

# Same-Day Discharge After Laparoscopic Hysterectomy

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**OBJECTIVE:** To estimate readmission rates and emergency care use by patients discharged home the same day after laparoscopic hysterectomy.

**METHODS:** This was a retrospective case series of patients discharged home the same-day after total or supracervical laparoscopic hysterectomy in a managed care setting. Chart reviews were performed for outcomes of interest which included readmission rates, emergency visits, and surgical and demographic characteristics. The two hysterectomy groups were compared using  $\chi^2$  tests for categorical variables and *t* tests or Wilcoxon rank-sum tests for continuously measured variables.

**RESULTS:** One-thousand fifteen laparoscopic hysterectomies were performed during the 3-year study period. Fifty-two percent (n=527) of the patients were discharged home the same-day; of those, 46% (n=240) had total laparoscopic hysterectomies and 54% (n=287) had supracervical. Cumulative readmission rates were 0.6%, 3.6%, and 4.0% at 48 hours, 3 months, and 12 months, respectively. The most common readmission diagnoses included abdominal incision infection, cuff dehiscence, and vaginal bleeding. Less than 4% of patients presented for emergency care within 48 or 72 hours, most commonly for nausea or vomiting, pain, and urinary retention. Median uterine weight was 155 g, median blood loss was 70 mL, and median surgical time was 150 minutes. There was no difference in readmission rates or emergency visits for the total compared with the supracervical laparoscopic hysterectomy group.

**CONCLUSION:** Same-day discharge after laparoscopic hysterectomy is associated with low readmission rates and minimal emergency visits in the immediate postoperative period. Same-day discharge may be a safe option for healthy patients undergoing uncomplicated laparoscopic hysterectomy.

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**LEVEL OF EVIDENCE: III**

Laparoscopic hysterectomy has become an acceptable and popular alternative to hysterectomy performed by the abdominal or vaginal approach.<sup>1,2</sup> The percentage of hysterectomies performed laparoscopically has increased from 0.3% in 1990 to 14% in 2005, although this increase has not occurred equally across geographic, age, ethnicity and race, or economic groups.<sup>3</sup> Nonetheless, the proportion of hysterectomies performed laparoscopically is expected to increase with consumer demand and with increasing numbers of gynecologists performing laparoscopic surgery.

The advantages of laparoscopy include fewer infections, less postoperative pain, shorter hospital stay, and faster recovery time, whereas the disadvantages may include increased surgical complications and higher costs.<sup>4</sup> Although most gynecologic surgeons admit patients overnight for observation, an increasing number are practicing same-day discharge after laparoscopic hysterectomy. Although many experts in the field endorse this practice as a means to decrease cost and iatrogenic complications, no large published studies have established the safety of same-day discharge after laparoscopic hysterectomy.

This study examines the readmission rates and emergency care use of same-day discharge after laparoscopic hysterectomy using our experience in the Kaiser Permanente Northern California health system. Kaiser Permanente is the largest health maintenance organization in the country, serving 35% of the Northern Californian population. Laparoscopic hys-

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terectomies have been performed at our institution since 2006, and same-day discharge of these patients began in 2007. A retrospective case series was utilized to examine the primary outcome of readmission rates. Secondary outcomes included urgent clinic or emergency room visits, demographic characteristics, and surgical characteristics.

## MATERIALS AND METHODS

This study was approved by the Kaiser Permanente Northern California Institutional Review Board for the protection of human participants. Current Procedural Terminology and International Statistical Classification of Diseases and Related Health Problems, 9th Revision codes were used to identify all patients who underwent laparoscopic hysterectomy for benign indications in the Kaiser Permanente Northern California system from January 2007 through December 2009. Patients with same-day discharge after surgery also underwent chart review of electronic medical records to assess study eligibility, ensure accuracy of coding, and perform data extraction.

