

Analysis of Fertility Sparing Surgery Outcomes in Ovarian Malignancy at Department of Gynaecologic Oncology Tertiary Care Centre**Mala Sinha¹, Maneesh Kumar², Tarini Sonwani³, Rashmi Rekha Bora⁴**¹Senior Registrar, Department of Gynecological oncology, Fortis Memorial Research Institute, Gurugram, India²Senior Resident, National Institute of Pathology, ICMR, New Delhi, India³Associate consultant, Department of Gynecological oncology, Fortis Memorial Research Institute, Gurugram, India⁴Senior consultant, Department of Gynecological oncology, Fortis Memorial Research Institute, Gurugram, India

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Abstract**Aim:** The aim of the present study was to assess the reproductive and oncological outcomes of women who have undergone fertility sparing surgery (FSS) in ovarian malignancy.**Methods:** The present study was conducted in the Department of Gynecologic Oncology, Fortis Memorial Research Institute, Gurugram from January 2018 and September 2022. A retrospective review of a clinical database of patients who underwent fertility sparing surgery done in Department of Gynaecologic Oncology was included. A total of 13 patients underwent FSS.**Results:** The mean age was 31.6 years (range 23 to 37.0 years) and the mean BMI was 22.22 (range 18-30 kg/m²). In pre-operative diagnosis, 10 had suspicious ovarian mass and 3 underwent biopsy. In frozen section, 8 were at borderline serous and one each had germ cell and granulosa cell tumor respectively. During the study period, 7/13 (53.8%) of the women had attempted to conceive following surgery, with a successful pregnancy of 6/7 (86%) and 5/6 (83.3%) were spontaneous conception, live birth rate of 4/13 (30.7%) and 2/13 (15.3%) at 34 and 36 weeks of period of gestation. The Complete surgery as done in one patient, after completion of child bearing. (Robot assisted hysterectomy and right salpingo oophorectomy). One patient (germ cell tumor) received neoadjuvant chemotherapy followed by interval cytoreductive surgery with fertility preservation done. There was no recurrence during study. Median disease free survival was 31 months.**Conclusion:** Fertility sparing surgery is feasible with good oncologic outcome and satisfactory conception and live birth rates in patients with early stage. Careful counselling is required when considering the type of surgery to be performed based on the histology, stage of disease and tumour grade.**Keywords:** reproductive and oncological outcomes, fertility sparing surgery, ovarian malignancyThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

The aim of conservative and functional surgery in an oncology setting is to preserve an organ's functionality and to avoid radical resection when possible. This approach is increasingly used in oncologic gynecologic surgery where fertility-sparing surgery (FSS) aims to preserve the ovarian tissue and the uterus. Moreover, FSS can improve sexual function and the psychological wellbeing of patients, both of which are negatively impacted after cancer diagnosis and treatment.¹ Cryopreservation may also be an option prior to surgery if the risk of gonadal damage is high.² Ovarian cancers are classified into epithelial (including borderline ovarian tumors (BOT) and malignant ovarian tumors) and non-epithelial cancer. Although most patients with epithelial ovarian cancer will undergo

radical surgery -the gold standard-patients with early-stage disease, BOT, or a non-epithelial tumor could be offered FSS depending on histologic subtypes and prognostic factors.^{3,4}

Fertility-sparing surgery (FSS) of epithelial ovarian cancer (EOC) is based on unilateral (salpingo-)oophorectomy and complete surgical staging. This empirical treatment option had initially been proposed to young women presenting with an early-stage invasive tumour and a low risk of recurrence.⁵ The first large series specifically devoted to this management was published nearly five decades ago (mixing different subtypes of ovarian tumours).⁶ Different publications, initially mixing different subtypes (EOC and borderline tumours and/or

epithelial and non-epithelial cancers) and more recently specifically dedicated to EOC, have been reported.⁷⁻¹⁰ Five years ago, international recommendations were finalised concerning the indications and modalities for FSS in EOC.¹¹

FSS in patients with BOT consists of preserving the uterus and at least part of one ovary. In 2013, Daraï et al. conducted a review to analyze the outcomes of FSS (salpingo-oophorectomy or cystectomy) in patients with BOT. They concluded that the risk of relapse was higher after FSS compared with standard treatment, with a global recurrence risk estimated at 13% (95% Confidence Interval (CI) 10–16%). The recurrence rate was correlated with the type of FSS performed with a higher risk (between 10 and 42%) observed in patients undergoing cystectomy.¹² Nevertheless, some authors report similar recurrence rates for cystectomy and salpingo-oophorectomy. Palomba et al.^{13,14} conducted a randomized trial in 32 patients who underwent laparoscopy for bilateral serous BOT. The patients were randomized into two groups: bilateral cystectomy or unilateral salpingo-oophorectomy on the largest lesion and contralateral cystectomy. They found no difference between the procedures in terms of the cumulative recurrence rates with a follow-up of 81 months. However, although the cumulative pregnancy rate and cumulative probability of a first pregnancy were higher in the group of patients treated with bilateral cystectomy¹³, time to first recurrence was shorter and the rate of radical treatment of the recurrence was higher in this group.¹⁴

The aim of the present study was to assess the reproductive and oncological outcomes of women who have undergone fertility sparing surgery (FSS) in ovarian malignancy.

Materials and Methods

The present study was conducted in the Department of Gynecologic Oncology, Fortis Memorial Research Institute, Gurugram from January 2018 and September 2022. A retrospective review of a clinical database of patients who underwent fertility sparing surgery done in Department of Gynaecologic Oncology was included. A total of 13 patients underwent FSS. Patients with a histological diagnosis of ovarian malignancy were included. Detailed data on surgery, staging, histopathology, obstetrical and reproductive outcomes after FSS and follow-up were reviewed.

