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Original Article

Improved Rates of Same-day Discharge in Patients Undergoing Surgery for Endometrial Cancer Following the COVID-19 Pandemic

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ABSTRACT **Study Objective:** To determine the effect of the coronavirus disease 2019 (COVID-19) pandemic on the rate of same-day discharge (SDD) after minimally invasive surgery for endometrial cancer.

Design: Retrospective cohort.

Setting: Teaching hospital.

Patients: A total of 166 patients underwent a minimally invasive surgery procedure for the indication of endometrial cancer at a large academic institution from September 1, 2019, to October 1, 2020—80 patients before the implementation of the COVID-19 restrictions and 86 patients after.

Interventions: COVID-19 pandemic with visitor restrictions and hospital policy changes placed on March 17, 2020.

Measurements and Main Results: SDD rate was increased by 18% after the start of the COVID-19 pandemic (40% vs 58%, $p = .02$). There were no differences between the 2 groups with regard to operative time ($p = .07$), estimated blood loss ($p = .21$), uterine weight ($p = .12$), age ($p = .06$), body mass index ($p = .42$), or surgery start time ($p = .15$). In a multivariable logistic regression model, subjects in the COVID-19 group had 3.08 times (95% confidence interval, 1.40–6.74; $p = .01$) higher odds of SDD than those in the pre-COVID-19 group. There was no difference in 30-day readmission rates (7.5% vs 5.8%, $p = .66$).

Conclusion: There was a significant increase in the SDD of patients with endometrial cancer since the start of the COVID-19 pandemic. The pandemic has strained hospital resources and motivated patients and physicians to avoid hospitalization. This shows that with proper motivation, an increase in SDD rates is possible without an increase in complications or rehospitalization. *Journal of Minimally Invasive Gynecology* (2022) 00, 1–5. © 2022 AAGL. All rights reserved.

Keywords: COVID-19; Endometrial cancer; Laparoscopy; Same-day discharge

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Background

Endometrial cancer is the most common gynecologic malignancy in the United States, with approximately 65 620 cases in 2020 [1]. Primary surgery including a complete hysterectomy, combined with staging when indicated, is the standard of care for endometrial cancer and is curative in most cases. Minimally invasive surgical techniques were developed for both hysterectomy and lymphadenectomy. Subsequently, the gynecologic oncology group conducted the Lap-2 trial comparing a minimally invasive approach and open surgery for endometrial cancer. This trial demonstrated similar oncologic outcomes, but minimally invasive surgery had the advantage of lower short-term morbidity and a quicker recovery [2,3]. Robotic

surgery was later adopted as an alternative to the laparoscopic approach [4,5].

Owing to the reduced bowel dysfunction and pain requirements after minimally invasive surgery, same-day discharge (SDD) is now possible after minimally invasive surgery for endometrial cancer. SDD has been demonstrated as a safe alternative to admitting patients after minimally invasive surgery and is not associated with an increased risk of readmission or other complications [6,7]. Despite these benefits, barriers exist for SDD in gynecologic oncology. Patients with endometrial cancer tend to be older, have more comorbidities, or have a higher expectation of staying in the hospital overnight [8,9]. Furthermore, patients undergoing minimally invasive hysterectomies for an oncologic diagnosis are even less likely to get SDD, although this trend is decreasing [10–12].

Although the rates of SDD have increased, there is still a wide range of rates between practices and surgeons, and until recently, there has been little incentive for patients to be discharged on the day of surgery [13]. However, the coronavirus disease 2019 (COVID-19) pandemic has motivated both surgeons and patients toward early discharge because of limitations in available hospital beds and concern over exposure to COVID-19. Therefore, we wanted to examine the impact of the pandemic on the SDD rates after minimally invasive surgery in a homogenous population. In addition, we wanted to see whether the change in SDD was associated with an increase in complications or readmission rates.

Materials and Methods

We retrospectively reviewed patients who had undergone either robotic or laparoscopic surgery for endometrial cancer from September 2019 to October 2020. Patients were divided into pre-pandemic and postpandemic cohorts based on the implementation of the pandemic guidelines limiting elective surgeries at our institution on March 17, 2020. Patients during this time with endometrial cancer undergoing either a robotic or laparoscopic procedure were included in the data analysis. All surgeries were completed by fellowship-trained gynecologic oncologists at 2 hospitals affiliated with Atrium Health. Two cohorts were identified defined by March 17, 2020, when the hospital COVID-19 policies were implemented. Subjects who underwent surgery between September 1, 2019, and March 17, 2020, were identified in the pre-COVID-19 cohort, and those whose surgeries were performed between March 18, 2020, and October 1, 2020, were identified in the COVID-19 cohort.

