Role of Laparoscopic Surgery in the Management of Endometrial Cancer

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Key Words
Uterine cancer, neoplasm, endometrial cancer, laparoscopy, LAVH, total laparoscopic hysterectomy, pelvic lymphadenectomy, para-aortic lymphadenectomy, staging, TLH

Abstract
Minimum surgical treatment for endometrial cancer is removal of the uterus. The operative approach to achieve that goal ranges from vaginal hysterectomy alone to laparotomy with radical hysterectomy, bilateral salpingo-oophorectomy, bilateral pelvic and para-aortic lymphadenectomy with possible omentectomy, and resection of all metastatic disease. Stratifying the risk factors for predicting presence of metastatic disease has error rates exceeding tolerance for many gynecologic oncologists. Most accept routine laparoscopic surgical staging with hysterectomy, pelvic and para-aortic lymphadenectomy, and removal of adnexa as standard care for patients with endometrial cancer. Modifying the extent of surgical staging for low-risk intrauterine findings or excessive risk for postoperative morbidity is also accepted. Laparoscopic surgery has become the ideal initial surgical approach for this disease, allowing for visual inspection of common metastatic sites, biopsy of abnormal areas, and cytology from peritoneal surfaces. The extent of staging can be altered depending on frozen section findings from the uterus, adnexa, and peritoneal surfaces. Intraoperative medical decision-making can be individualized, encompassing all known risk factors for metastases and balancing comorbidities and potential adverse outcomes. This article documents how laparoscopic surgery satisfies the needs of individual patients and surgeons treating this disease. (JNCCN 2009;7:559–567)

Endometrial cancer is the fourth most common cancer and eighth most common cause of cancer death among women in the United States. Cancer of the uterine corpus is the most common gynecologic malignancy, with 40,100 new cases and 7470 deaths estimated in 2008. The original International Federation of Gynecology and Obstetrics (FIGO) staging system adopted in 1971 was a clinical staging system that relied mainly on the clinical evaluation of patients who often were treated with preoperative radiation therapy followed by completion hysterectomy. When the results of 2 large prospective randomized trials conducted by the Gynecologic Oncology Group (GOG) reported key uterine and extraperitoneal factors that seemed to be directly related to patient outcome, FIGO revised uterine corpus cancer staging to that resulting from a comprehensive surgical approach. Controversy remains as to the extent and performance of lymphadenectomy in the endometrial cancer staging. Despite inclusion of lymph node status in the FIGO staging system, the FIGO clinical practice guidelines published in 2000 state that lymphadenectomy should be reserved for tumors with high-risk factors, such as grade 3, deep myometrial invasion, lymphovascular space invasion, positive peritoneal cytology, papillary serous or clear cell histology, or cervical involvement.

The NCCN guidelines include total hysterectomy and bilateral salpingo-oophorectomy, cytology, and complete bilateral pelvic and para-aortic lymphadenectomy in the surgical staging of endometrial cancer. Recently published results of 2 large European randomized controlled trials questioned the role of lymphadenectomy in women with early endometrial cancer. However, although both trials, which involved open procedures, have merits and flaws, they only further muddied the waters of this already confusing and controversial...
area of gynecologic oncology. Additionally, since its initial application in gynecologic oncology almost 20 years ago, laparoscopy and minimally invasive procedures have been areas of rapid growth, with both advocates and opponents.

The CONSORT trial randomized 514 patients to undergo standard open total abdominal hysterectomy (TAH)/bilateral salpingo-oophorectomy (BSO) with or without pelvic lymphadenectomy. Para-aortic lymph node sampling or dissection, as well as post-operative adjuvant therapy, was at the discretion of the surgeon. In this study, 29.6% of the no-lymphadenectomy patients received adjuvant radiation therapy with or without chemotherapy, compared with 22.4% of lymphadenectomy patients ($P = .06$). Although this difference is not statistically significant, it is possibly clinically significant. One third of positive lymph nodes are found in the para-aortic region, and this was not addressed. The value of staging is to adequately treat the disease that is identified, but this was not standardized.

