

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20221288>

Original Research Article

Surgical outcome in germ cell tumor of ovary

Pooja R.*, Varsha Narendra Patil

Department of Obstetrics and Gynaecology, Grant Government Medical College, Mumbai, Maharashtra, India

Received: 12 March 2022

Revised: 10 April 2022

Accepted: 11 April 2022

***Correspondence:**

Dr. Pooja R.,

E-mail: poojaleena1995@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Ovarian cancer accounts for 225,000 new cases and 140,000 deaths every year. Ovarian germ cell tumors account for 15-20% of all ovarian malignancies and incidence of malignant ovarian germ cell tumors is 2-6%. These tumors typically occur in adolescent girls and young women. Appropriate fertility conserving surgical treatment for patients where fertility needs to be preserved and resection of all visible disease can be successfully performed. For patients with advanced-stage disease, debulking surgery is done.

Methods: Current study is a retrospective study. The present study was conducted in the department of obstetrics and gynecology, Cama and Albess hospital, Mumbai, Maharashtra, India, from a period of May 2019 to December 2021. This study was conducted with 30 patients to evaluate the outcome in operated cases of germ cell tumors of ovary.

Results: Majority of the patients (30%) were in the age group of 31-40 years, 17 (56.7%) patients were unmarried while 13 (43.3%) patients were married. The most common symptom was abdominal mass and pain (86.7%). The most common histologic type was dysgerminoma (46.7%). Out of total 19 patients with FIGO stage I, 13 patients (68.4%) underwent Fertility sparing surgery (FSS) and 6 patients (31.6%) underwent non fertility sparing surgery (non-FSS).

Conclusions: Surgery has an important role in the management of germ cell tumors. Initial careful surgical staging is of great importance for appropriate subsequent therapy. Fertility sparing surgery is feasible in most cases. Malignant ovarian germ cell tumors have excellent prognosis for stage I and for advanced stages.

Keywords: Germ cell tumour, Unilateral salphingo-oophorectomy, Debulking surgery

INTRODUCTION

Ovarian germ cell tumors (OGCTs) are heterogeneous tumors that are derived from the primitive germ cells of the embryonic gonad, which accounts for about 2.6% of all ovarian malignancies. There are four main types of OGCTs, namely dysgerminomas, yolk sac tumor, teratoma, and choriocarcinoma. Dysgerminomas are the most common type and are particularly prominent in patients diagnosed with gonadal dysgenesis. OGCTs are relatively difficult to detect and diagnose at an early stage because of the nonspecific histological characteristics.

Common symptoms of OGCT are bloating, abdominal distention, ascites, and dyspareunia. OGCT is caused mainly due to the formation of malignant cancer cells in the primordial germ cells of the ovary. The exact pathogenesis of OGCTs is still unknown however, various genetic mutations and environmental factors have been identified. OGCTs are commonly found during pregnancy when an adnexal mass is found during a pelvic examination, ultrasound scans show a solid mass in ovary or blood serum test shows elevated alpha-fetoprotein levels. Neoplasm presenting in the ovary can originate from any of the various cell types present. The tumor

may be derived from the surface epithelium, the stroma, or the cellular elements of the follicle, where the latter may result in sex cord-stromal tumors (such as granulosa cell tumor or thecoma) or germ cell tumors (GCTs). The most frequently occurring ovarian GCTs are benign, cystic mature teratomas (MTs) that may show highly differentiated tissue and high morphological heterogeneity. World health organization (1973) classified malignant germ cell tumors as dysgerminoma, endodermal sinus tumor (yolk sac tumor), and immature teratoma, non-gestational choriocarcinoma, embryonal carcinoma, and mixed germ cell type. Malignant mixed germ cell tumor is a type of tumor that consists of two or more malignant germ cell components. These tumors are quite rare cancers, seen in 8% cases of germ cell tumors but are very aggressive in nature. The most common combination reported is dysgerminoma and endodermal sinus tumor (EST) and the rarest combination has embryonal carcinoma and immature teratoma as its components. Embryonal carcinoma, although very rare, holds the most malignant potential. Dysgerminomas, the most common OMGCTs, are usually solid and should be differentiated from other purely solid ovarian masses. Majority of the patients about 30 % were in the age group of 31-40 .This is similar to the studies of Agarwal et al, Kumar et al and Lakshmanan et al.^{2,3} Malignant OGCTs are predominantly unilateral and chemosensitive. Fertility-preserving surgery is primarily standardized to keep the contralateral ovary and fallopian tube intact, also known as unilateral salpingo-oophorectomy. For Stage II patients with observable metastasis, cytoreductive surgery may be performed to debulk the volume of the tumor, such as hysterectomy (removal of all or part of the uterus) and bilateral salpingo-oophorectomy. A surgical incision at the abdominal cavity after the completion of adjuvant chemotherapy, called second look laparotomy, is best applicable for patients reported with teratomatous elements after previous cytoreductive surgery. Debulking surgery is the mainstay in treatment of ovarian cancer. Since these tumors affect young adolescent girls, preservation of fertility is a major concern. Fertility preserving surgery followed by combination chemotherapy is the preferred treatment modality followed worldwide. Hence the present study was done at our hospital to study the management and outcome of operated cases of germ cell tumors of ovary.