Demographic and clinical characteristics were summarized with frequencies and percentages or medians and interquartile ranges, as appropriate. Chi-square and *t* tests were used to test for differences in pre-COVID-19 and COVID-19 cohorts on SDD, uterine weight, surgery start

time, concurrent procedures, readmission within 30 days, race, ethnicity, estimated blood loss (EBL), operative time, body mass index (BMI), and age. Uterine weight was categorized as ≥ 250 mg vs < 250 mg as recorded per patients' billing codes. Surgery start time was categorized as starting before vs after noon. Procedures were categorized as no concurrent procedures, retroperitoneal lymph node sampling (single or multiple sentinel nodes), peri-aortic lymph node sampling, or pelvic lymphadenectomy. Readmission was defined as being readmitted to the hospital within 30 days of discharge. EBL, operative time, BMI, and age were treated as continuous variables. To investigate the association between pre-COVID-19 and COVID-19 cohorts and SDD, multivariable logistic regression was used, controlling for potential confounders, including uterine weight, concurrent procedures, start time, EBL, operative time, BMI, and age. All statistical analyses were conducted using SAS 9.4 (SAS Institute, Inc., Cary, NC) with a significance level of < 0.05 .

Results

A total of 166 patients met the inclusion criteria for the study from September 1, 2019, to October 1, 2020. Of them, 80 patients were included in the cohort before the implementation of COVID-19 restrictions and 86 patients after the implementation of the restrictions. There was no difference between the 2 groups with regard to race, ethnicity, BMI, or age (Table 1).

In examining risk factors for overnight admission, operative time, uterine weight, surgery start time, and concurrent procedures were assessed (Table 1). There was no significant difference between the groups with regard to uterine weight > 250 g ($p = .115$), surgery start time after noon ($p = .153$), EBL ($p = .214$), or mean operative time ($p = .065$). There was a higher rate of sentinel nodes than full lymphadenectomy in the COVID-19 group ($p = .026$). There were no significant differences based on the surgeon or the site. Two surgeons had very small case numbers owing to the time frame of data collection and their employment at the institution. Given that patients' cases still met inclusion criteria, they were included in the analysis, and no changes were noted. Furthermore, removing subjects who had surgery performed at the satellite hospital did not affect the results. There was no difference in 30-day readmission rates between the 2 groups (7.5% pre-COVID-19 and 5.8% COVID-19, $p = .663$).

After the pandemic onset, the SDD rate increased from 40.0% to 58.1% ($p = .020$)—an 18% increase. The multivariable logistic regression model showed that starting surgery after noon (adjusted odds ratio [aOR], 0.33; 95% confidence interval [CI], 9.16–0.68; $p \leq .01$), longer operative time (aOR, 0.98; 95% CI, 97–0.99; $p < .01$), and older age (aOR, 0.92; 95% CI, 0.88–0.96; $p < .01$) were associated with a decrease in SDD (Table 2). Type of nodal surgery (either sentinel nodes or full lymphadenectomy) did

Table 1

Demographic and clinical characteristics based on the study group (pre- vs post-COVID-19)				
	Pre-COVID-19 (n = 80)	COVID-19 (n = 86)	Total (n = 166)	p value
Same-day discharge, n (%)				.020
Yes	32 (40.0)	50 (58.1)	82 (49.4)	
No	48 (60.0)	36 (41.9)	84 (50.6)	
Uterine weight, n (%)				.115
≥250 mg	8 (10.0)	16 (18.6)	24 (14.5)	
<250 mg	72 (90.0)	70 (81.4)	142 (85.5)	
Surgery start time, n (%)				.153
After noon	33 (41.3)	45 (52.3)	78 (47.0)	
Before noon	47 (58.8)	41 (47.7)	88 (53.0)	
Concurrent procedure, n (%)				.026
Retroperitoneal lymph node sampling (biopsy), single or multiple	27 (33.8)	47 (54.7)	74 (44.6)	
Peri-aortic lymph node sampling and/or pelvic lymphadenectomy	46 (57.5)	34 (39.5)	80 (48.2)	
None	7 (8.8)	5 (5.8)	12 (7.2)	
Readmission within 30 d, n (%)				.663
Yes	6 (7.5)	5 (5.8)	11 (6.6)	
No	74 (92.5)	81 (94.2)	155 (93.4)	
Ethnicity, n (%)				.552
Hispanic or Latino	2 (2.5)	2 (2.3)	4 (2.4)	
Not Hispanic or Latino	75 (93.8)	83 (96.5)	158 (95.2)	
Unknown	3 (3.8)	1 (1.2)	4 (2.4)	
Race, n (%)				.816
White	59 (73.8)	63 (73.3)	122 (73.5)	
Black or African American	14 (17.5)	17 (19.8)	31 (18.7)	
Other	6 (7.5)	4 (4.7)	10 (6.0)	
Patient declined	1 (1.3)	2 (2.3)	3 (1.8)	
Estimated blood loss (mL)				.214
Median (IQR)	50.0 (25.0–55.0)	30.0 (25.0–50.0)	30.0 (25.0–50.0)	
Operative time (min)				.065
Median (IQR)	132.0 (110.5–161.0)	123.5 (106.0–142.0)	128.0 (109.0–153.0)	
BMI				.424
Median (IQR)	32.8 (28.5–40.6)	34.1 (27.2–38.2)	33.2 (28.4–39.2)	
Age (yrs)				.063
Median (IQR)	65.0 (57.0–70.5)	67.5 (60.0–73.0)	66.0 (58.0–72.0)	
Primary surgeon, n (%)				.139
Surgeon 1	12 (15.0)	17 (19.8)	29 (17.5)	
Surgeon 2	19 (23.8)	27 (31.4)	46 (27.7)	
Surgeon 3	1 (1.3)	0 (0.0)	1 (0.6)	
Surgeon 4	0 (0.0)	1 (1.2)	1 (0.6)	
Surgeon 5	16 (20.0)	11 (12.8)	27 (16.3)	
Surgeon 6	18 (22.5)	24 (27.9)	42 (25.3)	
Surgeon 7	14 (17.5)	6 (7.0)	20 (12.0)	
Site, n (%)				.209
Site 1	16 (20.0)	11 (12.8)	27 (16.3)	
Site 2	64 (80.0)	75 (87.2)	139 (83.7)	

