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Surgical outcomes and national comprehensive cancer network compliance in advanced ovarian cancer surgery in a low volume military treatment facility ☆,☆☆

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HIGHLIGHTS

- NCCN compliant treatment and survival are reportedly improved at high volume hospitals, arguing for centralization of care
- Our low volume hospital achieved 85% NCCN treatment compliance, 73% optimal surgical cytoreduction, and 37 month overall survival rates
- Hospital volume alone is not a reliable metric for quality patient care

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ABSTRACT

Objective. To evaluate the optimal cytoreduction (OPT) rate, National Comprehensive Cancer Network (NCCN) treatment guideline compliance rate and patient outcomes for advanced stage epithelial ovarian cancer (EOC) patients at our low volume institution.

Methods. Following IRB approval, records of patients with Stage III-IV EOC, primary peritoneal, or fallopian tube carcinoma completing both primary surgery and adjuvant chemotherapy were reviewed. Patient demographics, clinicopathologic variables, cytoreduction status (optimal or suboptimal), NCCN treatment guideline compliance, and survival were reviewed. Standard statistical tests including the *t*-test, Chi-square or Fisher's exact test and Kaplan–Meier Survival curves were utilized.

Results. Overall, 48 patients met all inclusion criteria. 35(73%) and 13 (27%) achieved optimal and suboptimal cytoreduction, respectively. Median overall survival (OS) for all patients was 37.1 months (95% CI 23.2 – 51.1 months) and NCCN treatment guideline compliance was 85.4%. Compared to sub-optimally cytoreduced patients the optimally cytoreduced patients were significantly older (62.2 vs. 53.5 yrs; $p = 0.015$); no other significant clinicopathologic differences were observed between the two groups. 19 of 48 (39.6%) patients enrolled in an upfront cooperative group trial. Median OS was 43.4 months for optimally compared to 15.6 months in sub-optimally cytoreduced patients ($p = 0.012$).

Conclusions. NCCN treatment guideline compliance, OPT, and median OS rates in our low volume institution are similar to those reported nationally, and argue against using volume alone as a rationale for centralization of care.

Introduction

Epithelial ovarian cancer (EOC) is the leading cause of gynecologic cancer related mortality in the United States (US), primarily related to its propensity to present at an advanced stage, unfortunately portending a poor overall prognosis [1]. Recent population-based research suggests patients with EOC whose treatment is compliant with National Comprehensive Cancer Network (NCCN) guidelines have improved overall survival (OS) [2]. Moreover, as reported by Bristow and colleagues, compliance appears to vary based on both race as well as socioeconomic status. NCCN compliant therapy for ovarian cancer, which varies with the stage at presentation, includes both (1) surgical management and (2)

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chemotherapy administration [3]. As improved compliance with NCCN treatment guidelines was seen at centers with higher surgical volumes, the question has been raised as to whether low-volume centers are providing inferior care for patients with EOC [2]. Previous studies by the same group suggest that centralization of EOC treatment conveys a survival advantage with cost savings [4].

In addition to NCCN treatment guideline compliance, numerous studies have also noted an improvement in survival for patients with an optimal cytoreductive surgery in advanced EOC [4–6]. At the time of primary cytoreductive surgery in advanced EOC at least 22% of patients will have upper abdominal disease involving the spleen, diaphragm, liver, gallbladder, or pancreas [7]. Importantly the findings of upper abdominal disease and extensive abdominal–peritoneal disease can be obstacles to performing an optimal cytoreductive surgery. The wide variance in optimal cytoreductive surgery rates throughout the US has also been an argument in favor for centralization of care for EOC patients [4]. Evaluation of the National Cancer Database would suggest that high volume centers are those that perform greater than 21 cytoreductive surgeries annually while low volume centers perform nine or fewer cytoreductive surgeries per year [4]. With centralization of cytoreductive surgical procedures to high-volume regional cancer centers, proponents argue that national rates of optimal surgical cytoreduction would improve [4]. It is expected that high-volume regional treatment centers have multi-disciplinary teams and access to a variety of surgical specialties to afford advanced EOC patients the best chance of optimal cytoreductive surgery.

The United States Military Health Care System is a unique provider of healthcare in the continental US and abroad. The US military maintains numerous military treatment facilities (MTFs) throughout the continental US and abroad. MTFs are tasked with delivering the highest quality health care to active duty members and their dependents as well as eligible retirees. A regional MTF that maintains a full spectrum of primary, specialty, and subspecialty health care services is classified as a military medical center (MMC). Nonetheless, compared to civilian counterparts, these MMCs often see lower volumes of patients secondary to the unique payer status. We sought to evaluate optimal cytoreduction (OPT) rates, in addition to the determination of NCCN treatment guideline compliance, and overall patient outcomes at a single MMC.