METHODS

The present study is a type of research article with study design retrospective and was conducted in the department of obstetrics and gynaecology, Cama hospital, Mumbai, from May 2019 to December 2021.

Selection criteria

Selection criteria in current study were women operated for germ cell tumor.

Procedure

After taking detailed history regarding age, parity, marital status, menstrual history, general physical examination including height, weight, BMI was carried out. Complete blood count, tumour markers such as LDH, CA-125, beta HCG, AFP, CEA, R (resection) status, baseline tumor marker level, adjuvant chemotherapy status were investigated. Follow up USG abdomen+pelvis and tumor marker status were taken. Special investigations were done in necessary cases such as USG (abdomen+pelvis), CT, MRI, PET scan. A hospital based retrospective study was conducted with 30 patients to evaluate the outcome in operated cases of germ cell tumors of ovary.

Statistical analysis

Statistical analysis was done by SPSS software and Difference with a $p < 0.05$ was considered statistically significant.

RESULTS

Distribution of patients according to age

Majority of the patients (30%) were in the age group of 31-40 years followed by 23.4% in the age group of 21-30 years, 16.7% in the age group of 41-50 years, 13.3% in the age group of 11-20 years, 10% in the age group of 51-60 years and 3.3% in the age groups of 61-70 years and 71-75 years. The mean age of the patients was 35.30 ± 14.30 years (Table 1).

Table 1: Distribution of patients according to age.

Age (years)	N	%
11-20	4	13.3
21-30	7	23.4
31-40	9	30
41-50	5	16.7
51-60	3	10
61-70	1	3.3
71-75	1	3.3
Total	30	100
Mean\pmSD	35.30 ± 14.30	

Distribution of patients according to marital status

Total 17 (56.7%) patients were unmarried while 13 (43.3%) patients were married (Table 2).

Distribution of patients according to symptoms

The most common symptom was abdominal mass and pain (86.7%) followed by irregular menstruation (16.7%) and acute abdominal pain (6.7%) (Table 3).

Table 2: Distribution of patients according to marital status.

Marital status	N	%
Unmarried	17	56.7
Married	13	43.3
Total	30	100

Table 3: Distribution of patients according to symptoms.

Symptoms	N	%
Abdominal mass and pain	26	86.7
Irregular menstruation	5	16.7
Acute abdominal pain	2	6.7

Distribution of patients according to type of germ cell tumor

The most common histologic type was dysgerminoma (46.7%) followed by immature teratoma (26.7%), yolk sac tumor (20%), mixed germ cell tumor (3.3%) and choriocarcinoma (3.3%) (Table 4).

Table 4: Distribution of patients according to type of germ cell tumor.

Type of germ cell tumor	N	%
Dysgerminoma	14	46.7
Immature teratoma	8	26.7
Yolk sac tumor	6	20
Mixed germ cell tumor	1	3.3
Choriocarcinoma	1	3.3
Total	30	100

Distribution of patients according to international Federation of gynecology and obstetrics (FIGO) stage

19 (63.3%) and 6 (20%) patients had FIGO stage I and II respectively while 4 (13.4%) and 1 (3.3%) patient had FIGO Stage III and IV respectively (Table 5).

Table 5: Distribution of patients according to FIGO stage.

FIGO stage	N	%
I	19	63.3
II	6	20
III	4	13.4
IV	1	3.3
Total	30	34.3

Management of patients with FIGO stage I (n=19)

Complete surgery represented the first approach for 14 (73.7%) Stage I patients while incomplete surgery was the first approach for 5 patients. Of 14 completely staged patients, 13/14 (92.8%) patients underwent Fertility sparing surgery (FSS) and 1 patient underwent non-FSS.

All 5 incompletely staged patients with FIGO Stage I underwent FSS in the form of ovarian cystectomy. 7 (36.8%) patients were placed under active surveillance after surgery while 12 (63.2%) patients received adjuvant chemotherapy (Table 6).

