Surgical wait time: A new health indicator in women with endometrial cancer

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HIGHLIGHTS

- Surgical delays >6 weeks in women with endometrial cancer occur in 25% of cases.
- Being a minority, low SES, or lack of insurance were associated with delayed surgery.
- Long surgical wait times in endometrial cancer may be associated with worse survival.

ARTICLE INFO

ABSTRACT

Objective. To evaluate factors associated with delayed surgical treatment among women with endometrial cancer.

Methods. Using the National Cancer Database (NCDB), we analyzed time to first surgery for epithelial endometrial cancer patients who underwent surgical treatment from 2003 to 2011. Poisson regression was used to examine delays >6 weeks between diagnosis and surgery, controlled for patients' sociodemographic and clinical characteristics. Survival for women diagnosed between 2003 and 2006 with timely versus delayed surgery was compared using Cox proportional hazards regression.

Results. The study included 112,041 women diagnosed at 1108 continuously reporting NCDB hospitals. Survival through 2011 was available for 40,184 women. All patients underwent hysterectomy. Twenty-eight percent of patients underwent surgery >6 weeks after diagnosis. Poisson regression estimates indicated that being younger than 40 years old, being black or Hispanic, having Medicaid or being uninsured, or being from the lowest education quartile were associated with a significantly higher likelihood of surgical wait time > 6 weeks. Patients diagnosed in 2010–2011 were more likely (IRR 1.32, 95% CI 1.24–1.40) to undergo surgery >6 weeks after diagnosis compared to patients treated in 2003. Survival for women with surgical wait times >6 weeks was worse than those treated within 6 weeks of diagnosis (HR 1.14, 95% CI 1.09–1.20).

Conclusions. Being a minority patient and having lower socioeconomic status or poor insurance coverage were associated with an increased likelihood of delayed surgical treatment. Wait times >6 weeks from diagnosis of endometrial cancer to definitive surgery may have a negative impact on survival.

1. Introduction

Endometrial cancer is the most common gynecologic malignancy in the United States [1]. Endometrial cancer typically presents as a low-grade tumor and early-stage disease, making it an often curable disease with timely surgical-based treatment [2].

Diagnosis of endometrial cancer is commonly made with an endometrial biopsy. After diagnosis, standard of care consists of definitive surgical treatment with hysterectomy [3]. The time period between diagnosis of cancer and definitive surgical treatment is defined as the surgical wait time. Long surgical wait times can be influenced by numerous factors, such as patient preference or surgeon availability, and can reflect structural problems within a health care system. Several studies have demonstrated that longer surgical wait times are linked with poor access to services, geographic and socioeconomic barriers, inefficiency, and poor quality of care [4–6]. Long wait times may affect outcomes, including delays to adjuvant therapy, increased patient anxiety, and worse overall survival [7–8].

In 2008, the National Comprehensive Cancer Network (NCCN), the National Quality Forum, and the Institute of Medicine recommended

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timely care as quality measures for cancer patients [9–10]. However, there are few data to guide providers, institutions, and accreditation bodies in setting parameters for wait times [11]. The effect of wait times on survival has been studied in a variety of cancers, including breast cancer; yet few large-scale multicenter studies have examined wait times for uterine cancer surgery.

Using the National Cancer Data Base (NCDB), the aims of this study were to analyze 1) trends in the incidence of delayed treatment (defined as surgery greater than six weeks from diagnosis) and 2) the association of patients' sociodemographic and clinical characteristics with the likelihood of delayed treatment; and 3) analyze whether delayed treatment is associated with all-cause mortality.

2. Methods

2.1. Data source

The National Cancer Data Base (NCDB), a joint project of the American Cancer Society and the Commission on Cancer (CoC) of the American College of Surgeons, is a nationwide, facility-based oncology registry that collects data from >1500 CoC-accredited facilities [12–13]. Zip code-based indicators of socioeconomic status and facility level characteristics are also available through the NCDB.

Data are coded and reported according to a nationally established protocol coordinated under the auspices of the North American Association of Central Cancer Registries [14]. All data within the NCDB are compliant with the privacy requirements of the Health Insurance Portability and Accountability Act (HIPAA). Institutional Review Board approval was not required for this study because no patient, provider, or hospital identifiers were examined.

2.2. Study population

The study population was limited to women in whom endometrial cancer was their first cancer diagnosis, who received all or part of their care at the reporting hospital, had a biopsy-proven endometrial cancer treated with surgery, and were diagnosed with AJCC 0-IV uterine cancer between 2003 and 2011. Patients who received neoadjuvant treatment or hormonal treatment or were diagnosed with non-epithelial uterine cancers were excluded.

