Laparoscopy decreases the disparity in postoperative complications between black and white women after hysterectomy for endometrial cancer

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HIGHLIGHTS

- Rates of laparoscopy for the treatment of endometrial cancer are lower in blacks.
- Blacks have higher BMIs and have more preoperative comorbidities than whites.
- The rates of postoperative complications after any hysterectomy are higher in blacks.
- The rates of postoperative complications after laparoscopic hysterectomy are similar.

ARTICLE INFO

ABSTRACT

Objectives. Black race has been associated with increased 30-day morbidity and mortality following surgery for endometrial cancer. Black women are also less likely to undergo laparoscopy when compared to white women. With the development of improved laparoscopic techniques and equipment, including the robotic platform, we sought to evaluate whether there has been a change in surgical approach for black women, and in turn, improvement in perioperative outcomes.

Methods. Using the American College of Surgeons' National Surgical Quality Improvement Project's database, patients who underwent hysterectomy for endometrial cancer from 2010 to 2015 were identified. Comparative analyses stratified by race and hysterectomy approach were performed to assess the relationship between race and perioperative outcomes.

Results. A total of 17,692 patients were identified: of these, 13,720 (77.5%) were white and 1553 (8.8%) were black. Black women were less likely to undergo laparoscopic hysterectomy compared to white women (49.3% vs 71.3%, $p < 0.0001$). Rates of laparoscopy in both races increased over the 6-year period; however these consistently remained lower in black women each year. Black women had higher 30-day postoperative complication rates compared to white women (22.5% vs 13.6%, $p < 0.0001$). When laparoscopic hysterectomies were isolated, there was no difference in postoperative complication rates between black and white women (9.2% vs 7.5%, $p = 0.1$).

Conclusions. Overall black women incur more postoperative complications compared to white women undergoing hysterectomy for endometrial cancer. However, laparoscopy may mitigate this disparity. Efforts should be made to maximize the utilization of minimally invasive surgery for the surgical management of endometrial cancer.

1. Introduction

Endometrial cancer is the most common gynecologic cancer in the United States, with an estimated 61,380 new cases and 12,820 deaths in 2017 [1]. Standard first-line treatment for endometrial cancer is primary surgical management with total hysterectomy, bilateral salpingo-oophorectomy and at times, lymphadenectomy [2]. The procedure was traditionally performed by laparotomy, but multiple studies have demonstrated the efficacy and feasibility of a minimally invasive approach [3–6]. Compared with abdominal hysterectomy, minimally invasive hysterectomy is associated with reduced operative morbidity, faster recovery time and improved short-term quality of life [7,8]. The Gynecologic Oncology Group – LAP2 trial, comparing laparoscopy to

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laparotomy for the treatment of early stage endometrial cancer including comprehensive surgical staging, demonstrated equivalent survival outcomes with fewer complications and shorter hospital stays [8,9]. A Cochrane review based on eight randomized control trials reported similar findings [10]. Based on these results, the Society of Gynecologic Oncology (SGO) and the American College of Obstetricians and Gynecologists (ACOG) have both recommended that laparoscopy be the standard surgical approach for early stage endometrial cancer [2, 11].

Despite these advantages, black women are less likely to undergo minimally invasive hysterectomy for the treatment of endometrial cancer [12,13]. Black women more often present with advanced stage, poorly differentiated and aggressive non-endometrioid cancers compared to white women [14,15]. After controlling for multiple variables including stage, histology and treatment, black women with endometrial cancer have still been shown to have worse survival than white women [16,17].

A prior study of 3248 patients from 2005 to 2011 examined postoperative 30-day complications in black compared to white women with endometrial cancer and found that black women had more medical comorbidities and increased surgical complexity and thus, have an increased risk of postoperative complications. However, black race was not found to be an independent predictor of worse 30-day outcomes after controlling for other confounders [18].

The national rates of laparoscopic hysterectomy for endometrial cancer have steadily been rising [19], reflecting the increased adoption of standard and robotic assisted laparoscopic techniques, as well as increased training in residency and fellowship programs. The aim of this study is to evaluate the changes in surgical practices for the treatment of endometrial cancer among black and white women and the impact of race and mode of hysterectomy on 30-day postoperative complications using a national database.

2. Materials and methods

2.1. Data acquisition

The American College of Surgeons (ACS) compiles the National Surgery Quality Improvement Program (NSQIP) database, which provides patient-level, aggregate surgical outcomes data from over 600 participating hospitals throughout the United States. The NSQIP database is comprised of prospectively collected data from a sample of randomly assigned patients who are followed for 30 days after their surgical procedure.