Table 6: Type of surgery of patients with FIGO stage I and management of patients with FIGO stage I after surgery (n=19).

Parameters	N	%
Type of surgery		
Fertility sparing surgery	13	68.4
Non-Fertility sparing surgery	6	31.6
Total	19	100
Management of patients after surgery		
Active surveillance with no adjuvant chemotherapy	7	36.8
Adjuvant chemotherapy	12	63.2
Total	19	100

Management of patients with FIGO stage II-IV (n=11).

Total 4 (36.4%) patients with FIGO Stage II-IV underwent primary debulking surgery (PDS) followed by adjuvant chemotherapy, whereas 7 (63.6%) patients with FIGO Stage II-IV received neoadjuvant chemotherapy (NAC) followed by interval debulking surgery (IDS). In PDS cohort, 3 (75%) patients underwent FSS, whereas in NAC cohort, all patients underwent FSS (Table 7).

Table 7: Management of patients with FIGO stage II-IV (n=11).

Management of patients with FIGO Stage II-IV (n=11)	N	%
PDS+adjuvant chemotherapy	4	36.4
NAC+IDS	7	63.6
Total	11	100

Outcome of patients with FIGO stage I (n=19)

In patients with FIGO stage I, no recurrence was observed in all patients with complete staging surgery and 1 (5.3%) patient with incomplete staging. 3 (15.8%) patients with incomplete surgery showed recurrence and 1 (5.3%) patient with incomplete surgery died (Table 8).

Outcome of patients with FIGO Stage II-IV (n=11)

There was no recurrence in all patients with FIGO Stage II-IV (Table 9).

Distribution of patients according to Eastern cooperative oncology group (ECOG) performance status

Total 21 (70%) and 7 (23.4%) patients had Eastern cooperative oncology group (ECOG) performance status

of 0 and 1 respectively while 1 (3.3%) patient each had ECOG performance status of 2 and 3. A hospital-based retrospective, analytical study was conducted with 30 patients to evaluate the outcome in operated cases of germ cell tumors of ovary.

Table 8: Outcome of patients with FIGO stage I after surgery (n=19).

Outcome of patients after surgery	N	%
No recurrence	15	78.9
Recurrence	3	15.8
Death	1	5.3
Total	19	100

Table 9: Outcome of patients with FIGO stage II-IV (n=11).

Outcome of patients after surgery	N	%
No recurrence	11	100
Total	11	100

The following observations were noted: majority of the patients (30%) were in the age group of 31-40 years followed by 23.4% in the age group of 21-30 years, 16.7% in the age group of 41-50 years, 13.3% in the age group of 11-20 years, 10% in the age group of 51-60 years and 3.3% in the age groups of 61-70 years and 71-75 years. The mean age of the patients was 35.30±14.30 years (Table 1). 17 (56.7%) patients were unmarried while 13 (43.3%) patients were married (Table 2). The most common symptom was abdominal mass and pain (86.7%) followed by irregular menstruation (16.7%) and acute abdominal pain (6.7%) (Table 3). The most common histologic type was dysgerminoma (46.7%) followed by immature teratoma (26.7%), yolk sac tumor (20%), mixed germ cell tumor (3.3%) and choriocarcinoma (3.3%) (Table 4). 21 (70%) and 7 (23.4%) patients had Eastern cooperative oncology group (ECOG) performance status of 0 and 1 respectively while 1 (3.3%) patient each had ECOG performance status of 2 and 3. 19 (63.3%) and 6 (20%) patients had FIGO stage I and II respectively while 4 (13.4%) and 1 (3.3%) patient had FIGO Stage III and IV respectively (Table 5). Out of total 19 patients with FIGO (Table 6) stage I, 13 patients (68.4%) underwent fertility sparing surgery (FSS) and 6 patients (31.6%) underwent non fertility sparing surgery (non-FSS). 7 (36.8%) patients were placed under active surveillance after surgery while 12 (63.2%) patients received adjuvant chemotherapy (Table 6). 4 (36.4%) patients with FIGO stage II-IV underwent primary debulking surgery (PDS) followed by adjuvant chemotherapy, whereas 7 (63.6%) patients with FIGO stage II-IV received neoadjuvant chemotherapy (NAC) followed by interval debulking surgery (IDS). In PDS cohort (Table 7). 3 (75%) patients underwent FSS, whereas in NAC cohort, all patients underwent FSS. In patients with FIGO stage I, no recurrence (Table 8) was observed in all patients with complete staging surgery and 1 (5.3%) patient with incomplete staging. 3 (15.8%)

patients with incomplete surgery showed recurrence and 1 (5.3%) patient with incomplete surgery died. There was no recurrence and no death in all patients with FIGO stage II-IV (Table 9).

