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Socioeconomic disparities affect survival in malignant ovarian germ cell tumors in AYA population

L.V. Bownes, MD,[a] L.L. Stafman, MD,[a] I.I. Maizlin, MD, MSPH,[a] M. Dellinger, MD,[b] K.W. Gow, MD,[b] A.B. Goldin, MD, MPH,[b] M. Goldfarb, MD, MS,[c] M. Langer, MD, MS,[d] M.V. Raval, MD, MS,[e] J.J. Doski, MD,[f] J.G. Nuchtern, MD,[g] S.A. Vasudevan, MD,[g] and E.A. Beierle, MD[a,*]

[a] Department of Surgery, University of Alabama at Birmingham, Birmingham, Alabama
[b] Division of Pediatric General and Thoracic Surgery, Seattle Children's Hospital, Seattle Washington
[c] Department of Surgery, John Wayne Cancer Institute at Providence St. John's Health Center, Santa Monica, California
[d] Department of Surgery, Maine Children's Cancer Program, Tufts University, Portland, Maine
[e] Department of Surgery, Emory University School of Medicine, Atlanta, Georgia
[f] Department of Surgery, Methodist Children's Hospital of South Texas, University of Texas Health Science Center-San Antonio, San Antonio, Texas
[g] Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas

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ABSTRACT

Background: Malignant ovarian germ cell tumors (MOGCTs) are a rare form of ovarian malignancy. Socioeconomic status (SES) has been shown to affect survival in several gynecologic cancers. We examined whether SES impacted survival in adolescent and young adults (AYAs) with MOGCT.

Materials and methods: The National Cancer Data Base was used to identify AYAs (aged 15-39 years) with MOGCT from 1998 to 2012. Three SES surrogate variables identified were as follows: insurance type, income quartile, and education quartile. Pooled variance t-tests and chi-square tests were used to compare tumor characteristics, the time from diagnosis to staging/treatment, and clinical outcome variables for each SES surrogate variable, while controlling for age and race/ethnicity in a multivariate model. Kaplan–Meier survival estimates were calculated using the log-rank test.

Results: A total of 3125 AYAs with MOGCT were identified. Subjects with lower SES measures had higher overall stage and T-stage MOGCTs at presentation. There was no significant difference in the time to staging/treatment, extent of surgery, or use of chemotherapy by SES. Subjects from a lower education background, from a lower income quartile, and without insurance had decreased survival ($P \leq 0.02$ for all). Controlling for overall stage and T-stage, the difference in survival was no longer significant.

* *Corresponding author*. Beierle 1600 7th Ave South, Lowder Room 300, Birmingham, AL 35233. Tel.: +1 205 638 9688; fax: + 1 205 975 4972.
E-mail address: Elizabeth.beierle@childrensal.org (E.A. Beierle).
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Conclusions: AYAs with MOGCT from lower SES backgrounds presented with more advanced stage disease. Further studies that focus on the underlying reasons for this difference are needed to address these disparities.

Introduction

Malignant ovarian germ cell tumors (MOGCTs) are rare, comprising 5% of all primary ovarian malignancies and have a peak incidence in patients aged 16-20 years.[1,2] MOGCTs are broadly divided into pure dysgerminomas and nondysgerminomas, with the most common histologic subtypes being immature teratomas and yolk sac tumors.[2] Current treatment results in cure rates of approximately 95% and consists primarily of surgery and, if necessary, cisplatin-based combination chemotherapy.[3] Fertility-sparing surgery is commonly the goal, and reproductive outcomes are usually favorable.[1]

Previous studies in adults have demonstrated a correlation between lower socioeconomic status (SES) and decreased cancer survival rates in a variety of cancer types.[4] Specifically in gynecologic tumors, investigators have shown an association between race and survival, with African Americans consistently having decreased survival from ovarian, uterine, and cervical cancers.[5-7] Some of the suggested contributing issues include geographic access, biological factors, and hospital-based discrepancies.[7] Others have investigated sociodemographic factors and survival among dysgerminoma versus nondysgerminoma tumor histology and found that patients with nondysgerminomas from lower SES have lower survival than patients from higher SES.[8] A focused examination of the effects of SES on MOGCT survival in the adolescent and young adult (AYA) population has not been published. We focused our attention on the AYA population because the peak incidence of MOGCTs occurs in this population. We sought to determine if SES would affect survival in the AYA population.

Materials and methods

Data source

The National Cancer Data Base (NCDB) is jointly maintained by the American Cancer Society and the American College of Surgeons Commission on Cancer. Database records are created by over 1500 accredited centers nationwide, using highly standardized methods and definitions, consistent with specifications by the North American Association of Central Cancer Registries. Records include patient characteristics, cancer properties, treatment modality specifics, and basic outcome information. Data definitions are readily available online (https://www.facs.org/quality-programs/cancer/ncdb/puf). Approximately 70% of all cancer cases in the United States are captured in the database.[9,10] Since its inception, data from the NCDB have been consistently verified for validity and have been used in over 350 articles over the last 25 years.[11]

Study cohort

Institutional Review Board exemption was obtained from the University of Alabama, Birmingham IRB. The AYA age group was specified as ages 15-39 years old, which has been defined by the Children's Oncology Group guidelines.[12] All AYA women with the primary diagnosis of MOGCT were examined from the NCDB from 1998 to 2012. MOGCT diagnosis was determined based on the histological code designation of 9064, 9065, 9070-9073, 9081-9083, 9085, 9090, and 9091. Tumor stage was determined by the NCDB analytic stage, which uses pathologic staging when known. Otherwise, clinical staging was used for the NCDB analytic stage. Three socioeconomic surrogate variables identified were as follows: insurance type, median income in the patient's ZIP code, and the percentage of people with no high school degree in the patient's ZIP code. The median income and education by ZIP code was classified into quartiles from the 2012 US Census data. Patient race was classified as white, black, Asian, or other. The NCDB uses a second variable for ethnicity, and this was categorized as either Hispanic or non-Hispanic. The two variables were collated into a single variable (race/ethnicity). As a result, the white cohort was divided into Hispanic white and non-Hispanic white. The Hispanic black and other populations were too small to be differentiated by ethnicity and were therefore reported as black, Asian, and other. Variables of interest included overall stage at diagnosis, T-stage at diagnosis, days from diagnosis to staging, days from diagnosis to treatment, and survival.

Statistical analysis

Categorical variables were compared using chi-square in a univariate model. Continuous variables were evaluated with Student's t-test. A multivariate analysis was then performed for variables of interest using a multivariate Cox proportional hazard model, with the lowest value in each independent variable (such as lowest quartile or lack of insurance) serving as the baseline value.

Kaplan–Meier survival estimates were calculated for each variable of interest using the log-rank test. This method was performed to allow the use of time-dependent survival data from subjects whose overall survival status was censored.[13] In addition, the Cox proportional hazards model was used to evaluate the effects of the three aforementioned socioeconomic surrogate variables on overall survival in the form of hazard ratios.

Due to missing data, not all patients were included for every variable. Missing data points were deemed to meet all assumptions of missing at random.[14] As such, pairwise deletion at variable level was performed, resulting in available case analysis. Entries lacking survival data were excluded in a list-wise deletion. Statistical analysis was performed using