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Factors Influencing Same-day Hospital Discharge and Risk Factors for Readmission After Robotic Surgery in the Gynecologic Oncology Patient Population

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Abstract

Study Objective—To determine the factors that allow for a safe outpatient robotic-assisted minimally invasive gynecologic oncology surgery procedure.

Design—Retrospective chart review (Canadian Task Force classification II-1).

Setting—University hospital.

Patients—All patients (140) undergoing robotic-assisted minimally invasive surgery with the gynecologic oncology service from January 1, 2013, to December 31, 2013.

Interventions—Risk factors for unsuccessful discharge within 23 hours of surgery and same-day discharge were assessed using logistic regression models.

Measurements and Main Results—All patients were initially scheduled for same-day discharge. The outpatient surgery group was defined by discharge within 23 hours of the surgery end time, and a same-day surgery subgroup was defined by discharge before midnight on the day of surgery. One hundred fifteen (82.1%) were successfully discharged within 23 hours of surgery, and 90 (64.3%) were discharged the same day. The median hospital stay was 5.3 hours (range, 1–48 hours). Unsuccessful discharge within 23 hours was associated with a preoperative diagnosis of lung disease and intraoperative complications; unsuccessful same-day discharge was associated with older age and later surgery end time. Only 2 patients (1.4%) were readmitted to the hospital within 30 days of surgery.

Conclusions—Outpatient robotic-assisted minimally invasive surgery is safe and feasible for most gynecologic oncology patients and appears to have a low readmission rate. Older age, preoperative lung disease, and later surgical end time were risk factors for prolonged hospital stay. These patients may benefit from preoperative measures to facilitate earlier discharge.

Keywords

Gynecologic oncology; Robotic surgery; Same-day discharge

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Hysterectomy is 1 of the most common surgical procedures performed in the United States, with more than 600,000 hysterectomies performed annually [1]. The robotic surgical platform for minimally invasive surgery was approved for use in gynecologic surgery in 2005, and since that time the number of robotic surgeries has continually increased [2]. In 2009, the American Congress of Obstetrics and Gynecology produced a committee opinion stating that the surgeon should take into account both patient safety and cost-effectiveness of each route; however, this statement specifically excluded the use of the robotic platform for gynecologic oncology procedures [3]. The benefits of a minimally invasive approach to hysterectomy are well documented and include shorter hospital stay, decreased blood loss, less pain, fewer wound complications, earlier return to baseline function, and improved cosmesis without compromise in oncologic outcomes [4,5]. Several studies have shown an advantage specifically for gynecologic oncology procedures with increased lymph node counts, decreased blood loss, and fewer overall complications, with these improvements most pronounced in the obese population [6-10].

Traditionally, hysterectomies have been performed as an inpatient procedure to control postoperative pain and monitor for postoperative complications such as bleeding, symptomatic anemia, and delayed return of bowel function. However, hospital stays after minimally invasive surgeries can be significantly shortened because of decreased postoperative pain, minimal blood loss, and faster return of bowel function. Subsequently, an increasing number of insurance companies are requiring minimally invasive surgeries be performed as outpatient procedures.

The University of Minnesota gynecologic oncology service implemented a same-day discharge policy for all minimally invasive hysterectomy patients in 2012. The purpose of this study was to determine the factors that allow for a safe outpatient robotic-assisted minimally invasive gynecologic oncology procedure.

Methods

Study Population

University of Minnesota Institutional Review Board approval was obtained for this study. All robotic hysterectomies performed at the University of Minnesota Medical Center by the gynecologic oncology faculty were identified through a query of the gynecologic oncology surgical database. A retrospective chart review of all patients undergoing a robotic hysterectomy between January 1, 2013, and December 31, 2013, was performed. Patients were excluded from analysis if there was preoperative documentation of a planned postoperative admission, the procedure was converted to laparotomy, the gynecologic surgery was performed in conjunction with surgery performed by another service (e.g., colorectal surgery or urology), or if a radical hysterectomy was performed because not all providers allowed same-day discharge after this procedure. Electronic health records (EHRs) were reviewed to collect demographic and health information such as age; body mass index (BMI); tobacco use; American Society of Anesthesiology class; comorbidities including diabetes, lung disease, heart disease, cerebral vascular accident, deep-vein thrombosis/pulmonary embolus (DVT/PE), chronic kidney disease, and previous surgeries; and surgical

information including preoperative diagnosis, surgical procedure, postoperative diagnosis, intraoperative complications (e.g., urinary tract injury, vascular injury, or transfusion), and postoperative complications (e.g., readmission, pneumonia, abscess, or DVT/PE). The distance from a patient's home to the hospital was categorized as either <60 miles or ≥60 miles to represent the geographic borders of the Minneapolis–St. Paul metropolitan area.

