GYNECOLOGY

Predictors of 30-day readmission and impact of same-day discharge in laparoscopic hysterectomy

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OBJECTIVE: The objective of the study was to identify the predischarge predictors of 30-day readmission and the impact of same-day discharge after laparoscopic hysterectomy.

STUDY DESIGN: Patients undergoing only laparoscopic hysterectomy with or without bilateral salpingo-oophorectomy participated in the study.

RESULTS: The 30-day readmission rate was 3.1% (277 of 8890). Factors predictive of higher rates of readmission were diabetes (4.4% vs 3.0%; $P = .03$), chronic obstructive pulmonary disease (8.5% vs 3.1%; $P = .02$), disseminated cancer (20% vs 3.1%; $P < .001$), chronic steroid use (7.1% vs 3.1%; $P = .03$), daily alcohol use of more than 2 drinks (12.5% vs 2.5%; $P = .04$), and bleeding disorder (10.8% vs 3%; $P = .001$). Operative factors included surgical time of 2 hours or greater (3.5% vs 2.7%; $P = .014$). After surgery, patients had a higher rate of readmission when they experienced any 1 or more complications prior to discharge, (6.9% vs 3.1%; $P = .01$) as well as any complication after discharge (3.6% vs 1.6%; $P = .01$). Infections (35.7%) and surgical complications (24.2%) were the most common reasons of readmissions. Of these patients, 20.9% were discharged the same day (n = 1855) and had a similar rate of readmission (2.6% vs 3.2%; P = n.s.). Laparoscopic hysterectomy readmission score (LHRS) can be calculated by assigning 1 point to diabetes, chronic obstructive pulmonary disease, disseminated cancer, chronic steroid use, bleeding disorder, length of surgery of 2 hours or longer, and 2 points to any postoperative complication prior to discharge. Readmission rates for the LHRS score were score 1 (2.4%), score 2 (3.3%), score 3 (5.8%), or score 4 (9.5%).

CONCLUSION: The overall readmission rate after laparoscopic hysterectomy is low. Patients discharged the same day have similar rates of readmission. Higher LHRS is indicative of higher rates of readmission and may identify a population not suitable for same-day discharge and in need of higher vigilance to prevent readmissions.

Key words: laparoscopic hysterectomy, readmission, same-day discharge, surgical complications

Cite this article as: Jennings AJ, Spencer RJ, Medlin E, et al. Predictors of 30-day readmission and impact of same-day discharge in laparoscopic hysterectomy. Am J Obstet Gynecol 2015;213:344.e1-7.

Laparoscopic hysterectomy is an established alternative to abdominal hysterectomy that provides a shorter hospital stay and a faster recovery.[1-4] In addition to its wide adoption over the last decade, patients being discharged on the day following a laparoscopic hysterectomy has quadrupled.[5] In an era of increased scrutiny of the readmission rates by Medicare, it is paramount to establish the safety of same-day discharges as well as establish the factors related to higher readmission rates after laparoscopic hysterectomy. Predischarge predictors of readmission will allow for targeting the ideal cohort of patients suitable for same-day discharge, thereby increasing the cost savings as well as decreasing the readmission rate.

The overall risk of readmission for benign gynecological procedures is low. The rate of readmission in prior studies varies from 1.1% to 6.7%.[5-8] For same-day discharges, the largest analysis was completed by Schiavone et al[5] looking at 128,634 patients from an administrative database using reimbursement claims. The readmission rate for a same-day discharge was 4.0% compared with a readmission rate of 3.6% for those discharged on the day following surgery.[5]

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Received Jan. 18, 2015; revised March 7, 2015; accepted May 7, 2015.

The American College of Surgeons intermittently audits the data to ensure its integrity. The American College of Surgeons National Surgery Quality Improvement Program and the hospitals participating in the American College of Surgeons National Surgery Quality Improvement Program are the source of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

The authors report no conflict of interest.

Presented in oral format at the 43rd annual meeting of the American Association of Gynecologic Laparoscopists, Vancouver, BC, Canada, Nov. 17-21, 2014.

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0002-9378/$36.00 • http://dx.doi.org/10.1016/j.ajog.2015.05.014

The National Surgery Quality Improvement Program (NSQIP) provides a database that includes readmission rates and associated diagnoses in hospitals across the United States. The data are collected by trained reviewers and are more reliable than population-level administrative claims databases, and studies have assessed the reliability of this database.[9]

The aim of this current analysis was to identify the predischarge predictors of 30-day readmission and the impact of same-day discharge following laparoscopic hysterectomy.

