INTRODUCTION

Endometrial cancer is the most common malignancy of the female reproductive tract in developed countries. Most pa-

tients with endometrial cancer present at an early stage; thus, surgery is often the first major step in the management of this disease. Conventionally, surgery is performed via a midline laparotomy, which is known to be associated with substantial perioperative morbidity. Minimally invasive surgery (MIS) provides equivalent oncologic outcomes when used for endometrial cancer treatment with reduced surgical and postoperative morbidity. However, the well-known steep learning curve of a laparoscopic procedure restricts its widespread application in the surgical treatment for endometrial cancer. The introduction of robot-assisted staging surgery (RSS) with a relatively shallow learning curve has facilitated more gynecologic oncologists to employ MIS over open surgery when treating endometrial cancer.

Comparative Survival Outcome of Robot-Assisted Staging Surgery Using Three Robotic Arms versus Open Surgery for Endometrial Cancer

Kyung Jin Eoh1,2*, Dae Woo Lee3*, Ji Hyun Lee3, Eun Ji Nam3, Sang Wun Kim3, and Young Tae Kim2

1Department of Obstetrics and Gynecology, Yongin Severance Hospital, Yonsei University College of Medicine, Yongin; 2Department of Obstetrics and Gynecology, Institute of Women’s Medical Life Science, Yonsei Cancer Center, Severance Hospital, Yonsei University College of Medicine, Seoul; 3Department of Obstetrics and Gynecology, Bucheon St. Mary’s Hospital, the Catholic University College of Medicine, Bucheon, Korea.

Purpose: There is lack of data on direct comparison of survival outcomes between open surgery and robot-assisted staging surgery (RSS) using three robotic arms for endometrial cancer. The purpose of this study was to compare the overall survival (OS) and disease-free survival (DFS) between open surgery and RSS using three robotic arms for endometrial cancer.

Materials and Methods: Consecutive women with endometrial cancer who underwent surgery between May 2006 and May 2018 were identified. Robotic procedures were performed using the da Vinci robotic system, and the robotic approach consisted of three robotic arms including a camera arm. Propensity score matching, as well as univariate and multivariate Cox regression of OS and DFS were performed according to clinicopathologic data and surgical method.

Results: The study cohort included 423 unselected patients with endometrial cancer, of whom 218 underwent open surgery and 205 underwent RSS using three robotic arms. Propensity score-matched cohorts of 146 women in each surgical group showed no significant differences in survival: 5-year OS of 91% vs. 92% and DFS of 86% vs. 89% in the open and robotic cohorts, respectively (hazard ratio, 1.02; 95% confidence interval, 0.82–1.67). In the univariate analysis with OS as the endpoint, surgical method, age, stage, type II histology, grade, and lymph node metastasis were independently associated with survival. Surgical stage, grade, and type II histology were found to be significant independent predictors for OS in the multivariate analysis.

Conclusion: RSS using three robotic arms and laparotomy for endometrial carcinoma had comparable survival outcomes.

Key Words: Endometrial cancer, robot-assisted surgery, survival
Currently, py5,6,9 and laparoscopy with robot-assisted surgery exists,10,11 along with a meta-analysis comparing all three approaches.12,13 However, there is a scarcity of data with respect to direct comparison of survival outcomes between open surgery and RSS using three robotic arms for endometrial cancer.14-16 However, only few published studies have focused on the placement and the number of robotic arms used in the procedure.17-19 Therefore, this research aimed to assess the survival outcome of RSS using three robotic arms, and to compare it with that of staging laparotomy after propensity score matching among patients from a single tertiary institution. We hypothesized that RSS with three robotic arms would yield equivalent oncologic outcomes when compared to open surgery for endometrial cancer.

MATERIALS AND METHODS

Patients
All consecutive patients who underwent open staging laparotomy or da Vinci RSS using three robotic arms for endometrial cancer between May 2006 and May 2018 at a single institution were reviewed. Our research was performed in accordance with the ethical tenets of the Declaration of Helsinki, and was approved by the Institutional Review Board (IRB) of Yonsei University College of Medicine (ethic code: 4-2019-0817).