DISCUSSION

In the present study, majority of the patients (30%) were in the age group of 31-40. This is similar to the studies of Agarwal et al, Kumar et al and Lakshmanan et al. In our study, 17 (56.7%) patients were unmarried while 13 (43.3%) patients were married. Kumar et al hospital based retrospective study observed 12 patients were unmarried and 3 patients presented with germ cell tumour complicating pregnancy. The most common symptom in our study was abdominal mass and pain (86.7%) followed by irregular menstruation (16.7%) and acute abdominal pain (6.7%). This is comparable to the studies of Agarwal et al, Kumar et al and Lakshmanan et al. The most common histologic type in the present study was dysgerminoma (46.7%) followed by immature teratoma (26.7%), yolk sac tumor (20%), mixed germ cell tumor (3.3%) and choriocarcinoma (3.3%). Kumar et al, Lakshmanan et al and Agarwal et al noted similar observations in their studies. Kumar et al hospital based retrospective study found 9 patients (43%) presented with mixed germ cell tumour, 6 patients (29%) with dysgerminoma, 3 patients (14%) with yolk sac tumour and 3 patients (14%) with mature cystic teratoma. Lakshmanan et al retrospective study found dysgerminoma was the most common histological type seen followed by teratoma and mixed germ cell tumors. Evidence from large studies on recommendations of the fertility task force of the European society of gynecologic oncology about the conservative management of ovarian malignant tumors suggest that unilateral salpingo-oophorectomy of involved ovary is the standard of care and removal or biopsy of contralateral ovary is not associated with survival benefit.^{4,5} Goyal LD et al retrospective study of case series of rare cases assessing malignant mixed germ cell tumors of the ovary.

In the present study, out of total 19 patients with FIGO stage I, 13 patients (68.4%) underwent Fertility sparing surgery (FSS) and 6 patients (31.6%) underwent Non fertility sparing surgery (non-FSS). Inability to conceive causes women to experience anxiety, depression, poor self-esteem, and feelings of sexual inadequacy. Although patients tend to choose radical surgery due to anxiety regarding a life-threatening disease, it has been proven that radical surgery does not have a survival advantage over conservative surgery in carefully selected patients.⁷ Total 7 (36.8%) patients were placed under active surveillance after surgery while 12 (63.2%) patients received adjuvant chemotherapy. Similar observations were noted in the studies of Lakshmanan et al, Perrin et al, Ezzat et al, Brewer et al and Agarwal et al.⁷⁻¹⁰

Brewer et al described 26 patients of dysgerminoma in whom 16 underwent fertility-preserving treatment and

five pregnancies were noted. Active surveillance after CSS for stage IA dysgerminoma and stage IA grade 1 immature teratoma is the treatment of choice.¹¹ Patients with all other stages and histologic types receive adjuvant chemotherapy with standard BEP regimen. The results of pooled analysis of six studies (included 172 patients with Stage IA dysgerminoma, immature teratoma, YST, and mixed tumor) showed relapse rate of 16% after CSS on active surveillance with OS rate of 98%.¹²⁻¹⁷ It was observed in our study that there was no recurrence and no death in all patients with FIGO Stage II-IV. Similar observations were noted in the studies of Agarwal et al, Kumar et al, Mangili et al, Lakshmanan et al and Newton et al.^{18,19} Mangili et al in a retrospective study on outcome and risk factors for recurrence in malignant ovarian germ cell tumors demonstrated that residual disease after initial surgery is a prognostic factor for malignant germ cell tumour patients.

Limitations

Facilities for evaluation, surgical staging and chemotherapy are expensive and time consuming. Availability of experienced laproscopic oncosurgeons is the limitation in most facilities. Long term follow up of the patients was not take.