FSS was defined as the preservation of the uterus and at least a part of one ovary. RS was defined as the performance of bilateral oophorectomy and hysterectomy. Overall survival (OS) was calculated from the date of diagnosis to the date of death from any cause or the date of data retrieval. Progression-free survival (PFS) was defined as the time from diagnosis to the first appearance of relapse or the date of death from any cause. Patients known to be free of relapse were censored at the time of data retrieval. Medical records were reviewed when patient registration records were incomplete. For detailed data concerning relapses, all medical records were reviewed.

Statistical analysis

The Student's t-test and ANOVA were used for comparison of continuous variables. Categorical variables were evaluated using Fisher's exact test, as appropriate for each category size. All comparisons were 2-sided, and a 5% level of significance was used. Statistical analysis was performed using Stata statistical software

Results

Table 1: Demographic parameters

Demographic parameters	Mean	Range
Age	31.6	23-37 years
BMI	22.22	18-30 kg/m ²

The mean age was 31.6 years (range 23 to 37.0 years) and the mean BMI was 22.22 (range 18-30 kg/m²).

Table 2: Preoperative diagnosis, frozen section

Preoperative diagnosis	N=13
Suspicious ovarian mass	10
Biopsy proven N=3	
Low grade serous	1
Germ cell	1
Sertoli leydig cell tumor	1
Frozen section N=10	
Borderline serous	8
Germ cell	1
Granulosa cell tumor	1

In pre-operative diagnosis, 10 had suspicious ovarian mass and 3 underwent biopsy. In frozen section, 8 were at borderline serous and one each had germ cell and granulosa cell tumor respectively.

Table 3: Fertility outcome

Fertility outcome	N (%)
Attempted to conceive	7 (53.80%)
Pregnant	6 (86%)
Spontaneous conception	5 (71.40%)
IVF2	2 (28.50%)
Miscarriage	1 (14.20%)

During the study period, 7/13 (53.8%) of the women had attempted to conceive following surgery, with a successful pregnancy of 6/7 (86%) and 5/6 (83.3%) were spontaneous conception, live birth rate of 4/13 (30.7%) and 2/13 (15.3%) at 34 and 36 weeks of period of gestation.

Table 4: Surgery and surgical staging

Surgery & Surgical staging	N=13	Percentage
Unilateral Salpingo oophorectomy	12	92.3%
Bilateral salpingo oophorectomy	1	7.6%
Opposite side cystectomy	3	23%
Peritoneal biopsies	13	100%
Omentectomy	13	100%
Pelvic lymph node dissection	7	53.8%
Para aortic lymph node dissection	1	7.6%

The Complete surgery as done in one patient, after completion of child bearing, (Robot assisted hysterectomy and right salpingo oophorectomy). One patient (germ cell tumor) received neoadjuvant chemotherapy followed by interval cytoreductive surgery with fertility preservation done.

Table 5: Oncology outcome

Median follow-up	31 months (range 5-56 months)
Status at last follow up	All patients were free of disease

There was no recurrence during study. Median disease free survival was 31 months.

Discussion

According to GLOBOCON 2020, ovarian cancer is the seventh most common cancer among women in world and third most common in India.¹⁵ 4th most commonly diagnosed cancer in adolescents and young adults with 13% of all new diagnoses annually.¹⁶ The overall 5-year survival rate for all ovarian cancer in women ≤ 44 years of age is 91.2% in stages 1A and 1B.¹⁷ Fertility sparing surgery (FSS) is defined as the removal of disease while preserving the potential to conceive (USO, preserving uterus and contralateral ovary or BSO, preserving uterus).¹⁸

The mean age was 31.6 years (range 23 to 37.0 years) and the mean BMI was 22.22 (range 18-30 kg/m²). In pre-operative diagnosis, 10 had suspicious ovarian mass and 3 underwent biopsy. In frozen section, 8 were at borderline serous and one each had germ cell and granulosa cell tumor respectively. During the study period, 7/13 (53.8%) of the women had attempted to conceive following surgery, with a successful pregnancy of 6/7 (86%) and 5/6 (83.3%) were spontaneous conception, live birth rate of 4/13 (30.7%) and 2/13 (15.3%) at 34 and 36 weeks of period of gestation. The Complete surgery as done in one patient, after completion of child bearing. (Robot assisted hysterectomy and right salpingo oophorectomy). One patient (germ cell tumor) received neoadjuvant chemotherapy followed by interval cytoreductive surgery with fertility preservation done. There was no recurrence during study. Median disease free survival was 31

months. This is half the average age at diagnosis for ovarian cancer.¹⁸ This is due to the fact that FSS is only offered to patients of child-bearing age and usually accepted by women who have not completed their family. Just half (53.8%) of patients attempted to conceive following FSS. While this number may initially seem low, it is on the higher side compared to other studies which quote rates of 16–50%.¹⁹ There was an overall successful pregnancy rate of 86%, which is comparable to a number of other studies which quote ranges of 32-88%.¹⁵ The IVF rate of (29%) was comparable to other studies, but markedly higher than the general population.^{20,21} The ratio of live birth at term to number of pregnancy is 67% ,comparable to other studies.¹⁵ The miscarriage rate of 14% was compared to one systematic review of reproductive outcomes following FSS showed an average miscarriage rate of 15%.²² 46% of patients chose not to attempt to conceive following FSS is complex, as most of them were unmarried and there are likely multifactorial reasons for this that are beyond the scope of this study.

Conclusion

Fertility sparing surgery is feasible with good oncologic outcome and satisfactory conception and live birth rates in patients with early stage. Careful counselling is required when considering the type of surgery to be performed based on the histology, stage of disease and tumour grade.

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