Surgery and outcomes
The mode of surgery was selected mainly based on the surgeon’s discretion. Demographic and clinical characteristics (age at diagnosis and body mass index), pathological characteristics [histologic type, grade, and the International Federation of Gynecology and Obstetrics (FIGO) stage], perioperative characteristics (surgical approach, type of procedures performed, number of harvested lymph nodes, and conversion to laparotomy), adjuvant therapy (radiation, chemotherapy, or both), and survival outcomes (recurrence and vital status) were collected from the electronic medical records. Disease-free survival (DFS) was defined as the time interval between the date of initial diagnosis and that of disease progression based on the Response Evaluation Criteria in Solid Tumours (version 152.1.1).20 We calculated the overall survival (OS) as the time interval between the date of initial diagnosis and that of cancer-related death or the end of the study.

All patients underwent complete surgical staging for endometrial cancer, including hysterectomy, salpingo-oophorectomy, lymph node dissection (pelvic with/without paraaortic nodes), omentectomy, and peritoneal biopsies when required. Robot-assisted surgeries were performed using the da Vinci robotic surgical system (Intuitive Surgical Inc., Sunnyvale, CA, USA) with the Maryland Bipolar and Permanent Cautery Spatula or needle holder on each robotic arm, as described previously.17,18 Port placement of the RSS using three robotic arms is presented in Fig. 1.

Statistical analyses
Categorical variables were evaluated using Pearson’s chi-squared test or Fisher’s exact test depending on the category size, whereas Student’s t-test was used for comparing continuous variables. The Kaplan-Meier method was used to estimate the survival function. Using the proportional hazards model, we estimated the hazard ratios for each of the following vari-
ables: surgical method, age, FIGO stage, histology, grade, and lymph node status. We performed propensity score matching to reduce the bias in the estimate of the difference in survival after open and robot-assisted surgical staging for endometrial cancer. The propensity score model accounted for the surgical stage, grade, and histology. To estimate the difference in survival between the two surgical methods, we constructed a proportional hazards model using the matched data.

RESULTS

Patient characteristics
The flowchart for patient selection is shown in Fig. 2. In total, 423 patients were identified between May 2006 and May 2018; their clinical and pathological characteristics are shown in detail in Table 1. Open surgery was performed in 218 (51.5%) patients.

Table 1. Patient Characteristics Before and After PSM

| Characteristic          | Before PSM | After PSM | p value | Before PSM | After PSM | p value |
|-------------------------|------------|-----------|---------|------------|-----------|---------|
| Age (yr)                | Laparotomy (n=218) 55.2 (10.2) | Robotic (n=205) 52.8 (9.0) | 0.080 | Laparotomy (n=146) 54.9 (10.2) | Robotic (n=146) 53.4 (8.8) | 0.850 |
| BMI (kg/m²)             | 24.7 (4.8) | 24.6 (5.2) | 0.880 | 24.9 (5.1) | 24.5 (5.3) | 0.340 |
| FIGO stage              |            |           |        |            |           |         |
| I                       | Laparotomy (n=138) 138 (63.0) | Robotic (n=182) 182 (88.8) | <0.010 | Laparotomy (n=124) 124 (84.9) | Robotic (n=124) 124 (84.9) | 0.990 |
| II                      | 17 (7.8) | 5 (2.4) | 5 (2.4) | 5 (3.4) | 5 (3.4) |
| III                     | 42 (19.3) | 16 (7.8) | 15 (10.3) | 15 (10.3) |
| IV                      | 21 (9.6) | 2 (1.0) | 2 (1.4) | 2 (1.4) |
| Cell type               |            |           | <0.010 |            |           | 0.990 |
| Endometrioid            | Laparotomy (n=147) 147 (67.4) | Robotic (n=166) 166 (81.0) |           | Laparotomy (n=117) 117 (80.1) | Robotic (n=117) 117 (80.1) |       |
| Other                   | 71 (32.6) | 39 (19.0) |           | 29 (19.9) | 29 (19.9) |       |
| Grade                   |            |           | <0.010 |            |           | 0.990 |
| 1                       | 73 (33.5) | 106 (51.7) | 63 (43.2) | 63 (43.2) |
| 2                       | 67 (30.7) | 64 (31.2) | 51 (34.9) | 51 (34.9) |
| 3                       | 78 (35.8) | 35 (17.1) | 32 (21.9) | 32 (21.9) |
| Harvested LN, median (range) |            |           |        |            |           |         |
| Pelvic LN               | Laparotomy (n=16) 16 (2–54) | Robotic (n=12) 12 (2–72) | 0.990 | Laparotomy (n=16) 16 (2–47) | Robotic (n=13) 13 (2–46) | 0.180 |
| Paraaortic LN           | 3 (0–51) | 3 (0–36) | 3 (0–35) | 3 (0–36) | 0.550 |
| EBL (cc)                | 409.6 (614.4) | 91.9 (108.2) | <0.010 | 316.8 (333.4) | 113.0 (113.0) | <0.010 |
| Transfusion             | 40 (18.3) | 11 (5.4) | <0.100 | 9 (6.2) | 6 (4.1) | 0.420 |
| Conversion to laparotomy | 0         |           |        | 0         |           |         |
| Adjuvant therapy        |            |           | <0.010 |            |           | 0.200 |
| Radiation               | 53 (24.3) | 27 (13.2) | 41 (28.1) | 20 (13.7) |
| Chemotherapy            | 62 (28.4) | 29 (14.1) | 20 (13.7) | 23 (15.8) |
| Both                    | 22 (10.1) | 7 (3.4) | 9 (6.2) | 6 (4.1) |
| None                    | 81 (37.2) | 142 (69.3) | 76 (52.1) | 97 (66.4) |
| Recurrence              |            |           | <0.010 |            |           | 0.380 |
| No                      | 177 (81.2) | 187 (91.2) | 128 (87.7) | 133 (91.1) |
| Yes                     | 41 (18.8) | 18 (8.8) | 18 (12.3) | 13 (8.9) |
| Vital status            |            |           | 0.120 |            |           | 0.770 |
| Alive                   | 190 (87.2) | 193 (94.1) | 133 (91.1) | 135 (92.5) |
| Dead                    | 26 (12.8) | 12 (5.9) | 13 (8.9) | 11 (7.5) |