All women who underwent laparoscopic supracervical or total laparoscopic hysterectomy and were discharged home before midnight on the day of surgery were included. Procedures closely associated with the hysterectomy, or necessary to repair complications of the hysterectomy such as lysis of adhesions, dilation and curettage, adnexal procedures, and repair of cystotomy were included. Laparoscopically assisted vaginal hysterectomy as defined by ligation of the uterine arteries from the blinded vaginal approach was not included. Laparoscopically assisted vaginal hysterectomy is considered to be a separate procedure associated with different risk and complication profiles compared with laparoscopic hysterectomy and was therefore excluded from the study. Surgeries performed for malignancy or ancillary procedures such as pelvic reconstruction, appendectomy, cholecystectomy, or hernia repair were also excluded, as these additional procedures may substantially affect study outcomes.

The primary outcome of this study was hospital readmission at 48 hours, 3 months, and 12 months. Secondary outcomes included urgent clinic and emergency department visits within 48 and 72 hours of surgery, respectively. Also examined were diagnoses for evaluation or readmission, patient characteristics, and surgical characteristics. Surgical characteristics included estimated blood loss, uterine weight, and surgical time. Surgical time was determined from incision to close, excluding room time and anesthesia time.

Patient characteristics included age, race, body mass index, hysterectomy indication, comorbid medical conditions, and number of previous abdominal or pelvic surgeries. Comorbid medical conditions included diseases thought to interfere with wound healing or pelvic integrity such as diabetes, severe cardiovascular disease, morbid obesity, or chronic obstructive pulmonary disease. Indications for hysterectomy included leiomyomas, menorrhagia, pelvic pain, genetic risk, hyperplasia, sex reassignment, and other.

The laparoscopic hysterectomies in this study were performed predominately by generalist obstetrician-gynecologists at Kaiser Permanente hospitals throughout Northern California. Many facilities sponsored or were affiliated with residency training programs in obstetrics and gynecology approved by the Accreditation Council for Graduate Medical Education, and residents routinely participated in cases. All surgeries were performed using traditional multi-port laparoscopic hysterectomy techniques. No single port or robotic surgeries were included. Surgeries varied by uterine manipulator, number of port sites, vessel sealing device, morcellation technique, vaginal compared with laparoscopic cuff closure, and laparoscopic suture material.

Patients undergoing laparoscopic hysterectomy were informed at their preoperative appointment that same-day discharge is routine for all uncomplicated cases. Patients were required to have appropriate home support as well as access to telephone and transportation if needed. Patients and caregivers were counseled extensively on appropriate postoperative recovery course and warning signs. Bowel preparations were not routinely performed.

Intraoperative protocol for laparoscopic hysterectomy involved patient positioning with arms tucked in the dorsal lithotomy position. Steep Trendelenburg positioning was performed after placement of the first trocar. Dexamethasone and ondansetron were administered at the beginning of the procedure and ketorolac was administered on completion. The port sites were routinely injected with Marcaine (bupivacaine hydrochloride) before incision for pain reduction. Before removing the last ports, five positive pressure ventilations were administered in the Trendelenburg position to decrease residual pneumoperitoneum and improve postoperative pain.<sup>5</sup> Cystoscopy was routinely performed to evaluate ureteral patency and bladder integrity.

Postoperatively patients needed to ambulate, tolerate oral liquids, and have adequate pain control before discharge. Some patients who were unable to void a sufficient amount before discharge were either



discharged home with a Foley catheter leg bag or straight-catheterized and discharged home without a Foley. The decision to discharge a patient was made independently by each provider based on their experience and comfort level with the procedure. Although there were no absolute contraindications to same-day discharge, patients who experience intraoperative complications are not generally recommended for same-day discharge. Discharge medications included an anti-inflammatory, a narcotic, an antiemetic, and a stool softener.

Descriptive statistics were calculated for patient and surgical characteristics including frequencies, means, and medians. Data points not recorded for outcomes of interest were not included in the final denominator when calculating means or medians. The two hysterectomy groups were compared using  $\chi^2$  tests for the categorical variables, *t* tests for normally distributed continuously measured variables, and Wilcoxon rank-sum tests for nonnormal continuously measured variables. Normality of all continuously measured variables was assessed using the test for normality in PROC UNIVARIATE in SAS. All statistical analyses were conducted using SAS 9.