2.3. Patient characteristics, time periods and definition of delayed treatment

Patients' ages were categorized as 39 and under, 40 to 49, 50 to 69, and 70 years or greater. Race/ethnicity was classified into non-Hispanic white, non-Hispanic black, Hispanic, Asian, and other. Insurance status was categorized as Medicaid/uninsured or other insurance (Medicare or private). Income and education levels were categorized based on zip-code quartiles of census-based median income and educational attainment at the time of diagnosis. For comorbid disease, we examined the effect of the Charlson-Deyo comorbidity score, which is based on ICD-9 codes for chronic diseases, trichotomized as 0, 1, or 2 or greater [15]. Tumor stage was categorized according to the American Joint Committee on Cancer (AJCC) 7th edition guidelines [16]. Tumor histology was defined according to the International classification of disease for oncology (ICD—O) and categorized as either Type I or Type II endometrial cancers [17].

We created four time periods (2003, 2004–2006, and 2007–2009, and 2010–2011) to control for trends in diagnosis and treatment over the study period. Finally, we examined the time from diagnosis to first and definitive surgery. We defined wait times a priori as a dichotomous variable on the basis of whether surgery occurred within six weeks (≤42 days) of diagnosis. The six-week time point was identified because this is the benchmark wait time for surgical treatment in Canada as specified by Cancer Care Ontario (CCO) [5]. To the best of our knowledge, no benchmark currently exists for timely surgery in endometrial cancer in the United States.

2.4. Statistical analysis

All analyses were performed using STATA statistical software (STATA, version 14: College Station, TX). Chi-square tests were used to test the significance of univariate associations with delayed treatment. Poisson regression, which provides an incidence rate ratio (IRR) that is closer to relative risk than an odds ratio [18–19] was used to test the significance of delays greater than six weeks between diagnosis and surgery controlled for patient sociodemographic and clinical characteristics, hospital characteristics, and time period. Survival for women diagnosed between 2003 and 2006 with timely versus delayed surgery was compared using the log rank test and Cox proportional hazards regression which controlled for patient and hospital covariates.

3. Results

The NCDB identified 441,863 women as having a diagnosis of endometrial cancer between 1998 and 2011. Of these, 329,822 were excluded (Fig. 1), leaving 112,041 in the final cohort. Patients were excluded primarily because of non-epithelial histology ($n = 132,122$), diagnosis was made at the time of hysterectomy ($n = 62,089$), non-primary cancer diagnosis ($n = 35,976$), stage was missing ($n = 29,492$), patient received neoadjuvant treatment ($n = 14,150$), or patient was diagnosed and before 2003 ($n = 30,539$).

Patient characteristics are presented in Table 1. Mean age was 61.8 ± 11.4 years, 81.5% ($n = 91,323$) of women were non-Hispanic white, and 91.9% ($n = 102,982$) had some form of private or Medicare insurance. The majority of women were diagnosed with Stage I disease ($n = 85,646, 76.4\%$) and endometrioid adenocarcinoma ($n = 93,207, 83.2\%$) on final pathology. Twenty eight percent of women ($n = 31,903$) underwent surgery greater than six weeks after their initial diagnosis. The mean time from diagnosis to first surgery was 38 ± 30 days.

Poisson regression indicated the following were all significantly associated with delay in surgery greater than six weeks from diagnosis (Table 2): being younger than 40 years of age compared to age > 70 years (IRR 1.08, CI 1.01–1.13, $p = 0.014$), being non-Hispanic
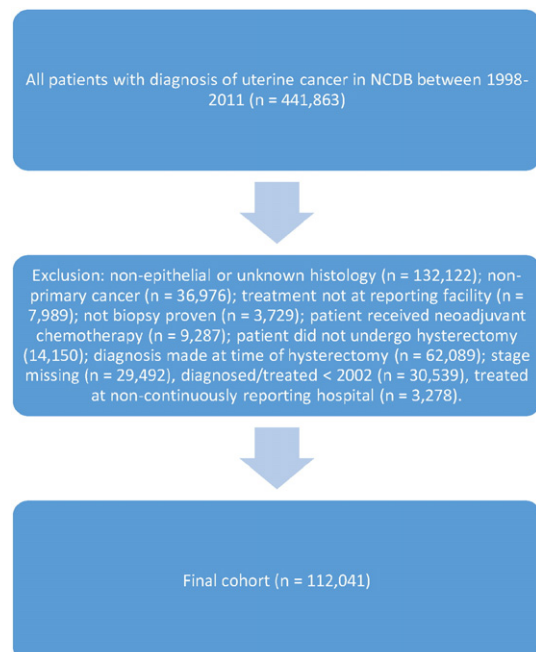

Fig. 1. CONSORT diagram.