The outpatient surgery group was defined as discharge from the hospital within 23 hours of the end of surgery, which insurance companies generally accept as an outpatient procedure. A same-day surgery subgroup was defined as discharge from the hospital before midnight the day of surgery. Any subject who stayed in the hospital >23 hours was categorized in the inpatient surgery group.

Surgical Procedures

The surgical procedures were categorized as (1) < hysterectomy (adnexal surgery or trachelectomy), (2) hysterectomy ± bilateral salpingo-oophorectomy, (3) staging (any of these procedures plus pelvic and/or para-aortic lymph node dissections ± omentectomy ± appendectomy), or (4) debulking (any of these procedures plus procedures to remove gross metastatic disease).

All surgeries were performed by 1 of 7 fellowship-trained gynecologic oncology surgeons. Surgeries were performed using the da Vinci S console platform (Intuitive, Sunnyvale, CA). A 5-port docking technique was used, and robotic monopolar and bipolar cautery were used. Vaginal cuff closure was performed using the robotic platform and either a polyglycolic acid or barbed V-Loc suture (Covidien, Mansfield, MA) per surgeon preference. Patients underwent preoperative transversus abdominis plane blocks with 0.25% bupivacaine with epinephrine per the pain control protocol at the University of Minnesota Medical Center unless there was a contraindication to this procedure. All patients were discharged with oxycodone 5 mg/acetaminophen 325 mg and ibuprofen 600 mg for pain control and senna for a stool softener unless they had a contraindication to these medications. Discharge criteria included stable and normal vital signs, the ability to maintain oxygen saturation levels >95% on room air, adequate control of nausea and vomiting, and adequate pain control with an oral regimen. Patients were scheduled for a postoperative clinic visit 1 to 3 weeks postoperatively per surgeon preference. The EHR was also assessed for any emergency room visits or telephone encounters indicating an admission to an outside facility because of postoperative complications within 30 days of discharge.

Statistical Methods

Patient demographic and clinical characteristics were summarized. Risks of not discharging to home the same day and discharging more than 23 hours after surgery were assessed by patient characteristics using logistic regression models. Demographic and preoperative characteristics considered included age, BMI, tobacco use, distance between home and hospital, preoperative diagnosis of diabetes, lung disease, heart disease, cerebral vascular accident, DVT/PE, chronic kidney disease, preoperative hemoglobin level, mental health disorders, number of prior abdominal surgeries, and indication for surgery. Intra- and postoperative characteristics considered included the type of surgery, intraoperative

complications, antibiotic use, preoperative anticoagulation, estimated blood loss, length of surgery, time of surgery completion, postoperative complications, and final pathology. Odds ratios (ORs) and 95% confidence intervals (CI) are presented. Because this was an exploratory analysis, p values were not adjusted for multiple comparisons. Analyses were performed using SAS version 9.3 (SAS Institute Inc, Cary, NC), and p values <.05 were considered statistically significant.

Results

A total of 191 surgical records were reviewed. Of those, 38 subjects were excluded before complete chart review because of cancellation of surgery (n = 17), conversion to laparotomy (n = 19), or surgery performed in conjunction with another surgical service (n = 2). After EHR review, an additional 13 subjects were excluded because of preoperative documentation of a planned postoperative admission. One hundred forty patients were included in the final analysis (Fig. 1). The mean age at surgery was 56.7 ± 12.1 years, the mean BMI was 34.0 ± 9.6 , 88 (62.9%) lived within 60 miles of the clinic, and most (64.3%) had a history of at least 1 prior abdominal surgery. The majority of patients (62.1%) underwent surgery for malignancy.

One hundred fifteen subjects (82.1%) met criteria for outpatient surgery with discharge from the hospital within 23 hours of the end of surgery. A total of 90 subjects (78.3%) were discharged the same day (Fig. 1). The median length of stay after the end of surgery was 5.3 hours (range, 1–48 hours). Of those requiring inpatient admissions, 80% were admitted for medical reasons and 20% for social reasons (Fig. 2). These social reasons for unplanned admission were varied but included factors such as lack of transportation from the hospital, need for placement in a rehabilitation facility, or need to arrange home health care services for the patient. The EHR-documented reasons for inpatient admission were baseline limitations (n = 11), postoperative pulmonary (n = 7) or cardiac issues (n = 6), urinary retention (n = 4), poor pain control (n = 3), long distance from the hospital to home (n = 2, 200 and 350 miles), late surgery end time (n = 2), weakness/dizziness (n = 2), need for patient education (n = 1), and nausea and vomiting (n = 1).

