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Characteristics, treatment and outcomes of women with immature ovarian teratoma, 1998–2012

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HIGHLIGHTS

- The incidence of immature teratoma is highest in young adults aged 18 to 39.
- Most patients present with early-stage disease, are managed with fertility sparing surgery and chemotherapy and have an excellent prognosis.
- Later age at diagnosis, advanced stage, and high-grade histology confer a worse prognosis.

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ABSTRACT

Objective. To explore the presentation, management and outcomes of adult women diagnosed with immature ovarian teratoma.

Methods. The National Cancer Database (NCDB) was used to identify women ≥ 18 years of age diagnosed with an immature teratoma from 1998 to 2012. We analyzed demographic, clinical and tumor characteristics, and treatment trends. Multivariable models were employed to examine predictors of adjuvant chemotherapy use and survival.

Results. We identified a total of 1045 adult women with immature teratoma. The median age of diagnosis was 27 years and most were diagnosed between ages 18 and 39 (88.9%). The majority presented with early-stage (I/II) disease (76.0%), underwent unilateral salpingo-oophorectomy (52.5%) and received adjuvant chemotherapy (56.8%). The probability of receiving chemotherapy increased with stage, grade, and treatment at academic compared to community based centers ($P < 0.05$.). Older age, advanced stage, and grade III histology were associated with worse survival ($P < 0.05$). Five-year survival rates were: 98.3% (95% CI 96.8–99.1), 93.2% (95% CI 82.8–97.4), 82.7% (95% CI 74.3–88.5), and 72.0% (95% CI 50.1–85.5) for stages I, II, III, and IV disease, respectively.

Conclusions. The incidence of immature teratoma is highest in young adults aged 18 to 39. Most patients present with early-stage disease, are managed with fertility sparing surgery and chemotherapy and have an excellent prognosis. Later age at diagnosis, advanced stage, and high-grade histology confer a worse prognosis.

1. Introduction

Malignant ovarian germ cell tumors (MOGCTs) are rare, accounting for fewer than 5% of all malignant ovarian neoplasms, [1,2] with a cumulative 30-year, age-adjusted incidence rate of 0.34 per 100,000 woman-years. [2] Among MOGCTs, dysgerminomas and immature teratomas are the most common histologic subtypes, with immature teratomas accounting for 35–38% of cases. [2,3] Immature teratomas consist of tissue derived from the three germ layers and contain immature neural elements. The quantity of immature neural tissue alone determines the grade. [4] Therapy consists of unilateral salpingo-oophorectomy with wide sampling of peritoneal implants. If the tumor if confined to the ovary and grade I, no further therapy is needed. However, chemotherapy is recommended for higher grade and stage disease. [5] Treatment with surgery followed by systemic chemotherapy can achieve remission and cure in over 90% of cases. [3,4].

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Table 1
Demographic and clinical characteristics of patients with immature teratoma.