The ASTEC trial randomized 1408 women to undergo open hysterectomy, BSO, and peritoneal washings, with or without pelvic lymphadenectomy. Para-aortic lymph node sampling or dissection was left to the discretion of the surgeon. Patients considered at high-risk for recurrence based on histologic and pathologic features were then randomized again postoperatively (independent of lymph-node status) to receive external beam radiotherapy (RT) or observation. The use of vaginal brachytherapy depended on local practice, independent of randomization. The fact that the positive lymph nodes identified by the surgery could not direct the adjuvant therapy makes the trial impossible to compare to current practice. Patients with known metastatic disease were not treated, 8% of the lymphadenectomy arm had positive nodes and half remained untreated. Of all patients, 30% received adjuvant therapy. Only about half of patients considered high risk and eligible for radiation therapy received treatment. Additionally, 7% to 9% of patients considered low-risk still received adjuvant radiotherapy: external beam, vaginal brachytherapy, or both.

The above studies ignore the value of surgical staging, which is not only to remove metastatic disease, but to inform the oncologist and patient so they can determine the best therapy for the specific condition. Current practice in the United States is to integrate both chemotherapy and radiation therapy into postoperative management of endometrial cancer for patients at significant risk of recurrent disease. Therefore, these studies confuse patients and physicians on best practices.

**Historical Perspective of Laparoscopy in Endometrial Cancer**

The traditional approach to surgical staging for endometrial cancer has been laparotomy, and FIGO states that the generally accepted protocol is to perform the procedure through a vertical midline abdominal incision. This remains the preferred procedure in patients with presumed advanced-stage disease or a large uterus. Because patients with endometrial cancer are often elderly and/or obese and have at least one comorbid medical condition, a large abdominal incision is often associated with significant postoperative morbidity. Therefore, numerous authors report that vaginal hysterectomy is an acceptable alternative to abdominal procedures in these patients.

The vaginal approach is associated with shorter operative times and significantly less morbidity, while still offering a high rate of cure. This approach, however, has numerous limitations: 1) inability to perform pelvic washings, 2) inability to explore the pelvis and upper abdomen, 3) inability to perform lymphadenectomy, 4) difficulty in removing the adnexae, and 5) occasional morcellation of the uterus. Laparoscopy seems to overcome many of these limitations, while minimizing morbidity and providing gynecologic oncologists with complete pathologic data to determine the appropriate surgical stage and prognosis, and to recommend adjuvant therapy specific to the pathologic result.

Reich et al. first reported on laparoscopic hysterectomy (LH) in benign disease in 1989. In 1991, Querleu et al. reported the successful use of laparoscopy in pelvic lymph node dissection for cervix cancer, followed by Nezhat et al. in 1992 who reported on successful right-sided para-aortic lymphadenectomy with pelvic lymphadenectomy and radical hysterectomy in cervix cancer. In 1993, Childers et al. reported the first series of 59 patients with endometrial cancer who underwent laparoscopically assisted surgical staging. Initially, only right-sided para-aortic dissection was performed; however, after successful development of a left-sided technique, women at the
end of the study had complete bilateral dissection. Childers’ series challenged gynecologic oncologists and the GOG to further investigate this modality as a possible alternative to the traditional abdominal approach in women with presumed early-stage disease. Soon after, Spirtos et al.19 published their series of the successful completion of total laparoscopic bilateral pelvic and para-aortic lymph node dissection in 33 of 40 patients.

From 1992 to 1994, the GOG enrolled 84 patients in a prospective phase II feasibility study of laparoscopic surgery in the management of women with clinical stage 1 endometrial cancer (LAP-1). This study also assessed the accuracy of gross evaluation of myometrial invasion compared with intraoperative frozen and paraffin sections. All 84 patients underwent laparoscopic-assisted vaginal hysterectomy (LAVH) with BSO, and 50 women meeting study criteria (preoperative grade 2 or 3, and preoperative grade 1 with ≥ 50% myometrial invasion on gross and frozen section) also underwent laparoscopic pelvic and para-aortic lymph node sampling. Of these 50 women, 5 failed the laparoscopic procedure, resulting in a 90% completion rate of LAVH, BSO, and pelvic and para-aortic lymph node lymphases in those eligible for study. Reasons for failure were conversion to laparotomy for dense adhesions (n = 2), conversion to laparotomy for trocar bowel injury (n = 1), equipment failure (n = 1), and hypercarbia (n = 1). Paraffin section confirmed gross evaluation of myometrial invasion in 89% and intraoperative frozen section in 87%.19 LAP-1 showed the feasibility, acceptable morbidity, and accuracy of laparoscopic staging in patients with presumed stage 1 endometrial cancer, and led to the phase III GOG trial, LAP-2.20,21