Potential baseline demographic and clinical risk factors for failure to discharge within 23 hours are presented in Table 1. The only preoperative factor statistically significantly associated with failure to discharge within 23 hours was preoperative lung disease (OR = 3.59; 95% CI, 1.4–9.24). Living outside of the metropolitan area (>60 miles from the hospital) did not appear to be associated with failure to discharge within 23 hours (OR = 1.73; 95% CI, 0.72–4.15). Patients who had an intraoperative complication were approximately 8 times more likely to be hospitalized >23 hours compared with those without complications (OR = 7.71; 95% CI, 1.22–48.83; p = .030) (Table 2). There did not, however, appear to be a statistically significant association between the procedure performed (hysterectomy vs staging vs debulking) and failure to discharge within 23 hours (OR = 0.81; 95% CI, 0.34–1.95). However, for each 30-minute increase in surgical time, there was a trend toward an increased risk for inpatient status (OR = 1.28; 95% CI, 0.99–1.67; p = .061).

Among the subgroup of patients who were discharged the same day as surgery (before midnight), the 2 factors found to be statistically significantly associated with same-day discharge were patient age (Table 3) and surgery end time (Table 4). For each 10-year increase in age, there was a 50% increased risk of stay past midnight (OR = 1.51; 95% CI, 1.10–2.07; $p = .011$). For example, patients 70 years and older were approximately 3 times more likely to not be discharged by midnight (OR = 3.07; 95% CI, 1.02–9.21, $p = .045$). For each 1-hour delay in surgery end time, there was almost a 25% increased risk of stay past midnight (OR = 1.23; 95% CI, 1.07–1.41; $p = .003$). There was not a statistically significant difference between patients who lived less than or greater than 60 miles from the hospital and risk of staying past midnight ($p = .108$).

Follow-up data were available for 95% of patients. There were only 2 (1.4%) readmissions within 30 days of initial hospital discharge reported in the EHR during the study period. The first was discharged within 3 hours of surgery and was readmitted on postoperative day 26 for the management of a pelvic fluid collection, which was incidentally diagnosed during magnetic resonance imaging performed for long-standing hip pain. She underwent computed tomographic-guided percutaneous drainage of the fluid collection. Final fluid cultures were negative, and the patient was discharged back to home after a 1-day hospital stay. The second patient was admitted for 2 days after surgery and was readmitted on postoperative day 8 for the management of an empyema. She underwent ultrasound-guided drainage of the empyema, and final cultures showed *Escherichia coli*. She was treated with levofloxacin and piperacillin/tazobactam antibiotics and was discharged back to home after a 14-day hospital stay.

Discussion

Our study supports the safety and feasibility of same-day hospital discharge in gynecologic oncology patients undergoing robotic surgery. We evaluated both discharge within 23 hours and discharge before midnight on the day of surgery. We identified age, preexisting lung pathology, intra-operative complications, and surgery end time as potential risk factors for longer hospital stays. Same-day discharge after minimally invasive surgery is becoming increasingly popular because of the increasing focus on cost containment by both hospitals and insurance companies.

The idea of same day-discharge after hysterectomy was reported in the vaginal hysterectomy literature in 1992 by Stovall et al [11], who showed that it was possible to discharge patients home the same day provided there was a clear expectation of such ahead of time. The reports of same-day discharge for laparoscopic hysterectomy followed 2 years later when Taylor [12] reported pilot data of 7 patients who were safely discharged home the same day; however, his protocol included 3 home nurse visits within 24 hours of discharge. Several subsequent reports have confirmed the feasibility and safety of same-day discharge for laparoscopic procedures, but the majority of these surgeries were performed for benign indications [13–15]. All these reports have very low readmission and complication rates. A large prospective database study showed that there has been a vast increase in the number of same-day discharges in recent years, with approximately 46% of hysterectomy patients discharged to home the same day of surgery in 2010; however, only 2.2% of these

hysterectomies were performed for malignancy [16]. Reluctance for same-day discharge for gynecologic oncology patients comes from concern regarding the older age of this patient population, their medical comorbidities, and the complex staging procedures performed in the setting of gynecologic malignancy, which may increase the risk of bleeding and other postoperative complications.