## RESULTS

One-thousand fifteen laparoscopic hysterectomies were performed during the 3-year study period; 52% (*n*=527) of those patients were discharged home on the same day (Fig. 1). For those patients discharged home the same day, estimated blood loss and uterine weight were available for 518 patients, and surgical time was recorded for 367 patients. Patient characteristics are shown in Table 1. The study population was ethnically diverse, with 50% of patients being non-white. Thirty-five percent of patients who were discharged home the same day were obese, and more than half had previous laparoscopic or open abdominal surgery.

An equal number of total and supracervical hysterectomies were performed. The most common rea-

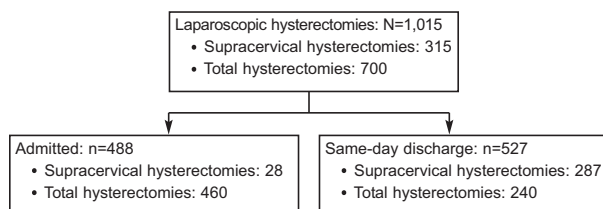
**Table 1. Patient Characteristics**

Characteristic	Total (N=527)
Median age (y)	45 (27–67)
BMI (kg/m <sup>2</sup> )	28 (18–52)
BMI higher than 30	185 (35)
Race	
White	264 (50)
Hispanic	92 (17)
African American	89 (17)
Asian	61 (12)
Other	21 (4)
Previous surgery	
None	242 (46)
1	149 (28)
2–3	118 (22)
4 or more	12 (2)
Major medical problem	21 (4)
Hysterectomy indication	
Leiomyomas	241 (46)
Menorrhagia	140 (27)
Pelvic pain	81 (16)

Data are median (range) or *n* (%).

sons for hysterectomy among patients discharged home the same day were symptomatic fibroids (46%), menorrhagia (27%), and pelvic pain (16%). The remaining reasons for hysterectomy included endometrial hyperplasia, genetic risk, sex reassignment, and other. The median estimated blood loss was 70 mL (mean 97 mL, range 5–600 mL) and the median uterine weight was 155 g (mean 222 g, range 21–1,505 g). The median surgical time was 150 minutes (mean 157 minutes, range 53–311 minutes). Compared with patients who underwent total laparoscopic hysterectomy, those who underwent laparoscopic supracervical hysterectomy had a lower median estimated blood loss (100 mL compared with 50 mL, *P*<.001) and shorter surgical time (144 minutes compared with 161 minutes, *P*<.001) and were more likely to undergo hysterectomy for symptomatic fibroids (55% compared with 45%, *P*<.001). No intraoperative complications or blood transfusions were noted for any of the patients reviewed.

Cumulative readmission rates were 0.6%, 3.6%, and 4.0% at 48 hours, 3 months, and 12 months, respectively. There were no differences between readmission rates or readmission diagnoses for laparoscopic supracervical compared with total laparoscopic hysterectomy patients for any time period (Table 2). Three patients were readmitted to the hospital within 48 hours for nausea and vomiting<sup>1</sup> and fever.<sup>2</sup> One patient with fever was later diagnosed with an upper respiratory viral infection and the other



**Fig. 1.** Distribution of all laparoscopic hysterectomies by admission status.

Perron-Burdick. Same-Day Discharge Laparoscopic Hysterectomy. *Obstet Gynecol* 2011.



**Table 2. Comparison of Readmission Rates Between Laparoscopic Supracervical Hysterectomy and Total Laparoscopic Hysterectomy**

Time Postsurgery	All Laparoscopic Hysterectomy* (N=527)	Laparoscopic Supracervical Hysterectomy (n=287)	Total Laparoscopic Hysterectomy (n=240)	P
48 h	3 (0.6)	2 (0.7)	1 (0.4)	1.0*
3 mo	19 (3.6)	10 (3.4)	9 (3.8)	.54†
12 mo	21 (4.0)	11 (3.8)	10 (4.2)	.48†

Data are n (%). Readmission rates are cumulative.

\* Fisher exact test.