Safety and Accuracy

A few small prospective trials comparing laparoscopic surgery to traditional laparotomy in patients with endometrial cancer were reported in the literature.22–26 Patient numbers range from 52 to 247, with 26 to 96 patients undergoing laparoscopic surgery. Success rates ranged from 95.8% to 100%. Reasons for conversion were adhesive disease, uncontrollable hemorrhage, anesthetic complications, extrauterine disease, and unexpected ovarian neoplasm.23,24 At least 68% of patients underwent lymph node dissection, with all patients undergoing pelvic lymph node dissection in 2 studies.24,25 Four studies showed equal harvesting of lymph nodes in laparoscopic procedures compared with laparotomy,22–25 whereas Kim et al.26 showed statistically more lymph nodes in laparoscopic procedures (27.4 vs. 23.9; P = .041).

Obesity is often viewed as a barrier to successful and safe laparoscopic surgery.27,28 Body mass index (BMI) did not differ significantly between groups in all but one study23 in which the patients who underwent laparoscopy had lower BMI compared with those undergoing laparoscopy (28.9 vs. 31.9 kg/m²; P = .04). Laparoscopy is often criticized for having unacceptable operative times leading to increased costs to the patient. Eltabbakh et al.21 and Holub et al.24 showed significant differences in operative room time favoring laparotomy, whereas the series by Malur et al.,22 Zorlu et al.,25 and Kim et al.26 showed no difference. Despite longer operative times, estimated blood loss was equal or less in the laparoscopy groups, and hospital length of stay was statistically shorter in all studies. Laparoscopic surgery seems to be as safe as laparotomy, and in many series significantly fewer complications occur, mostly because of a decrease in postoperative wound complications, infection, and ileus.13,23,29–34

Many retrospective series have been published since Childers’ initial series in 1993.17 Many are small, single-institution studies; however, a few larger studies of 56 to 322 patients have been published and widely cited in the literature.29,35–37 Magrina et al.36 reported on 56 patients undergoing laparoscopic lymphadenectomy and vaginal or LH with comparable success (87.5%), operative time (194.1 minutes), and length of stay (3 days) to the prospective studies. Frigerio et al.39 reported on 110 patients (55 each laparoscopic and laparotomy) with similar BMIs (25.5 vs. 26.0 kg/m²) and a 94.5% success rate in the laparoscopic arm. In keeping with other studies, lymph node retrieval was equal, operative time was longer, and estimated blood loss, complications, and length of stay were shorter among patients who underwent LH.

Scribner et al.37 reported on the first 103 patients at the University of Oklahoma to undergo laparoscopic pelvic and para-aortic lymph node dissection; 95 (92%) had endometrial cancer. The success rate of 70.9% was lower than in other reported studies, which was largely attributed to obesity (11.7%), cancer (5.9%), adhesions (4.9%), and bleeding (3.9%).