CONCLUSION

Surgery has an important role in the management of germ cell tumors. Initial careful surgical staging is of great importance for appropriate subsequent therapy. Fertility sparing surgery is feasible in most cases. Malignant ovarian germ cell tumors have excellent for Stage I and for advanced stages. Fertility preservation is a concern as these patients are usually young adolescent girls but fertility sparing treatment must be individualized on the basis of tumor type, surgical staging, and availability of combination chemotherapy. Considering high recurrence rate and mortality, total hysterectomy with complete surgical staging followed by combination chemotherapy should be performed at advanced stage and aggressive tumor biology. Preservation of fertility must be held secondary.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Agarwal R, Rajanbabu A, Keechilattu P. A retrospective analysis of the pattern of care and survival in patients with malignant ovarian germ cell tumors. *South Asian J Cancer.* 2019; 8(1):35-40.
- Kumar RB, Das V. Treatment outcomes in malignant ovarian germ cell tumors. *Int J Reprod Contracept Obstet Gynecol.* 2017;6:5256-60.
- Lakshmanan M, Gupta S, Kumar V. Germ cell tumor ovary: an institutional experience of treatment and survival outcomes. *Indian J Surg Oncol.* 2018;9(2): 215-9.
- Morice P, Denschlag D, Rodolakis A, Reed N, Schneider A, Kesic V, et al. Recommendations of the fertility task force of the european society of gynecologic oncology about the conservative management of ovarian malignant tumors. *Int J Gynecol Cancer.* 2011;21:951-63.
- Parkinson CA, Hatcher HM, Earl HM, Ajithkumar TV. Multidisciplinary management of malignant ovarian germ cell tumours. *Gynecol Oncol.* 2011;121:625-36.
- Downey J, McKinney M. The psychiatric status of women presenting for infertility evaluation. *Am J Orthop.* 1992;62:196-8
- Zanetta G, Bonazzi C, Cantu M, Binidagger S, Locatelli A, Bratina G, Mangioni C. Survival and reproductive function after treatment of malignant germ cell ovarian tumors. *J Clin Oncol.* 2017;19(4): 1015-20
- Perrin LC, Low J, Nicklin JL, Ward BG, Crandon AJ. Fertility and ovarian function after conservative surgery for germ cell tumors of the ovary. *Aust N Z J Obstet Gynecol.* 1999;39(2):243-5.
- Ezzat A, Raja M, Bakri Y, Subhi J, Memon M, Schwartz P, Stuart R. Malignant ovarian germ cell tumors: a survival and prognostic analysis. *Acta Oncol.* 1999;38(4):455-60.
- Brewer M, Gerhenson DM, Herzog CE, Mitchell MF, Silva EG, Wharton JT. Outcomes and reproductive function after chemotherapy for ovarian dysgerminoma. *J Clin Oncol.* 1999;17(9):2670-5.
- Ovarian Cancer including fallopian tube cancer and Primary peritoneal cancer. Available at: <http://www.nccn.org/professionals/physician>. Accessed on 20 October 2021.
- Bonazzi C, Peccatori F, Colombo N, Lucchini V, Cantù MG, Mangioni C. Pure ovarian immature teratoma, a unique and curable disease: 10 years' experience of 32 prospectively treated patients. *Obstet Gynecol.* 1994;84:598-604.
- Dark GG, Bower M, Newlands ES, Paradinas F, Rustin GJ. Surveillance policy for stage I ovarian germ cell tumors. *J Clin Oncol.* 1997;15:620-4.
- Cushing B, Giller R, Ablin A, Cohen L, Cullen J, Hawkins E, et al. Surgical resection alone is effective treatment for ovarian immature teratoma in children and adolescents: A report of the pediatric oncology group and the children's cancer group. *Am J Obstet Gynecol.* 1999;181:353-8.
- Mitchell PL, Al-Nasiri N, A'Hern R, Fisher C, Horwich A, Pinkerton CR, et al. Treatment of nondysgerminomatous ovarian germ cell tumors: An analysis of 69 cases. *Cancer.* 1999;85:2232-44.
- Patterson DM, Murugaesu N, Holden L, Seckl MJ, Rustin GJ. A review of the close surveillance policy for stage I female germ cell tumors of the ovary and other sites. *Int J Gynecol Cancer.* 2008;18:43-50.

17. Mann JR, Raafat F, Robinson K, Imeson J, Gornall P, Phillips M, et al. UKCCSG's germ cell tumour (GCT) studies: Improving outcome for children with malignant extracranial non-gonadal tumours: carboplatin, etoposide, and bleomycin are effective and less toxic than previous regimens. *J Clin Oncol.* 2000;18:3809-18.
18. Mangili G, Sigismondi C, Gadducci A, Cormio G, Scollo P, Tateo S et al. Outcome and risk factors for recurrence in malignant ovarian germ cell tumors: a MITO-9 retrospective study. *Int J Gynecol Cancer.* 2011;21(8):1414-21.
19. Newton C, Murali K, Ahmad A et al. A multicentre retrospective cohort study of ovarian germ cell tumours: Evidence for chemotherapy de-escalation and alignment of paediatric and adult practice. *Eur J Cancer.* 2019;113(19):e27.

Cite this article as: Pooja R, Patil VN. Surgical outcome in germ cell tumor of ovary. *Int J Reprod Contracept Obstet Gynecol.* 2022;11:1525-30.