†  $\chi^2$  test.

with pneumonia. The majority of readmissions occurred within 3 months, most commonly for cuff dehiscence (n=3), urologic injury (n=2), abdominal wound infection (n=2), and vaginal bleeding (n=2). (Table 3). Both urologic injuries were delayed thermal injury caused by the ureter or bladder and were not evident at the time of cystoscopy. The incidence of readmission was not high enough to demonstrate statistically significant difference between laparoscopic supracervical and total laparoscopic hysterectomy; however, it should be noted that vaginal cuff dehiscence or cellulitis occurs only in total laparoscopic hysterectomy. There was also no difference for readmission rates when patients were examined by uterine weight (Table 4). Of the 50 patients with uteri weighing 500–1,000 g, one was readmitted for postoperative fever later diagnosed as pneumonia. Only two hysterectomies were performed for uteri greater than 1,000 g; one of those patients was readmitted within 1 month for bowel herniation through a 5-mm port.

No patients required reoperation in the first 48 hours after same-day discharge. Within 3 months postoperatively, six patients required an additional surgery for one vesicovaginal fistula, one ureterova-

gina fistula, one trachelectomy for persistent vaginal bleeding, one bowel herniation, and two cuff dehiscence. At 12 months, three additional patients had undergone reoperation including one trachelectomy for cervical cancer, one sacrocolpopexy for vaginal vault prolapse, and one salpingoophorectomy for ovarian torsion.

Urgent clinic and emergency department visits after same-day discharge were also uncommon. Of the 527 patients discharged home the same day, eight (1.5%) had urgent clinic appointments within 72 hours, and 21 (4%) visited the emergency department within 48 hours of discharge. The most common reasons for immediate postoperative evaluation included urinary retention, pain, and nausea or vomiting or both (Table 5). There were no statistically significant differences between laparoscopic supracervical and total laparoscopic hysterectomy for urgent clinic or emergency room visits or associated diagnoses.

## DISCUSSION

This study describes the postoperative course of patients discharged home on the same day after laparoscopic hysterectomy. In 1994, Taylor reported a series of seven patients discharged an average of 4.5 hours after laparoscopic hysterectomy followed by

**Table 3. Readmission Diagnoses**

	Time Postsurgery		
	48 h	3 mo	12 mo
Pain	—	—	—
Nausea or vomiting or both	1	2	2
Fever (other)	2	3	3
Vaginal bleeding	—	2	2
Vaginal cuff cellulitis	—	1	1
Vaginal cuff dehiscence	—	2	3
Wound infection	—	2	2
Wound dehiscence or hernia or both	—	1	1
Urologic injury	—	2	2
Other	—	3	4
Total	3 (0.6)	18 (3.4)	20 (3.8)

Data are n (%). Columns are cumulative.

**Table 4. Comparison of Readmission Rates by Uterine Weight**

Time Postsurgery	Uterine Weight			P†
	Less than 500 g (n=466)	500–1,000 g (n=50)	More than 1,000 g (n=2)	
48 h	2 (0.43)	1 (2)	0 (0)	.27
3 mo*	16 (3.42)	1 (2)	1 (50)	.09
12 mo	17 (3.64)	1 (2)	1 (50)	.10

Data are n (%). Readmission rates are cumulative.

\* Uterine weight missing for two patients admitted at 3 months.

† Fisher exact test.



**Table 5. Emergency and Urgent Visit Diagnoses**

	Emergency Department (48 h)	Urgent Visit (72 h)
Pain	5	1
Nausea or vomiting or both	3	2
Fever	2	—
Vaginal bleeding	1	—
Urinary retention	4	3
Constipation	1	—
Wound check	1	2
Other	4	—
Total	21 (4)	8 (1.5)

Data are n or n (%).