All patients with endometrial cancer who had undergone hysterectomies were identified from the NSQIP participant use data files for the years 2010 to 2015 by the appropriate International Classification of Disease, Ninth Revision (ICD-9) diagnostic codes and Current Procedural Terminology (CPT) codes. Differentiation between conventional laparoscopy and robotic assisted laparoscopy was not possible due to the limitations of the database. Variables of interest included patient demographics, medical comorbidities, operative procedures, relative value units (RVUs), operative and anesthesia times, and postoperative complications.

The NSQIP database categorizes race as Black or African American, White, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, or Unknown/Not Reported. For the purposes of our analysis, only patients identified as Black or African American and White were included in this study.

All data was received from the ACS without identifiable information and was deemed exempt by the New York University School of Medicine's Institutional Review Board (IRB), in accordance with institutional standards.

2.2. Statistical analysis

Median values and standard deviations were used to describe continuous data, and categorical variables were displayed as totals and frequencies. Categorical covariates were compared using the chi-square analyses, and continuous covariates were compared using Wilcoxon signed-rank tests and Student's t-tests. The data was stratified by black or white race and by all hysterectomy approaches as well as by laparoscopic hysterectomies. Multivariate logistic regression analyses were performed to evaluate the association between race and postoperative complication rates. All statistical analyses were performed using R Studio version 1.0.143. The two-sided significance level was set at $p < 0.05$.

3. Results

The NSQIP database identified 17,692 patients who underwent hysterectomy for endometrial cancer from 2010 to 2015. Racial classification of these patients was as follows: 13,720 patients (77.5%) were of white race, 1553 patients (8.8%) were of black race, and 2419 (13.7%) were of another race. Among the 17,692 patients, 5496 patients (31.1%) had abdominal hysterectomies, 11,878 (67.1%) had laparoscopic hysterectomies, and 318 (1.8%) had vaginal hysterectomies.

White women were significantly more likely to undergo laparoscopic hysterectomy compared to black women (71.3% vs 49.3%, $p < 0.0001$) (Fig. 1A). The rates of laparoscopy in both white and black women increased significantly over the 6-year period: the rates of laparoscopy in white women increased from 45.6% in 2010 to 75.8% in 2015 ($p = 0.004$) and the rates in black women rose from 30.8% in 2010 to 54.3% in 2015 ($p = 0.002$) (Fig. 1B). When analyzing each year from 2010 to 2015, white women had significantly higher laparoscopy rates compared to black women for each year (Fig. 1C).

A comparison of characteristics between white and black patients is summarized in Table 1 evaluating those who underwent any hysterectomy and then analyzing those who underwent only laparoscopic hysterectomy. There was no difference in age between the two groups. For all cases, black women were more likely to have higher median BMI ($p < 0.0001$), partially or totally dependent functional status ($p < 0.0001$) and an American Society of Anesthesiologists (ASA) score >1 ($p < 0.0001$). This difference remained significant in the laparoscopic hysterectomy group. Black patients were also more likely to have lower preoperative hematocrit levels ($p < 0.0001$) and albumin levels ($p < 0.0001$) as well as higher creatinine levels ($p < 0.0001$) than white patients.

Table 2 lists patients' preoperative medical comorbidities. For all cases, when compared to white women, black women were more likely have diabetes (29.9% vs 21.1%, $p < 0.0001$), hypertension requiring medications (74.1% vs 55.2%, $p < 0.0001$), congestive heart failure (1.2% vs 0.4%, $p < 0.0001$), renal failure on dialysis (0.9% vs 0.3%, $p = 0.0001$) and a history of a transient ischemia attack (TIA) or cerebrovascular accident (CVA) (1.1% vs 0.5%, $p = 0.002$). For laparoscopic cases, black women had higher rates of diabetes (30.5% vs 20.1%, $p < 0.0001$), hypertension on medications (75.2% vs 54.1%, $p < 0.0001$) and congestive heart failure (1.4% vs 0.3%, $p < 0.0001$). There was no difference in rates of renal failure and history of TIA or CVA; however the numbers of patients with these comorbidities were low.

Operative and anesthesia times, the total number of relative value units (RVUs), the inclusion of lymph node dissection and the performance of radical versus simple hysterectomy were evaluated to determine the differences in the complexity of surgery (Table 3). Black patients had longer median operative times (168 min vs 155 min, $p < 0.0001$ for all cases; 170.5 min vs 158 min, $p < 0.0001$ for laparoscopy cases). They were also more likely to undergo radical hysterectomies than white patients (24.0% vs 19.9%, $p = 0.001$ for all cases; 21.8% vs 17.6%, $p = 0.005$ for laparoscopy cases). There were no differences in median anesthesia times and median total number of RVUs. There was