SCIENTIFIC PAPER

Does Route of Hysterectomy Affect Outcome in Obese and Nonobese Women?

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ABSTRACT

Objective: Our objective was to compare the surgical outcomes of obese women having hysterectomy according to the route (abdominal, vaginal, or laparoscopic) of the procedure.

Methods: A chart review of 293 hysterectomy procedures was performed. Data were collected including operative and anesthesia time, estimated blood loss, change in hematocrit, hospital stay, complications, conversion to laparotomy, transfusion, and body mass index. An analysis of variance and a Newman-Keuls Multiple Comparison test were performed.

Results: Obese women experienced a significant decrease in hospital days (2.5 versus 4.2) and reported blood loss (204 mL versus 455 mL) in the laparoscopic hysterectomy and vaginal hysterectomy groups compared with the abdominal hysterectomy group. No significant difference was found in obese women between laparoscopic and abdominal hysterectomy for time spent in surgery and under anesthesia. For obese and normal weight women, vaginal hysterectomy offered the shortest surgery, anesthesia times, and hospital stays.

Conclusions: For normal and obese women, vaginal hysterectomy offered the shortest hospital stay and surgery time. In obese patients for whom vaginal hysterectomy is not possible, laparoscopic hysterectomy should be considered before abdominal hysterectomy, because the laparoscopic route reduced hospital time and blood loss.

Key Words: Obesity, Hysterectomy, Laparoscopy.

INTRODUCTION

Obesity is frequently regarded as a risk factor for operative difficulty and morbidity. When vaginal hysterectomy (VH) is not possible, many surgeons are reluctant to use laparoscopic techniques on obese patients and instead use the abdominal approach. Current evidence suggests that there is no significant difference in outcomes for normal weight versus obese women undergoing laparoscopic hysterectomy (LH).[1,2] Traditional training for gynecologic surgeons emphasizes abdominal or vaginal approaches. Advances in laparoscopic technology have made LH more accessible. The option for laparoscopy is also more widely available for obese women. However, more gynecologic surgeons will have to master new skill sets to offer this route universally.

A growing body of evidence advocates the use of laparoscopic rather than open surgery in obese individuals.[3] The general surgery literature shows a preference for performing bariatric surgery with a laparoscopic rather than open approach.[3] A small case series in Europe suggests that surgical and anesthetic complications are reduced when laparoscopy is used preferentially to abdominal approaches in gynecologic surgery.[4] O'Hanlan et al[2] suggest that a study comparing the outcomes of normal weight and obese women undergoing LH and abdominal hysterectomy (AH) would contribute to the gynecologic literature. The objective of this study was to compare the surgical outcomes of obese and normal weight women having hysterectomy according to the route of the procedure.

MATERIALS AND METHODS

Institutional Review Board (IRB) approval was obtained for this retrospective study. An analysis was performed of patients who had surgery by faculty offering all 3 ap-

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proaches (AH, VH, LH). Hysterectomy procedures from June 6, 2001 (the date of the first total laparoscopic hysterectomy offered in the institution) through February 9, 2006 were analyzed. All hysterectomies performed by these surgeons during this time period are included in this study. There are no exclusion criteria. Study data were collected from inpatient and outpatient electronic medical records.

The indication for surgery, operative time, anesthesia time, complications, estimated blood loss, change in hematocrit, conversion of route, uterine weight, wound complications, and transfusion events were tabulated. Hospital stay was measured with the first day designated as day 1. Demographics and medical history information were also collected including age, race, gravidity, parity, weight, height, and history of prior uterine scar (including cesarean delivery, myomectomy, or other incision into the uterine myometrium).

The study procedures were performed by 1 of 2 faculty surgeons and a resident in obstetrics and gynecology at a tertiary care center. The faculty surgeons performing these cases trained in the same institution and operated together during the development of the total laparoscopic technique. The techniques used for the procedures were therefore substantially similar. No formal changes were made in surgical technique, such as additional training or new equipment, through the evaluation period. The route of hysterectomy was not determined by a protocol in this retrospective analysis. The mode of surgery was selected clinically by the surgical team.