PSM, propensity score matching; SD, standard deviation; BMI, body mass index; FIGO, International Federation of Gynecology and Obstetrics; LN, lymph node; EBL, estimated blood loss.

Data are presented as mean (SD) or n (%).
patients, and 205 (48.5%) underwent RSS using three robotic arms. There were no conversions to open laparotomy. After propensity score weighting, 146 patients were matched in each surgical group, and there was no difference in any of the patient characteristics, except for the estimated blood loss (EBL) and the number of adjuvant treatments (Table 1). EBL was significantly higher in the laparotomy group than in the robotic surgery group (316.8 cc vs. 113.0 cc; p<0.010), but the number of transfusions did not differ between the two groups. A significant difference was found in the proportion of patients who were treated with adjuvant therapy between the propensity score-matched groups (28.1% in open group vs. 13.7% in robotic group; p=0.019). After propensity score weighting, overall, 31 (10.6%) patients experienced recurrence, and there was no difference in this regard between the two groups (p=0.380). There were 24 deaths (8.2%) in the entire propensity score-matched cohort, and no difference was observed between the two groups in this regard (p=0.770).

**Survival outcome**

After propensity score matching that accounted for the FIGO stage, grade, and histology, Kaplan-Meier survival analysis showed no significant differences in DFS (p=0.695) and OS (p=0.487) between the two groups (Fig. 3). The estimated 5-year DFS rates were 86% and 89% in the laparotomy and robot-assisted surgical cohorts, respectively. The estimated 5-year OS rates were 91% and 92% in the laparotomy and robot-assisted surgical cohorts, respectively.

**Univariate and multivariate regression analyses**

In the univariate regression analyses of the complete cohort with DFS as the endpoint, the mode of surgery, FIGO stage, grade, histology, and lymph node metastasis were associated with increased risk of recurrence, whereas in the following multivariate analysis, only grade 3 (p<0.010) was shown to be a significant independent risk factor. When OS was set as the endpoint, the mode of surgery, age, FIGO stage, histology, grade, and lymph node metastasis were significantly associated with worse prognosis in the univariate regression analysis of the complete cohort. In the multivariate analysis, FIGO stage IV (p<0.01), histology (p=0.010), and grade 3 (p<0.010) were found to be significant independent risk factors (Table 2).