Materials and Methods

The NSQIP database for 2012 was analyzed for this study. Trained surgical clinical reviewers prospectively collect the data. Validated data from patients' medical charts allow the quantification of 30-day, risk-adjusted surgical outcomes.

All patients undergoing laparoscopic hysterectomy (including total laparoscopic, laparoscopic-assisted vaginal, and supracervical hysterectomies with or without bilateral salpingo-oophorectomy) in the 2012 dataset were included. Current procedural terminology (CPT) codes were used to identify the type of surgery (Table 1).

The secondary CPT codes were analyzed to allow only lysis of adhesions and cystoscopy as additional procedures. However, patients with malignancy diagnosed on final pathology who underwent the previously mentioned procedures were retained in the analysis. This was done to avoid the bias introduced by the increased complexity and extent of surgery (eg, lymph node dissection or omentectomy) in patients with a malignancy. The Human Subjects Committee at the University of Wisconsin policy on publicly available datasets with deidentified patient information makes this study exempt from institutional review board review.

From the 2012 NSQIP database file, we abstracted information about the patients' body mass index, comorbidities, type of procedure, operative time, postoperative complications, and causes for readmission. Medical comorbidities like diabetes and chronic obstructive lung disease were recorded in accordance with the definitions provided by the NSQIP user guide.[10] The dataset was evaluated for all women who underwent hysterectomy, including those with a diagnosis of malignancy and then reevaluated for patients who went home on the day of surgery.

The analysis was carried out in 3 domains. The preoperative phase consisted of baseline demographics and patient comorbidities, and the intraoperative phase consisted of operative time and surgical complexity. The surgical complexity was measured by the total relative value units (RVUs), which is a validated method to quantify the surgical complexity in the NSQIP database.[11]

The postoperative phase was analyzed for any complications experienced by the patient prior to being discharged. Postoperative complications were then classified under the following categories: surgical (bleeding requiring reoperation, return to operating room); cardiopulmonary (myocardial infarction, cardiac arrest, reintubation, prolonged intubation); infectious (superficial, deep and organ space surgical site infections, wound dehiscence, urinary tract infection, pneumonia, systemic sepsis, and septic shock); neurorenal (acute renal failure, progressive renal insufficiency, cerebrovascular accident/stroke, coma for longer than 24 hours, peripheral nerve injury); and thromboembolic (pulmonary embolism and deep vein thrombosis).

In addition, we created 2 separate variables to quantify the number of postoperative complications experienced by the patients. The first variable looked at patients having any one complication (those experiencing at least one complication), and the second variable examined total complications (the cumulative aggregate of all complications experienced by a patient; for example, if a patient has a surgical-site infection and pneumonia, the total number of complications experienced is 2).

The safety of same-day discharge was evaluated by comparing the readmission rates and the complication rates after discharge compared with the patients not discharged the same day. The reasons for readmission were abstracted from the *International Classification of Diseases*, ninth revision, codes provided as a reason for readmission. The reasons for readmission were binned in 6 categories (ie, surgical, infectious, gastrointestinal, renal, thromboembolic, and others).

Mean and median values were used to describe continuous data, with discrete variables displayed as totals and frequencies. For univariate analyses, 2-tailed Student *t* tests and Mann-Whitney *U* tests were used to compare continuous data, whereas the Fisher exact or χ^2 tests were used for categorical variables. Binary logistic regression was used to control for covariates noted to be significant on univariate analysis ($P < .1$). Point estimates are expressed as odds ratios (ORs), and 95% confidence intervals (95% CIs) are provided. A univariate analysis was used to determine the overall characteristics of the study population and readmission rates. A multivariate analysis was used to determine each factor-independent association with readmission.

Based on the factors identified in the univariate analysis, we developed the laparoscopic hysterectomy readmission score (LHRS) as a means of identifying patients at increased risk for readmission. Complications that occurred after discharge were not included in the LHRS because this information was unavailable at the time of discharge. The LHRS score was validated by analysis on a separate NSQIP dataset for the year 2013.

Results

A total of 36,941 cases were identified from the NSQIP 2012 file as gynecological surgeries. Using the CPT codes that corresponded to the procedures described in the Table 1, we identified patients undergoing laparoscopic hysterectomy with or without bilateral salpingo-oophorectomy. Cases with additional procedures other than cystoscopy or lysis of adhesions were excluded. A total of 8890 patients were included for the analysis.

A total of 277 patients (3.1%) were readmitted within 30 days of discharge. The demographic characteristics and preoperative morbidities of the entire