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with genitourinary injury, catastrophic vascular injury, and unknown reasons each causing one conversion to laparotomy. In this study, BMI was directly related to successful completion of laparoscopy, with a much lower completion rate among patients with a BMI of 35 kg/m² or greater than in those with a BMI less than 35 kg/m² ($P = .001$). Operative time was significantly longer in patients who successfully completed laparoscopic surgery compared with those converted to laparotomy. Estimated blood loss, complication rates, and length of hospital stay were smaller in the successful group.\textsuperscript{37}

The GOG designed a prospective randomized trial to assess the safety and effectiveness of laparoscopic surgical treatment of endometrial cancer (LAP-2).\textsuperscript{20,21} LAP-2 randomly assigned 2616 women to laparoscopic (n = 1696) or open (n = 920) hysterectomy, BSO, pelvic washings, and pelvic and para-aortic lymphadenectomy, with the last patient enrolled September 2005. The results of this trial were submitted to the Journal of Clinical Oncology in January 2009 and were previously presented in abstract form.\textsuperscript{20} Of the laparoscopy cases, 434 (25.8%) were converted to laparotomy. Reasons for conversion were poor exposure (n = 246, 14.6% of those randomized to laparoscopy, 56.7% of those converted), tumor spread (n = 69, 4.1% of those randomized to laparoscopy, 15.9% of those converted), and excessive bleeding (n = 49, 2.9% of laparoscopy arm, 11.3% of those converted). Ten patients were converted because of equipment failure, and 60 patients were converted because of other nonspecified reasons. Increasing BMI and age were found to be statistically correlated with the need to perform a laparotomy.

In the intent-to-treat analysis, LAP-2 showed that comprehensive surgical staging performed laparoscopically is associated with fewer adverse events of grade 2 or higher (14% vs. 21%; $P < .0001$) and shorter hospital stay (median of 3 vs. 4 days), and resulted in no significant difference in final surgical stages between the groups (17% had stage IIIA–IV disease in both groups). However, the ability to obtain both pelvic and para-aortic lymph nodes was better in the laparotomy group; pelvic and para-aortic nodes were not removed in 8% of patients who underwent laparoscopy and 4% of those who underwent laparotomy ($P < .0001$).

Despite median operative times of 70 minutes longer in the laparoscopy arm and the 25% conversion to laparotomy, safety remained superior. This arm, which included patients treated initially with laparoscopy and converted to laparotomy in the intent-to-treat analysis, still shows an advantage in terms of adverse events, use of antibiotics, and length of stay. Patients in whom laparoscopy could be completed were discharged at a median of 2 days and those converted to laparotomy had the same 4-day hospital stay as those randomized to laparotomy. Notably, robotics were rarely used during this period, and the procedures included both total laparoscopic and laparoscopically assisted approaches for hysterectomy.\textsuperscript{21}

### Survival

Because of small sample sizes, short follow-up, and lack of adjuvant therapy data, few studies have reported on survival and outcomes data. In 5 retrospective series of 80 to 320 patients with follow-up of 18 to 44 months, no significant differences in recurrence rates or overall or disease-free survival were shown in those undergoing laparoscopic procedures compared with those undergoing traditional laparotomy.\textsuperscript{13,31–33,38} Tozzi et al.\textsuperscript{39} published the only prospective randomized trial involving 122 patients (63 laparoscopy and 59 laparotomy), with an average follow-up of 44 months, showing no statistical difference in recurrence or disease-free or overall survival between the arms.

A larger, prospective cohort of 73 women with BMI less than 35 kg/m² undergoing laparoscopy and 196 undergoing laparotomy showed a 94.5% successful completion rate of laparoscopy, increased yield of lymph nodes harvested, longer operating times, less estimated blood loss, equal complications, and shorter hospital stays among those undergoing laparoscopy. With similar adjuvant therapy between the groups, no statistical difference was seen in recurrence rates or disease-free or overall survival, with a median follow-up of 51 and 52 months in the laparoscopy and laparotomy groups, respectively. On multivariate analysis, the only independent risk factor associated with disease-free survival was histologic subtype.\textsuperscript{30} The GOG LAP-2 data are not yet available for sites of recurrence or survival. These data are necessary to confirm whether laparoscopy has an overall better outcome.
Quality of Life

Improved quality of life (QoL) is often cited as one advantage of laparoscopic surgery. Zullo et al. showed this in a prospective trial randomizing 82 patients to laparoscopy or laparotomy for early-stage endometrial cancer. Both groups were also compared with a matched-control group of women without cancer who did not undergo surgery. All patients underwent total hysterectomy, BSO, peritoneal washings and inspection, and pelvic and para-aortic lymphadenectomy. A visual analogue scale (VAS) was used to assess postoperative pain, and the number of vials of pain medication were recorded. The Kupperman Index (KI) of climacteric symptoms and Short-Form Healthy Survey (SF-36) were used to assess menopausal symptoms and QoL. Consistent with other published studies, laparoscopic procedures resulted in longer operative times, less blood loss, equal number of lymph nodes retrieved, equal intraoperative complications, fewer postoperative complications, and shorter hospital stays.