**DISCUSSION**

The present study compared the survival outcomes between open surgery and RSS using three robotic arms in the era of a shift in the standard of care in the surgical management of endometrial cancers from open surgery to MIS. We found that staging surgery using three robotic arms in robotic surgery did not seem to compromise survival outcomes when compared to laparotomy for endometrial cancer. To the best of our knowledge, this is the first study to evaluate the survival outcomes between RSS using three robotic arms and open staging surgery for endometrial cancer. In South Korea, where robotic surgery is not covered by the National Health Insurance, it is necessary to reduce the economic burden on patients, and finding a strategy to reduce cost including using three robotic arms would have clinical implication.

The introduction of robot-assisted laparoscopic surgery has been shown to increase the application of MIS for malignancies,8,21,22 and MIS has been demonstrated to decrease surgical complications.23-26 Specifically, robot-assisted surgery is beneficial for obese patients, as it is correlated with a significantly reduced rate of surgical complications than that seen with open surgery, as well as a lower rate of conversion to open surgery when compared with conventional laparoscopy.27-29 However, in terms of the survival outcomes of MIS for endometrial cancer, most of the available studies compared open surgery with conventional laparoscopy rather than with robotic surgery, and indicated that laparoscopy was a favorable option for patients with endometrial cancer.13,30,31 In the present study, we compared the survival outcomes between propensity score-matched...
The use of three robotic arms in this study.

Compared with the previous reports, we demonstrated comparable survival outcomes (5-year DFS: 89% and 5-year OS: 92% with conventional laparoscopic or open surgery. It has been previously reported that eliminating one robotic arm may allow the patient to save approximately US$500.18 Since the introduction of the robotic surgical system in our institution, we have used three robotic arms for performing robotic surgeries, and have not encountered or observed major technical difficulties or perioperative complications.

The strength of our study was that all surgical procedures and adjuvant treatments were conducted at a single institution by fellowship-trained gynecologic oncologists and designated radiation oncologists. Despite this strength, our study also had some limitations, including the retrospective nature of the study and unmeasured variables that can cause confounding. In addition, potential selection bias, especially that owing to the selection of patients who can undergo robotic surgery, may also exist. Due to the small sample size, further investigation is current.

In the published literature, few studies have reported results on comparative long-term oncological outcomes between laparotomy and robotic surgery for endometrial cancer due to limited data and short follow-up period. Corrado, et al.32 observed that the 3-year OS rates were 86.7% and 91.5% and the 3-year DFS rates were 92.1% and 91.5% following open and robotic surgeries, respectively. Likewise, Cardenas-Goicoechea, et al.33 previously reported that eliminating one robotic arm may allow the patient to save approximately US$500.18 Since the introduction of the robotic surgical system in our institution, we have used three robotic arms for performing robotic surgeries, and have not encountered or observed major technical difficulties or perioperative complications.

The strength of our study was that all surgical procedures and adjuvant treatments were conducted at a single institution by fellowship-trained gynecologic oncologists and designated radiation oncologists. Despite this strength, our study also had some limitations, including the retrospective nature of the study and unmeasured variables that can cause confounding. In addition, potential selection bias, especially that owing to the selection of patients who can undergo robotic surgery, may also exist. Due to the small sample size, further investigation is current.

Table 2. Univariate and Multivariate Analyses of the Complete Cohort (n=423) with DFS and OS as Endpoints