	N	%
Age		
18–19	124	(11.9)
20–29	491	(47.0)
30–39	314	(30.1)
40–49	75	(7.2)
≥50	41	(3.9)
Race		
White	593	(56.8)
Black	206	(19.7)
Hispanic	157	(15.0)
Other	73	(7.0)
Unknown	16	(1.5)
Insurance status		
Private	700	(67.0)
Medicare	23	(2.2)
Medicaid	158	(15.1)
Uninsured	112	(10.7)
Other	20	(1.9)
Unknown	32	(3.1)
Income		
<$30,000	155	(14.8)
$30,000–$34,999	157	(15.0)
$35,000–$45,999	282	(27.0)
$46,000 +	399	(38.2)
Unknown	52	(5.0)
Education		
≥29%	226	(21.6)
20–28.9%	208	(19.9)
14–19.9%	201	(19.2)
<14%	358	(34.3)
Unknown	52	(5.0)
Facility type		
Community cancer	82	(7.9)
Comprehensive community cancer	491	(47.0)
Academic/research	471	(45.1)
Other	[b]	[b]
Facility region		
Eastern	219	(21.0)
Midwest	307	(29.4)
South	305	(29.2)
West	214	(20.5)
Facility location		
Metropolitan	885	(84.7)
Urban	96	(9.2)
Rural	10	(1.0)
Unknown	54	(5.2)
Comorbidity (Charlson/Deyo)		
0	755	(72.3)
1	47	(4.5)
2	[b]	[b]
Unknown	238	(22.8)
Year of diagnosis		
1998	39	(3.7)
1999	49	(4.7)
2000	34	(3.3)
2001	46	(4.4)
2002	70	(6.7)
2003	72	(6.9)
2004	77	(7.4)
2005	82	(7.9)
2006	75	(7.2)
2007	87	(8.3)
2008	73	(7.0)
2009	84	(8.0)
2010	88	(8.4)
2011	86	(8.2)
2012	83	(7.9)
Stage		
IA	502	(48.0)
IB-IC	147	(14.1)
INOS	77	(7.4)
II	68	(6.5)
III	143	(13.7)
IV	25	(2.4)
Unknown	83	(7.9)
Grade		
Well	231	(22.1)
Moderate	249	(23.8)
Poorly	387	(37.0)
Unknown	178	(17.0)
Surgery		
None	10	(1.0)
USO	549	(52.5)
BSO	97	(9.3)
Ovary/omentectomy	286	(27.4)
Debulking	92	(8.8)
Unknown	11	(1.1)
Regional nodes examined		
Yes	498	(47.7)
No	526	(50.3)
Unknown	21	(2.0)
Regional nodes positive[a]		
Positive	34	(6.8)
Negative	462	(92.8)
Unknown	[b]	[b]
Chemotherapy		
Yes	594	(56.8)
No	405	(38.8)
Unknown	46	(4.4)

[a] Among patients that had regional nodes examined.
[b] Censored due to small sample size.

Due to their rarity, data on immature ovarian teratomas are limited. Most population-based studies have examined MOGCTs as a group [2,3,6], while those studies focusing on immature teratomas have consisted of small, retrospective single-institution series. [4,7] Additionally, many studies have looked exclusively at the pediatric and adolescent population. [8–10] Little is known about the nationwide patterns of care and outcomes of immature ovarian teratomas as a specific histology and in adult women. Therefore, we performed a population-based analysis to examine the demographic and clinical characteristics, treatments, survival rates, and prognostic indicators of patients presenting with immature teratoma.

2. Materials and methods

Patient-level data from the National Cancer Data Base (NCDB) were used for analysis. NCDB is a nationwide registry developed by the American College of Surgeons and the American Cancer Society [11,12]. NCDB records all patients with newly diagnosed invasive tumors from >1500 Commission on Cancer-affiliated hospitals throughout the United States, capturing approximately 70% of all newly diagnosed cancers nationwide. The database includes information on patient demographics, tumor characteristics, treatment data, staging, follow-up and survival. Data are abstracted by trained cancer registrars, are audited regularly, and have been utilized in a large number of outcomes studies. The data do not contain patient identifiers and the study was deemed exempt by the Columbia University Institutional Review Board. We included in this study women ages 18 and older who were diagnosed with immature teratoma of the ovary at any FIGO stage between the years 1998 and 2012. Patients with mixed germ cell tumor histology and those with benign or borderline tumors were excluded.

Demographic data analyzed included age (18–19, 20–29, 30–39, 40–49, ≥50 years), race and ethnicity (white, black, Hispanic, other, unknown), insurance status (uninsured, private insurance, Medicaid, Medicare, other, unknown), income (<$30,000; $30,000–$34,999; $35,000–$45,999; $46,000 +; unknown as determined by the median household income in the patient's zip code) and education (percentage of adult residents in a patient's zip code that did not graduate from high school, categorized as equally proportioned quartiles among all US zip codes). Comorbidity was estimated using the Deyo classification of the Charlson comorbidity score (0, 1, ≥2). [13,14] Hospital characteristics