Although VAS scores did not differ between the treatment groups in the first 48 hours after surgery, they were significantly lower in the laparoscopy group at discharge, and these patients used significantly fewer vials of pain medication. Both treatment groups had significantly lower QoL scores than controls at baseline. At 1-, 3-, and 6-month postoperative follow-up, patients who underwent laparoscopy did not report significantly different QoL from controls; however, those who underwent laparotomy reported significantly worse QoL than those who underwent laparoscopy and controls. KI scores were equal among all 3 groups at baseline, and were significantly increased after surgery in both treatment groups compared with controls.

Statistics such as length of hospital stay, complications, and time needed to return to work or normal activity are often used as surrogates for measuring QoL when specific measuring tools are unavailable. In 2 prospective studies from the University of Vermont, Eltabbakh et al. showed that both thin and obese women who underwent laparoscopic surgical staging for early endometrial cancer had fewer complications, used less pain medication, had shorter hospital stays, and experienced quicker resumption of full activity and return to work compared with those who underwent laparotomy. Spirtos et al. conducted a retrospective chart review of 30 consecutive patients with early-stage endometrial cancer, 13 of whom underwent laparoscopic total hysterectomy, BSO, and pelvic and para-aortic lymphadenectomy, and 17 underwent the same procedures using laparotomy. Patients undergoing laparoscopy had significantly shorter hospital stays and quicker return to normal activity, independent of BMI.

GOG LAP-2 also evaluated QoL and found improved results in the laparoscopy arm for pain, resumption of daily activities, returning to work, and body image at the 6-week time point. However, at the 6-month assessment, only improved body image remained in the laparoscopy arm. Patients converted to laparotomy from laparoscopy had the same QoL results and length of stay as those in the laparotomy arm.

At-Risk Populations

Laparoscopy in the Obese

Obesity is often cited as a reason for unsuccessful completion of laparoscopic staging procedures and necessity to convert to laparotomy because of difficulty performing surgery and anesthetic complications associated with prolonged Trendelenberg position. The safety and feasibility of laparoscopic surgery in obese women with early-stage endometrial cancer were evaluated in 3 retrospective studies and 1 prospective study. In a prospective case-control study of 82 obese women with BMI between 28.0 and 60.0 kg/m² and clinical stage I endometrial cancer, Eltabbakh et al. showed an 88.1% successful laparoscopic completion rate in 42 cases compared with 40 controls who had undergone previous laparotomy. The mean BMI did not differ between the groups (35.8 kg/m² for laparoscopy, 36.9 kg/m² for laparotomy). All women underwent total hysterectomy and BSO. Among all women, 60% of those who underwent laparoscopy and 60% who underwent laparotomy underwent pelvic lymphadenectomy, and 17.5% and 20.0%, respectively, also underwent para-aortic lymphadenectomy. Patients who underwent laparoscopy had significantly longer operative times, more pelvic lymph nodes harvested, equal blood loss, equal intraoperative and postoperative complications, less pain medication administered, shorter hospital stays, equal total costs, and quicker return to normal activity and work compared with the controls who underwent laparotomy.
In an analysis of 100 obese patients expected to undergo pelvic and para-aortic lymphadenectomy as part of endometrial cancer staging, Scribner et al. analyzed 55 women who underwent laparoscopy (mean BMI, 40.0 kg/m²) and 45 who underwent laparotomy (mean BMI, 39.9 kg/m²). A 63.6% successful completion rate was seen in the laparoscopy arm, with 20 women requiring conversion to laparotomy to complete surgery. Obesity was cited as the most common reason for conversion (23.6%). Patients undergoing laparoscopy had longer operative times, equal numbers of nodes harvested, equal blood loss, less postoperative fever, ileus and wound infection, and shorter hospital stays. Laparoscopic completion rate was directly related to BMI, and those with BMI less than 35 kg/m² had an 82.1% success rate compared with 44.4% in those with BMI of 35 kg/m² or more.