Over the past few years, there has been increasing interest in same-day discharge for gynecologic oncology patients. Gien et al [17] reported that 48.5% (147/303) of their total laparoscopic hysterectomy patients, at least 62% of whom had a staging procedure, were able to be discharged to home the same day as surgery. Their hospital readmission rate was only 4.8% within 3 weeks of surgery, and only 3 patients (2%) could have avoided readmission with an initial postoperative admission [17]. Another retrospective review of 200 patients, 47.5% of whom were undergoing surgery for a malignant indication, reported a same-day discharge rate of 78% [18]. In this study, operative time, case completion before 18:00 military time, and the administration of ketorolac at the end of surgery were predictors of successful same-day discharge.

One major concern raised by those who oppose same-day discharge after minimally invasive hysterectomy is the potential to delay the diagnosis of postoperative complications. Our intraoperative complication rate (2.8%) was low and on par with those reported in the literature. All of our intraoperative complications were minor (2 cystotomies and 2 small bowel serosal lacerations) and were recognized and repaired intraoperatively; thus, a longer hospital admission would not have changed the outcomes. Importantly, we found very low hospital readmission rates with no apparent difference between those who were discharged within 23 hours or >23 hours postoperatively. Our 30-day readmission rate of 1.4% is lower than the approximately 5.2% 30-day readmission rate after robotic surgery previously reported by Liang et al [19]. In their study, an initial length of stay >1 day and any postoperative complication were found to be risk factors for readmission within 30 days; age, BMI, number of comorbidities, and performance of lymphadenectomy were not found to be predictors of readmission. Fever, vaginal drainage, and gastrointestinal complaints were the 3 most common reasons for readmission [19]. Our study showed similar reasons for admission, with both patients admitted for infection workup. Although our lower readmission rate could be because of outside hospital admissions that were not documented in our electronic medical record, we had at least a telephone follow-up for 95% of patients, which limits the number of missed readmissions. The difference in readmission rates may also be caused by a difference in hospital cultures because only 2 of 10 febrile patients in their study ultimately had a culture-proven infection, none of 8 patients with vaginal drainage were found to have a urinary tract injury, and only 3 of 8 were diagnosed with a vaginal cuff dehiscence requiring surgical repair. It is possible that some of these patients could have been evaluated as an outpatient, which would further decrease the postoperative readmission rate.

In our study, age, preexisting lung disease, intraoperative complications, and surgery end time were identified as risk factors for overnight admission, and these factors can be used to identify patients who are most likely to achieve same-day discharge and to counsel patients appropriately regarding their risk for admission. For example, scheduling robotic procedures

for those most likely to be discharged the same day (e.g., younger patients with good baseline performance status and no preexisting lung or cardiac disease) early in the day may further increase the number of patients successfully discharged before midnight the day of surgery. This is consistent with the findings of other studies [17,18]. Optimization of pulmonary and cardiac function before surgery may also help to avoid postoperative complications and improve the ability to discharge patients the same day or at least within 23 hours of surgery. Lastly, as identified in previous studies, preoperative counseling to set patient expectations for same-day discharge is key to a successful discharge [11].

The strengths of this study are the standard clinic policies including preoperative counseling for all patients describing that they would be discharged to home the day of surgery and the ability to monitor patients for up to 4 hours in the post-anesthesia care unit and a phase 2 recovery unit before discharge. Additionally, we have follow-up data for 95% of patients through clinic visits, telephone notes, and correspondence with outside providers. The limitations to this study are caused by the retrospective nature of the study design and include selection bias and information bias. For those patients who were not successfully discharged within 23 hours of surgery, the most commonly documented reason for admission was baseline limitations; however, these criteria are not standardized and are heavily influenced by patient, nursing, and physician perception. The immediate postoperative pain management regimen is also not standardized. Although all patients receive transversus abdominis plane blocks per the anesthesia protocol, the administration of ketorolac, which in a previous study has been shown to be a predictor of successful discharge, was administered at the discretion of the surgeon and anesthesia providers. Lastly, radical hysterectomy patients were excluded from this study because of inconsistent practice regarding same-day discharge after this gynecologic oncology procedure.