Procedures were classified as abdominal (AH), which included total and subtotal abdominal hysterectomy; vaginal (VH), which included total and laparoscopically assisted vaginal hysterectomy; and laparoscopic (LH,) which included total and subtotal laparoscopic hysterectomy as well as robotically assisted laparoscopic hysterectomy. For a procedure to be designated as LH, the entire procedure including colpotomy and vaginal cuff closure had to have been performed laparoscopically. Those procedures that required conversion to an abdominal route from the vaginal or laparoscopic approach were included in the group of the initial approach.

Obesity defined as body mass index (BMI) $\geq$30 was calculated by dividing the weight of the patient in kilograms by the patient's height in meters squared. Obesity has been defined by the World Health Organization as a BMI value of >30.[5] Patients were divided into 6 groups: obese and normal weight AH, obese and normal weight VH, and obese and normal weight LH. Complications were identified in the dictated operative note and from review of the medical record during the hospital stay and in clinical follow-up visits.

Data were compiled in Microsoft Excel (Microsoft Corporation, Redmond, Washington) and evaluated using the Number Cruncher Statistical System (NCSS, Kaysville, Utah) to perform an analysis of variance (ANOVA). A Newman-Keuls Multiple Comparison test was used to evaluate which pairs of data differed by a statistically significant amount (F-ratio >1). The P-value was set at 0.05. The distribution of patient race versus route of procedure was evaluated using chi-square analysis.

RESULTS

We identified 293 cases: 68 AH, 95 VH, and 130 LH. In the AH group, 37 of 68 patients, or 54%, were obese. In the VH group, 51 of 95, or 54%, were obese. In the LH group, 69 of 130, or 53%, were obese. Indications for surgery included symptomatic leiomyomata (51%), chronic pelvic pain (17%), dysfunctional uterine bleeding (17%), recurrent cervical dysplasia (8%), endometrial hyperplasia (1%), management of intraoperative hemorrhage (<1%), management of pelvic inflammatory disease (<1%), management of ovarian mass (<1%), and pelvic organ prolapse (<1%).

Demographics are compared in **Table 1**. No statistically

Table 1.
Demographic Data by Route of Hysterectomy

	Mean Age (years)	Race (% black, white, Hispanic)	Mean Gravidity	Mean Parity	Prior Cesarean Delivery	Mean Uterine Weight (grams)
Abdominal Hysterectomy	42.45	83, 16, 1	2.57	1.90	59%*	608*
Vaginal Hysterectomy	41.37	57, 37, 6	3.38*	2.58*	29%	160
Laparoscopic Hysterectomy	40.45	53, 46, 1	1.18	.91	34%	218

*Denotes statistical significance from other groups (Race differences discussed in Results).

Table 2.
Mean Anesthesia and Surgery Times by Route of Hysterectomy and Weight Category

	Abdominal Hysterectomy		Vaginal Hysterectomy		Laparoscopic Hysterectomy	
	Obese	Normal weight	Obese	Normal weight	Obese	Normal weight
Anesthesia Time (hr:min±STD)	3:17 ± 1:05	3:11 ± 1:01	3:04 ± 1:12	2:23 ± 0:52	3:44 ± 1:38	3:34 ± 1:29
Surgery Time (hr:min±STD)	2:30 ± 0:52	2:31 ± 0:49	2:15 ± 0:55	1:43 ± 0:44	2:58 ± 1:20	2:47 ± 1:12
Sample Size	36	29	51	44	69	60

significant difference existed in patient ages among the AH, VH, and LH groups. Women in the VH group had higher average gravidity and parity than women had in the AH or LH groups, a difference that was statistically significant. The AH and LH groups were not significantly different from each other for gravidity and parity.

The majority of women evaluated in the study were African-American followed by Caucasian and Hispanic. The AH group had significantly more African-American women than did the VH or LH groups. The LH group had significantly more Caucasian women than did the AH or VH groups. The VH group had significantly more Hispanic women than did the other groups.