In a retrospective analysis of 75 women undergoing total laparoscopic radical hysterectomy with or without pelvic lymphadenectomy and 37 undergoing the same procedure through laparotomy, Pellegriino et al. analyzed a cohort of 37 obese women in the laparoscopic arm. No differences were seen in operative time or number of lymph nodes removed between obese and nonobese women. Furthermore, obese women undergoing laparoscopy had higher operative times but less blood loss and fewer postoperative complications compared with obese women undergoing laparotomy.

GOG LAP-2 had a 17.5% conversion rate of laparoscopic staging to laparotomy for completion in women who had a BMI of 25 kg/m², whereas the rate increased to 26.5% if the BMI was 34 to 35 kg/m², and 57% if the BMI was greater than 40 kg/m². An acceptable conversion rate is unknown, but it is reassuring that the converted patients seem to have the same QoL and hospital length of stay as those in the laparotomy arm. The requirement of comprehensive surgical staging on this clinical trial, including para-aortic node dissection, may not be what is performed in routine practice in morbidly obese patients. The robotic equipment may also help achieve successful minimally invasive completion rates in obese patients.

**Laparoscopy in the Elderly**

Elderly women are also sometimes believed to be at relative contraindication to laparoscopic procedures and surgery in general. Elderly patients are believed to have greater risk for postoperative respiratory and cardiac complications, longer hospitalizations, more loss of independence after surgery, and greater risk for thromboembolic events.

In a retrospective review of 125 women older than 65 years (average age, 77.5 years) with clinical stage I endometrial adenocarcinoma undergoing surgical staging, Scribner et al. showed a 77.6% successful completion rate of LAVH, BSO, peritoneal washings, and bilateral pelvic and para-aortic lymph node dissection. In this study, 67 patients underwent laparoscopic procedures, 45 laparotomy, and 13 transvaginal hysterectomy. The main reasons for conversion to laparotomy in the laparoscopic group were obesity, bleeding, and intraperitoneal disease. Among the patients who underwent laparoscopy, 1 postoperative transfusion was required, no intraoperative or postoperative complications and less postoperative ileus occurred, and the average length of stay was 2.1 days. Regarding postoperative thromboembolic events, 3 occurred in the laparoscopy group and 1 in the laparotomy group. The authors concluded that laparoscopic staging for endometrial cancer was safe and feasible in the elderly. LAP-2 documented a statistically significant risk for conversion associated with age when the assessment was controlled for other factors such as BMI and stage. The etiology of this finding is not currently known but could be hypothesized to be secondary to aggressive tumors, poor tolerance of Trendelenburg position during laparoscopy, or comorbidities.

**Cost**

Increased operative times and longer hospital stays lead to increased surgical treatment costs, and a few small studies have evaluated the cost-effectiveness of laparoscopic surgery in endometrial cancer. Although operative charges are higher in patients undergoing laparoscopy, 3 studies have shown that overall costs are less for laparotomy given the shorter hospital stays. Two studies from the same institution have shown slightly higher (approximately $2000) total overall costs for laparoscopic surgery than laparotomy, although this difference was significant in only 1 study.

**The Future of Laparoscopic Surgery in the Management of Endometrial Cancer**

Robotic surgery was approved by the FDA in 2005. Laparoscopy has become a widely accepted alterna-
tive to laparotomy in managing patients with gynecologic cancer. However, the new robotic technology has now led investigators to begin comparing the cost-effectiveness and safety of the 2 minimally invasive procedures. Questions also remain as to whether which laparoscopic procedure—TLH or LAVH—if either, is superior.