Methods

Following institutional review board approval, a retrospective review of all charts for patients diagnosed with EOC, fallopian tube cancer, or primary peritoneal cancer at Brooke Army Medical Center between 2002 and 2010 was performed. Brooke Army Medical Center is an MMC with a level I trauma designation in addition to being the premier burn care facility in the department of defense. The intensive care units at Brooke Army Medical Center are highly efficient. For the purposes of this study, EOC includes patients with EOC, fallopian tube and primary peritoneal cancer. Abstracted data included: demographics, peri-operative lab values, medical co-morbidities, operative outcomes, compliance with NCCN treatment guideline recommendations, and tumor characteristics such as stage and histology among others. Surgical compliance with NCCN treatment guidelines was judged based on final pathologic stage. Patients with Stage IIIA or IIIB disease (N = 3) were required to have undergone a bilateral oophorectomy with hysterectomy, omentectomy and lymphadenectomy, while patients with stage IIIC or IV disease were required to have all of the previous procedures excluding the lymphadenectomy. All surgical procedures were performed by one of six, fellowship trained and board certified, gynecologic oncologists. Fellowship training was split equally between large academic training programs and Walter Reed Army Medical Center. Residents in Obstetrics and Gynecology acted as first-assist, there were no fellows involved in any of the surgeries. Staff gynecologic oncologists directed chemotherapy and compliance was defined as the administration of platinum-based combination chemotherapy and it was noted if patients received chemotherapy as part of a cooperative group clinical trial. Patients had to be NCCN compliant from both a surgical and chemotherapy standpoint to be considered compliant. Only patients identified with stage III–IV EOC undergoing primary cytoreductive surgery and subsequent chemotherapy at our MMC were included in our final analysis. Patients receiving neoadjuvant chemotherapy, primary surgery or chemotherapy at an outside institution, or with incomplete records were excluded.

The primary objective of our study was to evaluate the rate of primary optimal cytoreductive surgery at our MMC. Although not the primary purpose of the study, patients receiving neo-adjuvant chemotherapy (NAC) during the study period and their records were also reviewed. Patients meeting inclusion criteria were placed into two groups based on surgical status: 1) OPT or 2) suboptimal cytoreduction (SO) with OPT defined as no residual tumor volume greater than 1 cm in greatest dimension. Variables compared between the two groups included demographic data, preoperative CA-125, tumor characteristics, surgical blood loss and quantity of ascites, postoperative hospital length of stay, and survival. IBM SPSS Statistics version 20 (IBM Corporation, Armonk, NY) was utilized to perform standard statistical tests including the *t*-test, Chi-square test or Fisher's exact test, and Kaplan–Meier survival curves with the log rank test were used to evaluate differences in variables observed between the groups. Information regarding the chemotherapy regimens received by patients was also noted, affording a complete review of each patient from diagnosis to recurrence, last known follow-up, death or end of study period.

Results

Forty-eight patients met all study inclusion criteria. Overall median survival for all 48 patients was 37.1 months (95% CI 23.2–51.1 months). NCCN treatment guideline compliance for the entire cohort of patients was 85.4%. 35 (73%) comprised the OPT group while 13 (27%) were categorized into the SO group. Demographic and tumor characteristic data for each group is outlined in Table 1. Compared to SO the OPT patients were significantly older (62.2 vs. 53.5 years; $p = 0.015$). No significant

Table 1
Patient demographics.

	Optimal (N = 35)	Suboptimal (N = 13)
Age (mean; range)	62.2 (39–87)	53.5 (46–62)
Race		
White	24	8
Black	4	2
Hispanic	4	1
Asian	3	1
Other	0	1
LOS[a] (mean; range)	8.2 (2–45)	11.3 (3–35)
CA-125 (mean; range)	1102 (36–3774)	2229 (86–9730)
Ascites (mean; range) mL	2005 (0–12,000)	3277 (500–6750)
Primary Tumor		
Ovary	29	11
Peritoneal	6	1
Fallopian Tube	0	1
Grade		
1	3	
2	4	
3	28	10
Unknown	0	3
Stage		
IIIA	1	0
IIIB	2	0
IIIC	25	6
IV	7	7
Histology		
Serous	28	9
Clear	2	3
Mixed	4	1
Other	1	0

[a] LOS = Length of Stay (postoperatively).