BMI = body mass index; COVID-19 = coronavirus disease 2019; IQR = interquartile range.

not affect likelihood for SDD ($p = .77$ and $.88$, respectively).

Discussion

SDD after laparoscopic surgery for endometrial cancer has been proven safe and feasible. Although certain institutional or insurance pressures were motivating patients and providers toward SDD, there remain many subjective

reasons that patients are not discharged same day following these procedures. The strain on resources and concerns for COVID-19 exposure further incentivized both physicians and patients for SDD, and we hypothesized this would increase the rates of SDD. We observed an 18% increase in the rate of SDD shortly after the start of the COVID-19 pandemic, without affecting hospital readmission rates or increasing morbidity. Although other factors may have also contributed to this increase, it is likely that the pandemic was the primary driving factor, given the rapid shift in the

Table 2

Adjusted odds ratios of same-day discharge

Multivariable logistic regression		
Characteristic	Odds ratio (95% CI)	p value
Study group (post- vs pre-COVID-19)	3.08 (1.40–6.74)	.01
Uterine weight (high vs low)	0.64 (0.18–2.21)	.48
Concurrent procedure		
Retroperitoneal lymph node sampling (biopsy), single or multiple	1.26 (0.28–5.59)	.77
Peri-aortic lymph node sampling and/or pelvic lymphadenectomy	1.21 (0.28–5.21)	.88
None	REF	
Start time (after noon vs before noon)	0.33 (0.16–0.68)	<.01
Estimated blood loss (1 mL increase)	1.00 (1.00–1.01)	.67
Operative time (1 min increase)	0.98 (0.97–0.99)	<.01
BMI (1 point increase)	0.97 (0.93–1.00)	.12
Age (1 yr increase)	0.92 (0.88–0.96)	<.01

BMI = body mass index; CI = confidence interval; COVID-19 = coronavirus disease 2019; REF = reference.

patterns of discharge that was temporally related to the pandemic. This significant increase in SDD occurred despite the demographics of our patient population including multiple comorbidities and a large geographic referral area.

Previous studies on SDD have focused on determining the safety, cost-effectiveness, and patient and surgical variables associated with SDD [6,8,10–12,14,15]. In gynecologic surgery, the safety of SDD after minimally invasive surgery (MIS) hysterectomy has been well-established, with no difference in 30-day readmissions or complication rates. These studies have included benign hysterectomies, urogynecologic procedures, oncologic procedures, and elderly patients [6,8,10–12]. Despite a wealth of data supporting the safety and feasibility of SDD after MIS hysterectomy, most patients with endometrial cancer stayed in the hospital overnight before the pandemic [14]. Although some patients have comorbidities that warrant an overnight stay, many patients remain inpatient owing to less tangible explanations. This study suggests that external pressure from the COVID-19 pandemic motivated patients and physicians to increase SDD without compromising safety.

This is an uncontrolled retrospective study; thus, the observed increase in SDD may be unrelated to the pandemic, as SDD has become more widely accepted after MIS. However, the increase in SDD was exceptionally rapid, suggesting that the COVID-19 pandemic was responsible for this trend. Although this study was retrospective, selecting a historic cohort temporally close to the intervention group and adjusting analyses for risk factors that could affect SDD limited bias and confounding factors.

A proportion of patients with gynecologic cancer will require admission after MIS hysterectomy owing to comorbidities and perioperative complications. However, MIS is well tolerated, and most patients should anticipate SDD after surgery. Although the cost savings of SDD are relatively modest [15], SDD represents a much more efficient

utilization of hospital resources. The COVID-19 pandemic caused an acute awareness of limited resources, including a nationwide hospital bed shortage, and served as the nidus for improving SDD.

The SDD rate went up significantly after the start of the COVID-19 pandemic. The likely explanation is that fear of exposure in the hospital and the scarcity of hospital resources motivated both physicians and patients toward SDD. This demonstrates that hospital resources can be utilized more efficiently if there is motivation. The pandemic and its strain on hospital resources has worsened since these data were collected, and it is likely that SDD rates will continue to increase. Providers need to continue to be conscientious of the utilization of hospital resources even after the pandemic has been brought under control.

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