The rate of supracervical hysterectomy was noted to be 22% in the AH group and 15% in the LH group. The rate of salpingo-oophorectomy was 79% in the AH group, 22% in the LH group, and 20% in the VH group. Conversions to an abdominal approach were experienced in 1 LH case and 4 VH cases. LAVH was performed in 13% of the VH group. Additional procedures performed at the same time of AH were 2 appendectomies and one suburethral sling procedure. One appendectomy, one anterior and posterior colporrhaphy, and 2 suburethral sling procedures were performed at the time of VH. One appendectomy and 2 suburethral sling procedures were performed at the time of LH.

In the analysis of surgical history, the VH group had a significantly lower number of prior Cesarean deliveries per patient (0.3) compared with the AH (0.6) and LH (0.8) groups. No significant difference existed between LH and AH in history of prior Cesarean deliveries. However, the LH group had significantly more total abdominal surgery per patient (2.0) than AH (1.3) or VH (1.3) had.

Three complications in obese women occurred: a cystotomy during VH and 2 enterotomies during AH. Nine complications in normal weight women occurred: 2 cystotomies during LH, 2 cystotomies during AH, 1 cystotomy during VH, laceration of the inferior epigastric artery during LH, puncture of the sigmoid colon during LH, and 2 cases of hemorrhage requiring intraoperative transfusion during LH and AH. Total complication rates were therefore 1.9% for obese women and 6.6% in nonbese women.

The average uterine weight for the entire cohort was 290 grams. The AH group had a significantly higher average uterine weight (608 grams) versus the VH (159 grams) or LH (207 grams). No significant differences existed between VH and LH for uterine weight.

Time required for anesthesia and surgery are outlined in **Table 2.** The longest surgical times and anesthesia times were recorded in obese women in the LH group. However, these times were not significantly different from times for obese women in the AH group. Obese women in the VH group had the shortest cases of the obese women in the study. Similar trends were noted for normal weight women in the LH, AH, and VH groups. Normal weight women having VH had the shortest anesthesia and surgery times of any group, a statistically significant difference.

Hospital stay data, outlined in **Table 3**, revealed that obese women in the LH group spent 2.5 days in the hospital on average, compared with obese women in the AH group who stayed 4.2 days, a significant difference. There was a statistically significant increase in hospital stay in the AH group versus VH or LH, for both obese and normal weight women. There was no significant difference in hospital stay in the VH and LH groups, whether obese or normal weight weight. All postoperative care was delivered by the same faculty physicians and residents in the same hospital, ensuring that the discharge criteria were consistent among all groups.

Estimated blood loss (EBL), outlined in **Table 4**, was highest in normal weight women in the AH group (478mL) followed by obese women in the AH group (455mL). The blood losses seen in the obese versus normal weight LH and obese versus normal weight VH groups were not significantly different. The difference in

Table 3.
Hospital Length of Stay by Route of Hysterectomy and Weight Category

	Abdominal Hysterectomy		Vaginal Hysterectomy		Laparoscopic Hysterectomy	
	Obese	Normal Weight	Obese	Normal Weight	Obese	Normal Weight
Hospital Stay (days)	4.23	4.22	2.20	2.20	2.49	2.28
Standard Deviation	1.60	1.53	0.85	0.82	1.19	0.98
Sample Size	36	31	51	44	68	61

estimated blood loss was significant between AH and the other groups for both obese and normal weight women.

The change in hematocrit data was not reliable for analysis. A sizeable number of patients did not have postoperative hematocrit measurements. These data were also affected by dilutional effects and intraoperative transfusions. For this reason, estimated blood loss was used as the primary evaluation of surgical blood loss.