| Variables          | DFS (HR [95% CI]) | p value | DFS (HR [95% CI]) | p value | OS (HR [95% CI]) | p value | OS (HR [95% CI]) | p value |
|--------------------|-------------------|---------|-------------------|---------|------------------|---------|------------------|---------|
| Surgical mode      |                   |         |                   |         |                  |         |                  |         |
| Laparotomy         | 1.00 (1.00–1.00)  | 1.00    | 1.00 (1.00–1.00)  | 1.00    |                  |         |                  |         |
| Robot              | 0.43 (0.25–0.76)  | <0.001  | 1.03 (0.56–1.91)  | 0.091   | 0.42 (0.21–0.82) | 0.010   | 0.92 (0.42–1.97) | 0.380   |
| Age (yr)           |                   |         |                   |         |                  |         |                  |         |
| ≤49                | 1.00 (1.00–1.00)  | 1.00    | 1.00 (1.00–1.00)  | 1.00    |                  |         |                  |         |
| ≥50                | 1.31 (0.72–2.40)  | <0.001  | 1.03 (0.56–1.91)  | 0.192   | 2.36 (0.99–5.63) | 0.052   | 2.09 (0.85–5.12) | 0.103   |
| FIGO stage         |                   |         |                   |         |                  |         |                  |         |
| I                  | 1.00 (1.00–1.00)  | 1.00    | 1.00 (1.00–1.00)  | 1.00    |                  |         |                  |         |
| II                 | 3.85 (1.59–9.41)  | <0.001  | 1.99 (0.21–18.83) | 0.543   | 2.85 (0.83–9.75) | 0.087   | 1.52 (0.07–30.88)| 0.780   |
| III                | 3.633 (1.88–7.01) | <0.001  | 0.47 (0.50–4.50)  | 0.831   | 3.12 (1.34–7.29) | <0.001  | 0.45 (0.00–25.01)| 0.888   |
| IV                 | 19.36 (9.94–37.69)| <0.001  | 11.51 (5.49–24.14)| <0.001  | 19.69 (9.20–42.10)| <0.001  | 11.27 (4.80–26.43)| <0.001  |
| Histology          |                   |         |                   |         |                  |         |                  |         |
| Endometrioid       | 1.00 (1.00–1.00)  | 1.00    | 1.00 (1.00–1.00)  | 1.00    |                  |         |                  |         |
| Other              | 3.44 (2.05–5.77)  | <0.001  | 1.44 (0.79–2.63)  | 0.223   | 5.60 (2.95–10.61)| <0.001  | 2.47 (1.17–5.24)| 0.012   |
| Grade              |                   |         |                   |         |                  |         |                  |         |
| 1                  | 1.00 (1.00–1.00)  | 1.00    | 1.00 (1.00–1.00)  | 1.00    |                  |         |                  |         |
| 2                  | 2.16 (0.94–4.95)  | 0.058   | 1.82 (0.78–4.23)  | 0.151   | 3.11 (0.97–9.92) | 0.053   | 2.62 (0.81–8.44)| 0.062   |
| 3                  | 7.39 (3.54–15.39) | <0.001  | 3.68 (1.61–8.39)  | <0.001  | 11.82 (4.11–33.92)| <0.001  | 4.59 (1.45–14.49)| <0.001  |
| LN metastasis      |                   |         |                   |         |                  |         |                  |         |
| Negative           | 1.00 (1.00–1.00)  | 1.00    | 1.00 (1.00–1.00)  | 1.00    |                  |         |                  |         |
| Positive           | 5.36 (3.12–9.20)  | <0.001  | 1.68 (0.69–4.03)  | 0.122   | 6.16 (3.22–11.77)| <0.001  | 1.56 (0.51–4.70)| 0.430   |

DFS, disease-free survival; OS, overall survival; HR, hazard ratio; CI, confidence interval; FIGO, International Federation of Gynecology and Obstetrics; LN, lymph node.
low-up and multicenter investigations are required to confirm carcinoma had equivalent survival outcomes. Long-term follow-up and multicenter investigations are required to confirm the result of this study as well as its generalizability.

AUTHOR CONTRIBUTIONS

Conceptualization: Young Tae Kim. Data curation: Kyung Jin Eoh and Dae Woo Lee. Formal analysis: Kyung Jin Eoh and Dae Woo Lee. Funding acquisition: Young Tae Kim. Investigation: Young Tae Kim. Methodology: Ji Hyun Lee, Eun Ji Nam, and Sang Wun Kim. Project administration: Young Tae Kim. Resources: Young Tae Kim, Eun Ji Nam, and Sang Wun Kim. Software: Kyung Jin Eoh. Supervision: Young Tae Kim. Validation: Sang Wun Kim. Visualization: Eae Woo Lee. Writing—original draft: Kyung Jin Eoh. Writing—review & editing: Young Tae Kim. Approval of final manuscript: all authors.

