



MATERNAL AND PERINATAL OUTCOME IN WOMEN WITH OVARIAN TUMORS COMPLICATING PREGNANCY

Riya Gupta, *Latika Sahu

¹(MBBS) Postgraduate resident, Department of Obstetrics and Gynaecology, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi. India.

²(MD, FICOG) Director Professor, In Charge Gynecologic Oncology Clinic, Department of Obstetrics and Gynaecology, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi. India.



***Corresponding Latika Sahu**

(MD, FICOG) Director Professor, In Charge Gynecologic Oncology Clinic, Department of Obstetrics and Gynaecology, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi. India.

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ABSTRACT

Background: Ovarian tumors during pregnancy are uncommon and pose significant diagnostic and therapeutic challenges because of physiological changes associated with pregnancy and the need to optimize both maternal and fetal outcomes. While most adnexal masses are benign, timely identification of malignant lesions is essential for appropriate management. **Objective:** To evaluate the clinical profile, management strategies, histopathological spectrum, maternal and neonatal outcomes of ovarian tumors diagnosed during pregnancy at a tertiary care teaching hospital. **Method:** This prospective observational study was conducted in the Department of Obstetrics and Gynaecology and the Gynecologic Oncology Clinic, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi, from May 2023 to October 2025. Fourteen pregnant women with clinico-radiologically diagnosed ovarian tumors were included. Clinical evaluation, serum tumor markers, ultrasonography using IOTA simple rules and Risk of Malignancy Index (RMI), and magnetic resonance imaging where indicated were performed. Management was individualized according to gestational age, tumor characteristics, symptoms, and suspected malignancy. Histopathological examination was performed for surgically managed cases. Maternal, obstetric, and neonatal outcomes were analyzed. **Results:** The prevalence of ovarian tumors during pregnancy was 0.73 per 1,000 pregnancies. The mean maternal age was 25.7 ± 4.7 years, and 84.6% of women were nulliparous. Most tumors (84.6%) were detected incidentally during routine antenatal ultrasonography, predominantly in the first trimester. Ovarian torsion occurred in three patients (21.4%). Nine women underwent surgery, including cystectomy (66.7%) and unilateral salpingo-oophorectomy (33.3%), while five were managed conservatively with serial follow-up. Histopathology revealed predominantly benign tumors, with serous cystadenoma (28.6%) being the most common, followed by mucinous cystadenoma (21.4%). One patient was diagnosed with mucinous cystadenocarcinoma in the postpartum period. Vaginal delivery occurred in 71.4% of patients, and no adverse maternal or neonatal outcomes were observed. **Conclusion:** Ovarian tumors during pregnancy are rare and are predominantly benign. Early diagnosis through routine antenatal ultrasonography and individualized multidisciplinary management facilitates favorable maternal and neonatal outcomes. Surgical intervention, when indicated, can be safely performed during the second trimester or at cesarean delivery. Larger multicenter studies are needed to establish evidence-based management guidelines.

KEYWORDS: Pregnancy; Ovarian tumor; Adnexal mass; Ovarian neoplasm; Ultrasonography; Histopathology; Maternal outcome; Neonatal outcome.

INTRODUCTION

Ovarian tumors encountered during pregnancy are uncommon but present unique diagnostic and therapeutic

challenges. The reported incidence ranges from 0.1% to 0.8% of pregnancies, with most lesions detected incidentally during routine antenatal ultrasonography.^[1,2]

Although the majority of ovarian tumors in pregnancy are benign, the possibility of malignancy necessitates careful evaluation and management.^[3]

Ovarian malignancies are rare in pregnancy; however, the incidence of abnormal adnexal masses diagnosed during pregnancy is increasing. The most common masses are ovarian cysts and only 3–6% of those are malignant. The majority of ovarian masses are diagnosed at an early stage by routine ultrasound examinations. Ovarian cancer is among the most common malignancies diagnosed during pregnancy, ranking fifth globally among pregnancy-associated cancers following breast, thyroid, cervix and Hodgkin lymphoma.^[4] Malignant germ cell tumors are the most common ovarian malignancies associated with pregnancy.

The physiological changes of pregnancy can obscure symptoms, delay diagnosis, and complicate treatment decisions. Additionally, serum tumor markers such as CA-125 may be physiologically altered during pregnancy, limiting their diagnostic utility.^[5] During pregnancy, ovarian cysts can either regress or develop complications like torsion or intra-cystic hemorrhage, with possible adverse effects on pregnancy outcomes.^[6] The reported incidence of Epithelial ovarian malignancy (EOC) is 1:12,000–1:50,000 of pregnancies. The diagnosis and management of ovarian cancer during pregnancy remain unclear due to the rare occurrence and scant data on this condition.^[7]