Bell et al.\(^4,7\) conducted a retrospective analysis of 110 patients at a single institution operated on by a single gynecologic oncologist. All patients underwent total hysterectomy, BSO, and pelvic and para-aortic lymphadenectomy, and 40 underwent laparotomy (TAH), 30 traditional LH, and 30 robotically assisted laparoscopy (RH). The patients were statistically older in the TAH group (average, 72.3 years) compared with those in the LH and RH groups (68.4 and 63.0 years, respectively; \(P = .03\) and .0005, respectively). BMI or uterine weight were not statistically different among the groups. Nodal counts removed were not statistically different among the 3 approaches; however, TAH had a significantly shorter operative time (108.6 min) than both LH (171.1 min) and RH (184.0 min).

Operative times between LH and RH were not statistically different (\(P = .14\)). Laparotomy was found to be associated with significantly higher estimated blood loss (316.8 cc) than RH (166.0 cc; \(P = .01\)); however, LH (253.0 cc) and RH were not significantly different (\(P = .25\)). Additionally, RH was associated with significantly fewer complications than both TAH (\(P = .015\)) and LH (\(P = .03\)). Despite the significantly longer operative times with both LH and RH, total average direct and indirect costs were significantly higher ($12,943.60) in the TAH group than the LH ($7569.80) and RH ($8212.00) groups, and the difference between LH and RH was not statistically different (\(P = .06\)). Those in the TAH group had a longer hospital stay than those in the LH and RH groups, and the latter had a significantly shorter time returning to normal activity compared with patients in both the TAH and LH groups.

Although small and retrospective in nature, this study shows that robotic surgery seems to be equivalent to laparoscopy and superior to laparotomy in cost and QoL measures.\(^47\) In a similar study, Boggess et al.\(^35\) compared robotic assistance (TRH; \(n = 103\)), laparoscopy (TLH; \(n = 81\)), and laparotomy (TAH; \(n = 138\)) in hysterectomy with staging for 322 patients with endometrial cancer. Despite having a higher BMI than patients who underwent TLH and an equal BMI to those who underwent TAH, patients who underwent TRH had a higher number of total, pelvic, and para-aortic lymph nodes removed. Total operative time was lowest in those who underwent TAH, but was statistically lower in the TRH group than the TLH group. TRH was associated with statistically lower estimated blood loss and total hospital stay compared with both TLH and TAH. No more conversions to laparotomy occurred in the TRH or TLH arms when compared with each other. Postoperative and overall complication rates were comparable for TLH and TRH, yet significantly lower for TRH than TAH.

Despite being retrospective in nature and lacking long-term survival and outcome data, the authors concluded that TRH is safe and feasible in staging women with endometrial cancer, and is preferable to TAH and possibly also TLH. A controlled trial of 72 patients in Italy randomized 37 women to LAVH and 35 to TLH and found that TLH had a significantly shorter mean total operating time than LAVH, largely because of a significantly longer hysterectomy phase in obese patients who underwent LAVH versus those who underwent TLH. Estimated blood loss and intraoperative and postoperative complication rates did not differ between the groups. The authors concluded that both approaches can be performed safely and successfully in patients with endometrial cancer, and that obese patients may benefit from TLH versus LAVH because of shorter operating times.\(^46\)

### Conclusions

Given the newly published results of the ASTEC and CONSORT trials,\(^8,9\) and pending mature follow-up data for survival and recurrences from LAP-2, gynecologic oncologists remain without clear direction when deciding the proper surgical procedure to perform on women with early-stage endometrial cancer. Although most experts agree that women with high-grade, deeply invasive tumors, and those with high-risk histology warrant a comprehensive staging procedure incorporating complete bilateral pelvic and para-aortic lymphadenectomy. Clinical judgment must determine when full staging procedures are indicated in women believed to have low-risk disease. Results of LAP-2 show that laparoscopic comprehensive surgical staging in women with endometrial
cancer is safe and feasible, and results in fewer complications, shorter hospital stays, and improved QoL. Women previously not believed candidates for laparoscopic surgery (obese, elderly, and medically fragile) are perhaps those who benefit most. The laparoscopic approach can be individualized to the patient, the histology encountered, and the surgical training and equipment available. The need for laparotomy will always remain for managing the large uterus and metastatic disease.

References


