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## Laparoscopic-assisted vaginal hysterectomy with laparoscopic pelvic and paraaortic staging for early endometrial cancer

Received: 1 May 2006 / Accepted: 8 June 2006 / Published online: 22 September 2006  
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**Abstract** While abdominal hysterectomy with bilateral salpingo-oophorectomy and pelvic and paraaortic lymphadenectomy is still considered the gold standard for the surgical treatment of endometrial cancer, the laparoscopic-assisted vaginal hysterectomy (LAVH) plus laparoscopic lymphadenectomy has been performed in FIGO stage I endometrial cancer in selected centers for about a decade. Clinical studies have shown that the frequency of intra- and postoperative complications, the pelvic and paraaortic lymph node yield, and—more importantly—the overall survival, are similar both with the laparoscopic-assisted vaginal approach and the abdominal approach in stage I disease. Blood loss and duration of hospital stay may even be reduced with the LAVH. In summary, provided there is compliance with established oncologic guidelines, LAVH with pelvic and paraaortic lymphadenectomy can probably be performed in patients with endometrial cancer FIGO stage I without safety loss.

**Keywords** Endometrial cancer · Laparoscopic-assisted vaginal hysterectomy · Laparoscopy · Laparoscopic pelvic and paraaortic lymphadenectomy

### Introduction

Endometrial cancer is the most common gynecologic malignancy. Annually, about 42,000 women die from this disease worldwide [1]. In Germany [2] and the United States [3] estimated incidences of approximately 12,000 and 36,000 new patients per year, respectively, have been published. The mean age at diagnosis is 68 years [1, 2]. However, 4% of all patients with endometrial cancer are younger than 40 years of age [4]. The surgical treatment—if feasible—is preferred over primary radiation therapy at all stages of the disease [3–7].

Owing to the risk profile of the typical patient with type I endometrial cancer, the surgeon is often faced with a number of problems as follows: older age, obesity, hypertension, and other associated morbidity [6–9]. Median laparotomy with hysterectomy, salpingo-oophorectomy, and pelvic and paraaortic lymphadenectomy (LAE)—according to stage and risk factors—is considered the therapeutic gold standard [3, 5–7]. In cases of marked obesity and morbidity, the vaginal approach for hysterectomy - from a surgical point of view - may be the more favorable one [8, 9]. However, vaginal hysterectomy—from an oncologic point of view—is considered less safe in endometrial cancer, with the following arguments being asserted. First, both inspection and palpation of the abdomen, peritoneal surfaces, and the liver are impossible. Second, in large uteri morcellation may be necessary with potential opening of the tumor and cell spillage. Third, pelvic and paraaortic lymph nodes can neither be assessed by palpation nor be removed—if indicated. Fourth, occasionally, removal of the adnexa by the vaginal route is difficult, and, finally, some authors have reported an increased rate of vaginal cuff recurrences after vaginal hysterectomy for endometrial cancer. Consequently, the abdominal, open technique has been established as the surgical approach of choice for endometrial cancer [3, 4, 6, 10, 11]. Having said that, in a retrospective study, Massi et al. [12] compared 180 patients with endometrial cancer FIGO stage I who were operated on vaginally with a group of 147 similar patients who underwent the abdominal approach (106

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of whom with LAE). Interestingly, 5- and 10-year survival were 90 and 87% vs. 91 and 90% for the vaginal and the abdominal group, respectively, (not significant). Both LAE and adjuvant radiation therapy were not correlated with the survival in that study [12].

With the development of the laparoscopic technique for the exploration of the abdomen and pelvic and paraaortic lymph node dissection, the combination of vaginal hysterectomy and laparoscopy would seem to be the thing to do in selected cases of early endometrial cancer [13, 14]. However, the laparoscopic approach is also being viewed critically in oncologic indications with problems of the laparoscopic management of complex adnexal masses being transferred to other oncologic entities [15, 16]. More specifically, there is concern that a laparoscopic LAE may cause tumor cell spillage, and that port site recurrences may be increased [17]. On the other hand, this observation (i.e., abdominal wall recurrence) is known from the open approach as well [18, 19]. The authors would like to refer to the ongoing extensive debate on this problem regarding ovarian tumors [15, 16].

## Review of the literature

In a systematic search of the scientific literature (PubMed), publications on the laparoscopic-assisted approach to endometrial cancer have been identified. So far, more than 600 patients have been included in such studies [14]. Since 1992, several authors have emphasized the good technical feasibility of laparoscopic-assisted vaginal hysterectomy (LAVH) with laparoscopic LAE for proper surgical staging of endometrial cancer. These feasibility studies were primarily based on the experience with cervical cancer [20–22]. For the laparoscopic LAE, it must be remembered that there is a considerable learning curve [23, 24]. Altogether, most of the investigators consider the LAVH ± laparoscopic pelvic and paraaortic LAE for endometrial cancer an attractive alternative to the open surgical approach [25–30].