DISCUSSION

Surgical management of the obese patient continues to be a challenge to the gynecologic surgeon. LH appears to be a safe procedure for obese women[1,2] but has a short history, leaving its role in certain clinical situations unclear. LH has been found in large randomized trials to be generally inferior to VH in terms of operative time and anesthesia complications, but superior to open procedures in recovery time and complications.[6–8] A critical evaluation of these trials suggests LH is a more effective tool when surgical expertise is considered.[9–12]

The results from this study suggest that LH is a favorable alternative to AH in obese women who, for whatever reason, are judged unsuitable for VH. In this retrospective study, obese women having LH versus AH had significantly shorter hospital stays and less blood loss but similar surgery and anesthesia times. Shorter hospital stays are advantageous for both the patient and healthcare facility. While recovery data were not collected for this study, the experience of the surgeons is that the LH patients return to normal activities sooner than AH patients do, whether obese or not. These data also agree with data from other studies, suggesting VH is preferable to AH or LH when possible.[7,13] Patients who had VH spent the fewest days in the hospital, experienced the shortest surgery and anesthesia times, and had the lowest EBL.

Limitations of this study stem from the retrospective approach. The decision to proceed with any given surgical approach was made clinically by the surgeon. The abdominal approach would likely have been selected for a case with a high degree of anticipated difficulty due to uterine size. This evaluation period captures the introduction of laparoscopic hysterectomy at the study institution, and as such demonstrates an initial bias toward AH in patients with large uteri, until increased experience with LH made these cases feasible. The abdominal approach may also have been selected in obese patients with large uteri causing significant distortion of normal anatomic relationships. The selection bias for route of procedure in the patient with a large uterus is suggested by the much higher mean uterine weight in the AH group.

This study classified laparoscopically assisted vaginal hysterectomy (LAVH) in the VH group. The rationale for this inclusion was based on the original intention of the surgical team – to remove the uterus vaginally, with a vari-

Table 4.
Estimated Blood Loss by Hysterectomy Route and Weight Category

	Abdominal Hysterectomy		Vaginal Hysterectomy		Laparoscopic Hysterectomy	
	Obese	Normal weight	Obese	Normal weight	Obese	Normal weight
Estimated Blood Loss (mL)	455	478	263	170	204	197
Standard Deviation	199	254	128	75	126	123
Sample Size	37	31	51	43	68	61

able degree of laparoscopic assistance. In similar fashion, those vaginal or laparoscopic procedures that required conversion to laparotomy were analyzed in the group of the initial route (intent to treat).

Confounders such as patient disease, including diabetes and asthma, were not specifically evaluated in this study. Such patient conditions may have influenced the chosen route of surgery and therefore the comparisons. The distribution of complications, favoring normal weight women in the abdominal hysterectomy group, may suggest that the selection of the abdominal approach was based on risk factors for operative difficulty (history of prior surgery or uterine scar). The VH group was more likely to have fewer such predictors for difficult surgery compared with women in the AH or LH group.

The groups were also significantly different by racial composition. This bias is consistent with studies describing larger and more symptomatic myomata in African-American women,[14,15] leading to more frequent selection of the abdominal route. The VH group contained more Hispanic women, but the sample size was too small to draw definitive conclusions for this finding.

The groups were remarkably similar in the proportion of obese patients. This distribution is consistent with the patient population served by the university in which the study was performed. There was no prospective assignment of patients by BMI into surgical procedure. The number of patients evaluated did not allow for further stratification by BMI to determine whether the severity of obesity was consistent across all groups.

CONCLUSION

These data capture the experience of the faculty surgeons from the very first LH procedure performed at the institution. Neither faculty surgeon received training in laparoscopic hysterectomy during residency. The training was obtained from postgraduate courses and expert preceptors. In this 5-year period, it did not appear that obesity biased selection of the route of surgery, as approximately half of the patients in each group were obese. Intuitively, surgeons selecting patients for a new procedure might tend to choose straightforward surgical cases. However, it is promising that, even with the inclusion of the learning curve, the laparoscopic route benefited obese patients with shorter hospital stays, less blood loss, and fewer complications.

These data suggest that in obese patients, vaginal hysterectomy be considered first because these patients had the shortest hospital stay, surgery, and anesthesia times. The VH patients also experienced the least blood loss. Surgeons in private and academic practice environments should continue to regard VH as the route of choice in obese patients thanks to favorable outcomes and operating times. LH should be selected over AH in obese patients for whom a vaginal approach is not feasible. The laparoscopic route reduced hospital stay and blood loss in obese women.

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