same-day home nurse visits; no complications or readmissions were observed.<sup>6</sup> Hoffman et al documented a 30-day readmission rate of 4.9% for same-day discharge (n=81) compared with 2.2% for later-day discharge (n=278), although this difference was not statistically significant.<sup>7</sup> The 3-month and 12-month readmission rates for patients discharged home the same day after laparoscopic hysterectomy are also comparable with readmission rates for hysterectomies performed by more traditional approaches. Readmission rates for vaginal and open hysterectomy range from 2.8% to 7.2% in the published literature.<sup>8–11</sup> There were no differences in rates of readmission, emergency visits, or urgent clinic visits for total laparoscopic compared with laparoscopic supracervical hysterectomy patients. Although laparoscopic supracervical hysterectomy patients did experience slightly less blood loss and longer surgical time, these differences did not appear to be clinically significant. Uterine weight did not appear to influence readmission rates; however, the interpretation of these data are limited by the relatively small number of large uteri.

The strength of this study lies in the careful documentation of the immediate postoperative period. Critics of same-day discharge may ask, “Why discharge patients home only to have them return to the hospital for routine postoperative issues?” Our study demonstrates very low rates of readmission, emergency department use, and clinic visits in the days immediately after surgery. It is important to note that many of the reasons for postoperative visits, such as nausea and pain, can be prevented by comprehensive preoperative counseling, anesthesia protocols for pain and nausea prevention, detailed postoperative instructions, access to appropriate medications at home, and telephone check-ins by a health care provider. The success of our same-day discharge

program is demonstrated by the increasing number of patients discharged home on the same day after laparoscopic hysterectomy. In 2007, 17% of patients were discharged home the same day, and by 2009 this percentage had increased to 66%. Currently 80% of patients are discharged home on the same day after laparoscopic hysterectomy.

Thorough accounting of all study participants is an additional strength of this study. Kaiser Permanente is the sole provider to its members and uses electronic medical records for documentation of all patient encounters, procedures, medications, imaging, and laboratory tests that occur in the entire Northern California service area. Despite the convenience and accuracy of electronic medical records, there were instances in which data were not recorded in patient charts. Additionally, it is possible that some patients presented to a non-Kaiser facility for postoperative care or that individual members lost coverage or experienced a lapse in coverage during the 12-month follow-up period.

The data in this study are limited by the absence of a non-same-day comparison cohort. Same-day discharge of patients after laparoscopic hysterectomy became standard practice within Kaiser Permanente Northern California soon after the surgery was widely implemented, thus it would have been difficult to obtain a non-same-day comparison group with a risk profile similar to those of patients discharged the same day. Patients admitted to the hospital are likely to have had intraoperative surgical complications or comorbid conditions and thus are at increased risk for readmission and emergency care use. In fact, we reported no intraoperative complications or blood transfusions for any of the patients discharged home the same day. Although prospective controlled randomization is the gold standard for any research study, we believed it would not be feasible at an institution where same-day discharge has become both patient expectation and standard of care.

This study is generalizable to a diverse patient and surgeon population. Our patient population was racially diverse and many were obese, had large uteri, or had previous abdominal surgery. Jacoby and colleagues illustrated significant racial disparities in laparoscopic hysterectomy<sup>3</sup>; however, in our study, ethnic minorities are well represented compared with the Kaiser Permanente Northern California membership, which includes 60% Caucasian, 18% Asian, and 12% African American members. Health maintenance organizations may provide standardized care by which minimally invasive technologies are equally available to all members. The majority of surgeons were gen-



eralist obstetrician–gynecologists using a variety of instruments and surgical techniques. Although our surgical times were slightly longer than have been previously reported, this difference can be attributed to the relatively recent introduction of laparoscopic hysterectomies and ongoing training of physicians and residents in new surgical techniques. Anecdotally, we have seen decreased surgical times and increased uterine size as surgeons have become more adept at laparoscopic hysterectomy.

In conclusion, same-day discharge after uncomplicated laparoscopic hysterectomy is a safe alternative to overnight admission in healthy patients. Rates of readmission after same-day discharge are similar to those of other hysterectomy approaches that require postoperative admission. Patients are unlikely to present for emergency department or urgent clinic visits in the immediate postoperative period. Additionally, none of the readmissions or urgent visits documented in this study were for life-threatening complications. Eliminating overnight hospital stay could provide significant cost savings and reduce health care burden without compromising patient safety.

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