These pilot studies were followed by clinical comparisons of the two approaches (Table 1). In the present studies, reduced hospitalization, shorter convalescence, reduced blood loss (resulting in a better quality of life), fewer postoperative complications—but longer operating times—have been described as the advantages—and disadvantage— of LAVH [14, 18, 31–45]. Some studies have dealt with the cost. While the overall reduced cost of LAVH were presented in one study [31], other authors have even found increased charges [36]—and still others have found no difference [34]. In his review paper, Holub [14] has summarized that the laparoscopic-assisted vaginal approach to endometrial cancer is as safe as the conventional open one. Among the papers looked at, there was only one prospective randomized series [18, 46]. In a recently published investigation, significantly fewer postoperative complications were shown for the LAVH group—this tendency was especially pronounced in the subgroup with associated morbidity (e.g., obesity) [41].

**Table 1** Laparoscopic-assisted vaginal hysterectomy (LAVH) ± lymphadenectomy (LAE) vs. laparotomy ± LAE in the treatment of early endometrial cancer

Reference	<i>n</i> (LAVH/ laparotomy)	Results and authors' conclusions
[31]	13/17	Significant cost savings, improved quality of life
[32]	29/64	Fewer complications, shortened hospital stay
[33]	69/251	Fewer complications, shorter hospitalization
[34]	19/17	Less pain, improved quality of life, total costs statistically not different
[35]	65/65	LAVH in early endometrial cancer feasible, also in obese patients
[36]	86/57	Shorter hospitalization, earlier recovery, higher financial cost
[37]	67/45	Increased OR time, shorter stay
[38]	96/24	Attractive alternative, shorter recovery time
[18]	52/46	Reduced blood loss, shorter hospital stay
[14]	600	Review article, laparoscopic-assisted surgical staging as safe as open procedure
[39]	226/284	Eleven conversions from total laparoscopic hysterectomy to laparotomy, similar clinical course, similar recurrence rates
[40]	47/31	Morbidly obese patients (mean weight 118.7 kg), five conversions from total laparoscopic hysterectomy to laparotomy, significantly fewer wound infections in the laparoscopy group
[41]	63/59	Fewer postoperative complications in the LAVH group—especially in patients with comorbidity
[42]	41/36	Longer duration of surgery, but shorter hospital stay for LAVH
[43]	74/168	Higher number of lymph nodes, fewer postoperative complications, and shorter hospital stay for LAVH
[44]	38/37	More postoperative complications in the laparotomy group, shorter hospital stay for LAVH group
[45]	20/36	Longer operating time, less blood loss, and shorter hospital stay for LAVH

The main criterion for the treatment of malignant tumors is survival. In this respect, 11 studies have been identified—one of which is a prospective, randomized trial [18, 46]—with no difference regarding recurrence rate and overall survival compared with the open approach being found [18, 40, 42, 43, 47–53]. Chu et al. [10] have reported three patients with vaginal cuff recurrence after LAVH for endometrial cancer, warning not to implement this surgical method too fast (Table 2).

**Table 2** Follow-up, recurrence, and survival after LAVH ± LAE compared with laparotomy ± LAE for early endometrial cancer

Reference	n (LAVH/ laparotomy)	Results/authors' conclusions
[47]	56	Three-year survival and recurrence rates similar those of the abdominal approach
[48]	221/45	No difference with regard to recurrence or survival between groups (median follow-up 33.6 months)
[49]	100/86	Similar 2-year and 5-year estimated recurrence-free survival rates as well as overall survival rates
[18]	52/46	No difference in overall and recurrence-free survival between LAVH and laparotomy (follow-up 0–67 months)
[10]	3	Case reports on vaginal cuff recurrences after LAVH
[50]	47/31	Five-year survival rate similar that for laparotomy (94.7% FIGO I)
[39]	226/284	Patterns of recurrence similar in both groups (total laparoscopic vs. total abdominal hysterectomy; median follow-up 29.4 months)
[51]	63/59	Disease-free and overall survival similar in both groups (median follow-up 44 months, range 5–96 months)
[42]	41/36	Retrospective study, no differences in recurrence and survival rates
[43]	74/168	Three-year recurrence-free survival rates were similar: 97.5% vs. 98.6% respectively
[52]	19/94	No significant differences for disease-free and overall survival (total laparoscopic vs. total abdominal hysterectomy)
[44]	38/37	No significant difference in disease recurrence between the two groups
[53]	45/136	No statistically significant differences in disease-free survival and recurrence rate between groups

There are further potential indications for performing a laparoscopy in endometrial cancer. For instance, some researchers are working on the development of sentinel lymph node detection in this malignancy [54]. Others recommend a staging laparoscopy like that for advanced cervical cancer [55] in order to exclude intraabdominal manifestations in very early endometrial cancer if a uterus-preserving procedure is planned in women who wish to preserve their fertility [56]. As these measures are still experimental, they should only be used within clinical trials.