In conclusion, same-day discharge after robotic gynecologic oncology procedures is both feasible and safe. Preoperative counseling and care as well as optimization of the surgery schedule based on patient age and comorbidities could increase the proportion of patients who can be successfully discharged to home the same day as a robotic procedure.

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Fig. 1.
The flow of patients through the study.

Fig. 2.
The reasons for non-same-day discharge.

Table 1

Baseline demographic and clinical risk factors for Nonoutpatient (admission >23 hours) robotic surgery

Risk factor	Outpatient n (%)	Inpatient n (%)	OR (95% CI)	p Value
Age (per 10 years)	115	25	1.15 (0.80–1.66)	.448
BMI (per 5 units)	115	25	1.15 (0.93–1.43)	.194
Home distance from clinic				
<60 miles	75 (65)	13 (52)	1.00	
60+ miles	40 (35)	12 (48)	1.73 (0.72–4.15)	.218
Diabetes				
No	89 (77)	22 (88)	1.00	
Yes	26 (23)	3 (12)	0.47 (0.13–1.68)	.244
Lung disease				
No	97 (84)	15 (60)	1.00	
Yes	18 (16)	10 (40)	3.59 (1.40–9.24)	.008
Heart disease				
No	55 (48)	11 (44)	1.00	
Yes	60 (52)	14 (56)	1.17 (0.49–2.79)	.728
History of cerebral vascular event				
No	113 (98)	23 (92)	1.00	
Yes	2 (2)	2 (8)	4.91 (0.66–36.69)	.121
History of deep-vein thrombosis				
No	110 (96)	23 (92)	1.00	
Yes	5 (4)	2 (8)	1.91 (0.35–10.48)	.455
Mental health disorder				
No	78 (68)	14 (56)	1.00	
Yes	37 (32)	11 (44)	1.66 (0.69–4.00)	.262
Chronic kidney disorder				
No	108 (94)	25 (100)	1.00	
Yes	7 (6)	0 (0)	*	
Tobacco use				
Never/former	96 (83)	23 (92)	1.00	
Current	19 (37)	2 (8)	0.44 (0.01–2.02)	.291

BMI = body mass index; CI = confidence interval; OR = odds ratio.

*
Not estimable.

Table 2

Surgical risk factors for Nonoutpatient (admission >23 hours) robotic surgery

Risk factor	Outpatient n (%)	Inpatient n (%)	OR (95% CI)	p Value
Prior abdominal surgery				.149
None	43 (37)	7 (28)	1.00	
1	44 (38)	7 (28)	0.98 (0.32–3.02)	
2+	28 (24)	11 (44)	2.41 (0.84–6.97)	
Indication for surgery				.556
Endometrial hyperplasia	14 (12)	6 (24)	1.00	
Endometrial cancer	57 (49)	11 (44)	0.45 (0.14–1.43)	
Other cancer	16 (14)	3 (12)	0.44 (0.09–2.08)	
Adnexal, uterine, or cervical abnormality	18 (16)	5 (20)	0.65 (0.16–2.57)	
Risk reducing	10 (9)	0 (0)	*	
Type of surgery				.644
< Hysterectomy	2 (2)	0 (0)	*	
Hysterectomy ± BSO	57 (49)	14 (56)	1.00	
Staging	55 (48)	11 (44)	0.81 (0.34–1.95)	
Debulking	1 (1)	0 (0)	*	
Intraoperative complication				.030
No	113 (98)	22 (88)	1.00	
Yes	2 (2)	3 (12)	7.71 (1.22–48.83)	
Preoperative pharmacologic thromboprophylaxis				.292
No	30 (26)	4 (16)	1.00	
Yes	85 (74)	21 (84)	1.85 (0.59–5.84)	
Postoperative complication				.223
No	109 (95)	22 (88)	1.00	
Yes	6 (5)	3 (12)	2.48 (0.58–10.66)	
Postoperative pathology				.851
Benign	38 (33)	7 (28)	1.00	
Uterine cancer	61 (53)	14 (56)	1.25 (0.46–3.37)	
Other cancer	15 (13)	4 (16)	1.45 (0.37–5.68)	
Other	1 (1)	0 (0)	*	
Preoperative hemoglobin (per 1 unit)	114	25	0.75 (0.56–1.02)	.065
Estimated blood loss (per 100 mL)	115	25	1.30 (0.86–1.98)	.216
Surgery end time (per 1 hour)	115	25	0.89 (0.74–1.08)	.232
Length of surgery (per 30 minutes)	115	25	1.28 (0.99–1.67)	.061

BSO = bilateral salpingo-oophorectomy; CI = confidence interval; OR = odds ratio.