ORCID iDs

Kyung Jin Eoh https://orcid.org/0000-0002-1684-2267
Dae Woo Lee https://orcid.org/0000-0002-9095-526X
Ji Hyun Lee https://orcid.org/0000-0001-9086-992X
Eun Ji Nam https://orcid.org/0000-0003-0189-3560
Sang Wun Kim https://orcid.org/0000-0002-8342-8701
Young Tae Kim https://orcid.org/0000-0002-7347-1052

REFERENCES

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. CA Cancer J Clin 2019;69:7-34.
2. Mourits MJ, Bijen CB, Arts HJ, ter Brugge HG, van der Sijde R, Paulsen L, et al. Safety of laparoscopy versus laparotomy in early-stage endometrial cancer: a randomised trial. Lancet Oncol 2010;11:763-71.
3. Wright JD, Barrena Medel NI, Sehouli J, Fujiwara K, Herzog TJ. Contemporary management of endometrial cancer. Lancet 2012;379:1352-60.
4. Walker JL, Piedmonte MR, Spirtos NM, Eisenkop SM, Schaerth JB, Mannel RS, et al. Recurrence and survival after random assignment to laparoscopy versus laparotomy for comprehensive surgical staging of uterine cancer: Gynecologic Oncology Group LAP2 Study. J Clin Oncol 2012;30:695-700.
5. Chu LH, Chang WC, Sheu BC. Comparison of the laparoscopic versus conventional open method for surgical staging of endometrial carcinoma. Taiwan J Obstet Gynecol 2016;55:188-92.
6. Lee CL, Huang KG, Wu PJ, Lee PS, Yen CF. Long-term survival outcome of laparoscopic staging surgery for endometrial cancer in Taiwanese experience. Taiwan J Obstet Gynecol 2014;53:57-61.
7. Mok ZW, Yong EL, Low JJ, Ng JS. Clinical outcomes in endometrial cancer care when the standard of care shifts from open surgery to robotics. Int J Gynecol Cancer 2012;22:819-25.
8. Lau S, Vaknin Z, Ramana-Kumar AV, Halliday D, Franco EL, Gotlieb WH. Outcomes and cost comparisons after introducing a robotics program for endometrial cancer surgery. Obstet Gynecol 2012;119:717-24.
arotomy for the management of early stage endometrial cancer. Cochrane Database Syst Rev 2018;10:Cd006655.

26. Bergstrom J, Aloisi A, Armbruster S, Yen TT, Casarin J, Leitao MM Jr, et al. Minimally invasive hysterectomy surgery rates for endometrial cancer performed at National Comprehensive Cancer Network (NCCN) Centers. Gynecol Oncol 2018;148:480-4.

27. Seamon LG, Cohn DE, Henretta MS, Kim KH, Carlson MJ, Phillips GS, et al. Minimally invasive comprehensive surgical staging for endometrial cancer: robotics or laparoscopy? Gynecol Oncol 2009;113:36-41.

28. Bernardini MQ, Gien LT, Tipping H, Murphy J, Rosen BP. Surgical outcome of robotic surgery in morbidly obese patient with endometrial cancer compared to laparotomy. Int J Gynecol Cancer 2012;22:76-81.

29. Seamon LG, Bryant SA, Rheaume PS, Kimball KJ, Huh WK, Fowler JM, et al. Comprehensive surgical staging for endometrial cancer in obese patients: comparing robotics and laparotomy. Obstet Gynecol 2009;114:16-21.

30. Weber DM. Laparoscopic surgery: an excellent approach in elderly patients. Arch Surg 2003;138:1083-8.

31. Siesto G, Uccella S, Ghezzi F, Cromi A, Zefiro F, Serati M, et al. Surgical and survival outcomes in older women with endometrial cancer treated by laparoscopy. Menopause 2010;17:539-44.

32. Corrado G, Cutillo G, Pomati G, Mancini E, Sperduti I, Patrizi L, et al. Surgical and oncological outcome of robotic surgery compared to laparoscopic and abdominal surgery in the management of endometrial cancer. Eur J Surg Oncol 2015;41:1074-81.

33. Cardenas-Goicoechea J, Shepherd A, Momeni M, Mandeli J, Chuang L, Gretz H, et al. Survival analysis of robotic versus traditional laparoscopic surgical staging for endometrial cancer. Am J Obstet Gynecol 2014;210:160.e1-11.

34. Brudie LA, Backes FJ, Ahmad S, Zhu X, Finkler NJ, Bigsby GE 4th, et al. Analysis of disease recurrence and survival for women with uterine malignancies undergoing robotic surgery. Gynecol Oncol 2013;128:309-15.

35. Kilgore JE, Jackson AL, Ko EM, Soper JT, Van Le L, Gehrig PA, et al. Recurrence-free and 5-year survival following robotic-assisted surgical staging for endometrial carcinoma. Gynecol Oncol 2013;129:49-53.