameters such as length of parametria and vaginal margin and number of resected pelvic nodes, as well operative time. In the obese subgroup blood loss was statistically higher, even if it remains lower than the commonly reported data on traditional laparotomic radical surgery.

As expected, laparoscopy was associated with decreased blood loss and an increased operative time. Surgical parameters, such as parametrial and vaginal length of the retrieved specimen is comparable to abdominal radical type II hysterectomy performed in our institution in case of stage I endometrial cancer (Table 3). We can observe only a reduction of nodes removed in the laparoscopic group. However, we think that this difference could be explained by the lower oncological risk of patients treated with TLRH in the first part of our experience, who underwent only to external and obturatory nodes resection. In fact, when we consider only women with grade 3 or deep myometrial invasion endometrial cancer, who underwent systematic pelvic lymphadenectomy (common iliac nodes included), the median number of resected nodes increased to 24 (range 21–30), without any difference between obese and nonobese subgroups.

The different intraoperative and post operative complication rates in obese women between laparoscopy and laparotomy is remarkable (Table 3), confirming previous data [18, 25, 30, 31].

Particularly only one woman compared with three women in the laparotomic subgroup, was admitted to the intensive care unit for cardiopulmunary distress. We did not register any cases of thromboembolism morbidity; no ileus or urinary complications as bladder, uretheral fistula or hydroureteronephrosis were observed. In the laparoscopic subgroup a re-laparotomy was required, because a trocar site hernia, despite the use of 5 mm ancillary trocar stitched at the end of surgery [29], while, in the laparotomic subgroup, five women required secondary surgery for wound toilette (2) or reparation of symptomatic post surgical hernia (3).

In conclusion, even if the number of patients analysed in this study does not allow to draw definitive conclusions, our preliminary data suggests that total laparoscopic radical hysterectomy with or without pelvic lymphadenectomy is a safe and feasible approach in case of obese women. Adequacy of the surgical procedure, absence of intraoperative or late serious complications, support the possibility to perform TLRH in obese or heavily obese women, overcoming the anatomical difficulties and high post operative complications of laparotomic approach in endometrial cancer or any other gynecological malignancies.

Conflict of interest statement All the authors (Antonio Pellegrino, Mauro Signorelli, Robert Fruscio, Annalisa Villa, Alessandro Buda, Pietro Beretta, Annalisa Garbi and Domenico Vitobello) disclose any possibile conflict of interest.

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