*
Not estimable.

Table 3

Baseline demographic and clinical risk factors for non-same-day discharge

Risk factor	Discharged n (%)	Not discharged n (%)	OR (95% CI)	p Value
Age (per 10 years)	90	50	1.51 (1.10–2.07)	.011
BMI (per 5 units)	90	50	1.06 (0.89–1.27)	.514
Home distance from clinic				.108
<60 miles	61 (68)	27 (54)	1.00	
60+ miles	29 (32)	23 (46)	1.79 (0.88–3.65)	
Diabetes				.780
No	72 (80)	39 (78)	1.00	
Yes	18 (20)	11 (22)	1.13 (0.48–2.63)	
Lung disease				.081
No	76 (84)	36 (72)	1.00	
Yes	14 (16)	14 (28)	2.11 (0.91–4.89)	
Heart disease				.208
No	46 (51)	20 (40)	1.00	
Yes	44 (49)	30 (60)	1.57 (0.78–3.16)	
History of cerebral vascular event				.137
No	89 (99)	47 (94)	1.00	
Yes	1 (1)	3 (6)	5.68 (0.58–56.12)	
History of deep-vein thrombosis				.239
No	87 (97)	46 (92)	1.00	
Yes	3 (3)	4 (8)	2.52 (0.54–11.75)	
Mental health disorder				.958
No	59 (66)	33 (66)	1.00	
Yes	31 (34)	17 (34)	0.98 (0.47–2.03)	
Chronic kidney disorder				.687
No	85 (94)	48 (96)	1.00	
Yes	5 (6)	2 (4)	0.71 (0.13–3.79)	
Tobacco use				.461
Never/former	75 (83)	44 (88)	1.00	
Current	15 (17)	6 (12)	0.68 (0.25–1.89)	

BMI = body mass index; CI = confidence interval; OR = odds ratio.

Table 4

Surgical risk factors for non–same-day (discharge after midnight) discharge

Risk factor	Discharged n (%)	Not discharged n (%)	OR (95% CI)	p Value
Prior abdominal surgery				.265
None	35 (39)	15 (30)	1.00	
1	34 (38)	17 (34)	1.17 (0.50–2.70)	
2+	21 (23)	18 (36)	2.00 (0.84–4.79)	
Indication for surgery				.678
Endometrial hyperplasia	12 (13)	8 (16)	1.00	
Endometrial cancer	39 (43)	29 (58)	1.12 (0.40–3.08)	
Other cancer	13 (14)	6 (12)	0.69 (0.19–2.59)	
Adnexal, uterine, or cervical abnormality	16 (18)	7 (14)	0.66 (0.19–2.32)	
Risk reducing	10 (11)	0 (0)	*	
Type of surgery				.166
< Hysterectomy	2 (2)	0 (0)	*	
Hysterectomy ± BSO	49 (54)	22 (44)	1.00	
Staging	38 (42)	28 (56)	1.64 (0.81–3.31)	
Debulking	1 (1)	0 (0)	*	
Intraoperative complication				.267
No	88 (98)	47 (94)	1.00	
Yes	2 (2)	3 (6)	2.81 (0.45–17.39)	
Preoperative pharmacologic thromboprophylaxis				.953
No	22 (24)	12 (24)	1.00	
Yes	68 (76)	38 (76)	1.02 (0.46–2.30)	
Postoperative complication				.211
No	86 (96)	45 (90)	1.00	
Yes	4 (4)	5 (10)	2.39 (0.61–9.34)	
Postoperative pathology				.093
Benign	34 (38)	11 (22)	1.00	
Uterine cancer	42 (47)	33 (66)	2.43 (1.07–5.51)	
Other cancer	13 (14)	6 (12)	1.43 (0.44–4.65)	
Other	1 (1)	0 (0)	*	
Preoperative hemoglobin (per 1 unit)	89	50	0.86 (0.67–1.11)	.252
Estimated blood loss (per 100 mL)	90	50	1.08 (0.74–1.59)	.685
Surgery end time (per 1 hour)	90	50	1.23 (1.07–1.41)	.003
Length of surgery (per 30 minutes)	90	50	1.15 (0.94–1.42)	.180

BSO = bilateral salpingo-oophorectomy; CI = confidence interval; OR = odds ratio.

* Not estimable.