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Original Article

A Comparison of Quality Outcome Measures in Patients Having a Hysterectomy for Benign Disease: Robotic vs. Non-robotic Approaches

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ABSTRACT **Study Objective:** To measure procedure-related hospital readmissions within 30 days after discharge for patients who have a hysterectomy for benign disease. Secondary outcome quality measures evaluated were cost, estimated blood loss, length of stay and sum of costs associated with readmissions.

Design: Retrospective cohort study (Canadian Task Force classification II-2).

Setting: Academic community hospital.

Patients: Patients who underwent hysterectomy to treat benign disease from January 2008 to December 2012.

Interventions: Patients were grouped according to route of hysterectomy: robotic-assisted laparoscopic hysterectomy (robotic), laparoscopic hysterectomy (laparoscopic), abdominal hysterectomy (open via laparotomy), and vaginal hysterectomy (vaginal).

Measurements and Main Results: Inclusion criteria were met by 2554 patients: 601 in the robotic group, 427 in the laparoscopic group, 1194 in the abdominal group, and 332 in the vaginal group. Readmission rates in the robotic cohort were significantly less ($p<.05$) than in non-robotic cohorts: Robotic (1%), laparoscopic (2.5%), open (3.5%), vaginal (2.4%). Estimated blood loss, length of stay, and sum of readmission costs were also significantly less in the robotic cohort ($p<.05$) compared with the other 3 cohorts.

Conclusion: Patients who undergo robotic-assisted laparoscopic hysterectomy have a significantly lower chance of readmission <30 days after surgery compared with those who undergo laparoscopic, abdominal (open) hysterectomy, and vaginal approaches. Patients in the robotics cohort also experienced a shorter length of stay, less estimated blood loss, and a cost savings associated with readmissions when compared to non-robotic approaches. Prospective registries describing quality outcomes, total sum of costs including 30 days follow-up, as well as patient-related quality of life benefits are recommended to confirm these findings and determine which surgical route offers the highest patient and societal value. Journal of Minimally Invasive Gynecology (2014) 21, 389–393 © 2014 Published by Elsevier Inc. on behalf of AAGL.

Keywords: Benign gynecologic surgery; Hysterectomy; Readmission; Robotic surgery

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The Center for Medicare and Medicaid Services has identified "readmissions at <30 days" as a major source of health care expenditures and recommend that this quality metric be measured and reimbursement reduced for hospitals with high readmission rates [1–3]. This goal stemmed from recommendations of the Medicare Payment Advisory Commission to the Centers for Medicare and Medicaid

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Services to identify means to reduce overall health care expenditures [2]. Hospital readmission data are public information on the Department of Health and Human Services website (hhs.gov); thus readmission rates can be used as a quality outcomes measure to improve the transparency of hospital related quality outcomes [3].

One large study published in 2009 reported a 19.6% readmission rate within 30 days from a previous admission among Medicare beneficiaries [4]. The authors stated that 70.5% of these patients were re-hospitalized for treatment of a medical condition and that only 10% of these admissions were planned. They concluded that poor communication with patients and lack of timely follow-up were the reasons for the high unplanned readmission rate. They also estimated the cost of unplanned re-hospitalization in 2004 at $17.4 billion [4]. A study performed by Henretta et al [2] in 2011 demonstrated the readmission rate within 30 days for gynecologic oncology patients to be nearly 13%.

Hysterectomy is one of the most frequently performed operations in women in the United States [5]. Approximately 600,000 such operations are performed each year. More than 90% are performed to treat benign conditions such as leiomyomas, pelvic pain, pelvic organ prolapse, and abnormal uterine bleeding [6]. A large retrospective study published in 2009 compared abdominal vs laparoscopic and vaginal hysterectomy [6]. The authors found that patients undergoing open abdominal hysterectomy had a higher probability of readmission < 30 days compared with patients undergoing laparoscopic hysterectomy or vaginal hysterectomy. The American College of Obstetricians and Gynecologists concluded in their 2009 Committee Opinion that the vaginal approach should be the preferred approach, when possible. They also determined at that time that there was not enough published literature related to the robotic approach to draw any conclusions as to its role in gynecologic surgery [9].

To date, few published studies of robotic-assisted procedures have been added to this comparison, and data for benign disease are limited. A recent publication by Wright et al [7] identified that with low-volume surgeons (average, 12 procedures per year), quality outcomes may not be different between hospital centers but that there may be a higher cost associated with a robotic-assisted hysterectomy. The present study assessed all patients who underwent hysterectomy to treat benign gynecologic disease at a single institution over 5 years from January 2008 to December 2012. The primary objective was to examine the rates of readmission within <30 days in patients who underwent robotic, laparoscopic, abdominal, and vaginal procedures. Our secondary objectives was to evaluate quality outcome measures including estimated blood loss, length of stay, and total sum of costs associated with readmissions < 30 days from discharge.

Table 1

Patient characteristics

	Approach to hysterectomy				
Variable	Robotic-assisted (n = 601)	Laparoscopic (n = 427)	Abdominal (n = 1194)	Vaginal (n = 332)	p value
Age, yrs					.12
<40	97 (16.1)	81 (19.0)	210 (17.6)	63 (19.0)	
40–49	262 (43.6)	192 (45.0)	500 (41.9)	124 (37.4)	
50–59	155 (25.8)	86 (20.1)	274 (23.0)	75 (22.6)	
≥60	87 (14.5)	68 (15.9)	210 (17.6)	70 (21.1)	
Race/ethnicity					.004
White	528 (87.9)	355 (83.1)	970 (81.3)	284 (85.6)	
Black	30 (5.0)	29 (6.89)	65 (5.4)	18 (5.4)	
Other/unknown	43 (7.2)	43 (10.1)	159 (13.3)	30 (9.0)	
Insurance status					.07
Commercial	478 (79.5)	343 (80.3)	936 (78.4)	243 (73.2)	
Medicare	86 (14.3)	52 (12.2)	157 (13.2)	58 (17.5)	
Medicaid	29 (4.8)	31 (7.3)	82 (6.9)	28 (8.4)	
Uninsured	8 (1.3)	1 (0.2)	19 (1.6)	3 (0.9)	
Comorbidity score					.11
0	162 (27.0)	140 (32.8)	359 (30.1)	110 (33.1)	
1	123 (20.5)	80 (18.7)	262 (21.9)	78 (23.5)	
≥2	316 (52.6)	207 (48.5)	573 (48.0)	144 (43.4)	
Body mass index	31.55 ± 8.17	30.62 ± 7.26	30.54 ± 7.51	30.07 ± 7.26	.21
Uterine weight, g	205.8 ± 179.2	245.5 ± 292.5	255.5 ± 351.5	232.1.5 ± 356.2	.86

Data are n (%) or mean±standard deviation unless otherwise specified.