### Surgical management

Based on the systematic investigations by the groups of Hatch and Childers et al. [13, 20, 25], Eltabbakh et al. [8,

23, 36, 49], Holub et al. [9, 14, 38, 48, 54], Magrina et al. [47, 50], and Schneider et al. [18, 41, 46, 51, 57, 58] surgical measures are recommended as described below. In general, outside clinical studies LAVH ± LAE should be restricted to cases deemed FIGO stage I [3]. (This is not the place to address the question as to whether or not endometrial cancer FIGO stage IIB requires a radical hysterectomy (Piver II/III), be it as an open procedure or as Schauta's operation [5, 7, 18, 46, 51, 59].)

At first, it should be checked by pelvic examination under anesthesia whether or not a vaginal approach to the hysterectomy seems to be feasible. Upon laparoscopy, both the parietal and the visceral peritoneal surfaces, the liver, the diaphragm, and the pelvic lymph node regions are thoroughly inspected, and the uterine size is assessed again. If there are no peritoneal manifestations of the disease, and if the indication for the LAE is already clear at this point, the surgeon may want to start with the systematic removal of the pelvic and paraaortic lymph nodes (see below). However, the first step of the operation should be the bipolar coagulation of the fallopian tubes in order to prevent potential retrograde dissemination of tumor cells. For the laparoscopic part of the hysterectomy, the round ligaments are coagulated and cut, and the retroperitoneal space opened. The ureter is identified and the infundibulopelvic ligaments coagulated and cut while the adnexa remain connected to the uterus. Some authors prefer the laparoscopic mobilization of the uterus down to level of the ascending branch of the uterine artery including the dissection of the vesicocervical and rectovaginal septum; others even like to coagulate or clip the uterine artery at its origin from the internal iliac artery; and still others would at the point mentioned above proceed with the vaginal part of the operation. It seems to be important to stress that the uterine fundus should not be grasped with tenacula while being removed vaginally in order to leave it intact. As an alternative to the LAVH, a total laparoscopic hysterectomy is performed in some centers [39, 40, 52]. The vagina is closed vaginally or laparoscopically, respectively.

The laparoscopic pelvic and paraaortic LAE has been well standardized by a number of groups, and the authors would like to refer to the scientific literature [57, 58]. According to the latest Guidelines for the Management of Endometrial Cancer by the Task Force "Uterus" of the Gynecologic Oncology Study Group (AGO) of the German Society of Obstetrics and Gynecology [5] the indications for the systematic pelvic and paraaortic LAE are as follows [3–7, 51]. With the exception of tumor stages pT1a and pT1b, grading 1–2 where the LAE is considered optional, the LAE is to be performed at all other stages of endometrioid adenocarcinoma. For the serous and clear cell forms of endometrial cancer, the LAE plus omentectomy is indicated at all stages as these histological forms are considered "high grade" by definition, having a more aggressive malignant potential.

If the indication for LAE is only clear after the definite histologic examination, i.e., if the tumor is being upstaged on definite histology, the LAE should be performed during a second session [30]. Likewise, if endometrial cancer is

found incidentally after a hysterectomy for another reason, the secondary laparoscopic LAE is a good procedure.

### Potential contraindications

Stages higher than FIGO I should only be treated by LAVH within clinical studies [3]. Pathological findings concerning the adnexa, relevant adhesions that make a vaginal hysterectomy difficult, fixed uteri and narrow vagina are considered contraindications [47]. A large uterus clearly requiring vaginal morcellation in order to be removed—based on our current understanding—is obviously an absolute contraindication to LAVH in endometrial cancer.

### Conclusion

Compared with the conventional surgical approach using laparotomy, reduced blood loss and reduced hospital stay can be stated as the advantage of the laparoscopic-assisted approach. As yet, based on published studies, these results apply to FIGO stage I. There is no difference between the laparoscopic and the open technique with regard to the number of lymph nodes harvested. For laparoscopic LAE, a considerable learning curve must be taken into account. Also, initially, a longer operating time should be considered.

Hitherto, there have been no reports in the scientific literature describing a worse prognosis (i.e., with regard to recurrence rate, overall survival) for LAVH ± LAE compared with laparotomy ± LAE in FIGO stage I endometrial cancer [53, 60]. Long-term results of large, prospective, randomized trials with sufficient statistical power are lacking though [3, 18, 51]. Such a phase III study (with 2,100 planned patients) is currently being conducted by the Gynecologic Oncology Group [61].

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