Management of ovarian tumors in pregnancy requires balancing maternal oncologic safety with fetal well-being. Decisions regarding observation versus surgery depend on tumor size, morphology, symptoms, suspicion of malignancy, gestational age, and availability of multidisciplinary care.^[6] Optimal maternal and neonatal outcomes can be achieved through coordinated multidisciplinary care involving experts in perinatal medicine, gynecologic oncology, chemotherapy, neonatology, and psychological support.^[8]

This study aims to analyze the clinical profile, management strategies, histopathological spectrum, and reproductive outcomes of ovarian tumors diagnosed during pregnancy at a tertiary care teaching institution.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology and gynecologic oncology clinic at Maulana Azad Medical college & Lok Nayak Hospital New Delhi, from May 2023 to October 2025. In these thirty months of study period 14 antenatal patients with clinico-radiologically diagnosed ovarian tumors, admitted to the maternity ward and planned for delivery, were included in this study. Written informed consent was taken. A detailed history taking and clinical examination were performed. A 3 ml blood sample of each patient was sent for preoperative tumor markers (CA-125, CA 19-9, CEA,

LDH, AFP, beta-HCG and Inhibin B [only in selected cases] and based on the cut-off value of our biochemistry lab, the patients were classified as benign or malignant ovarian tumors. Further USG scan and MRI were done and based on ultrasound findings, using the IOTA simple rules and RMI score, ovarian tumors were classified into three categories: benign (if one or more benign features were present), malignant (if one or more malignant features were present) and inconclusive (if both benign and malignant features were present or none of the features were present). Management was decided based on tumor type, period of gestation and any associated complications like torsion of ovarian tumor. Those who were operated upon, the ovarian tumor after removal was sent for intraoperative frozen section. The gross pathology of ovarian tumor described cystic or solid or mixed consistency tumor. The histopathological study of specimens was reported as benign, borderline, or malignant, and subtyped as epithelial, germ cell, and sex cord-stromal tumors. Data on timing/period of gestation at diagnosis and type of surgery, complications, histopathology, mode of delivery, and maternal–fetal outcomes were analyzed.

OBSERVATION AND RESULTS

A total of 14 patients were included in this study. The prevalence of ovarian tumors in pregnancy was 0.73 in 1000 pregnancies [Total deliveries during this time period - 19,178].

Table-1 depicts the demographic profile of study participants. Most participants were in the 21–30 years age group (69%). The mean maternal age was 25.7 ± 4.7 years. A large majority of the patients (84.6%) were nulliparous, while 15.4% were multigravida. Large majority were Hindu by religion, from urban area and belongs to low socio-economic status.

Most patients were diagnosed incidentally (84.6%), while 15.4% had abdominal pain as the presenting complaint. Normal CA125 values found in 12 patients, while 2 had raised CA125 values (cutoff- 35U/ml).

Table-2 depicts all maternal parameters of study participants. In the present study, 11 patients were diagnosed during the antenatal period – 6(42.85%) during the first trimester, 4 (28.57%) during the second trimester, and 1(7.14%) during the third trimester. One patient (7.14%) was diagnosed during emergency cesarean section, while 2 were diagnosed preconceptionally (14.29%).

Out of 14 cases, 3 patients (21%) were found to have ovarian torsion, while no other significant complication was observed. out of 14 patients, 3 patients each (21.43%) had surgery done for ovarian tumor during the 2nd trimester, cesarean section (2- during emergency cesarean section and 1- during elective cesarean section) and postnatally, while 5 patients (35.71%) are not operated due to their benign nature of tumor markers and

radiological findings and after counselling they were willing to follow up in OPD and to be operated as and when required, and are still on follow-up. Follow-up management includes either planned surgical intervention after delivery or continued monitoring through serial ultrasound examinations. In the present study, 9 patients underwent surgery for an ovarian tumor, out of which 6 (42.85%) had cystectomy, while 3 (21%) had unilateral salpingo-oophorectomy. Those who were not operated are following up in OPD every three months with tumor markers and radiological finding. All 5 cases who were not operated during pregnancy are doing well without any complication.

The most common histopathological finding in the present study was serous cystadenoma (28.57%), followed by mucinous cystadenoma (21.43%) and one case each of dermoid, and mucinous cystadenocarcinoma (Figure 1). Ten patients (71.43%) were delivered vaginally, while 4 patients (28.57%) had cesarean section.

Table-3 depicts perinatal or neonatal outcome of all study participants. Regarding neonatal outcomes, most newborns (42.85%) weighed in the 2500–2999 grams range. Low birth weight (<2500 g) was observed in 14.29% of cases, and no babies weighed > 4000 g. No adverse neonatal outcome was reported.

DISCUSSION

The present study evaluates the clinical profile, management, and outcomes of ovarian tumors diagnosed during pregnancy. The prevalence of ovarian tumors in pregnancy in the present study was 0.73%, which is comparable to that reported by Ritta et al. from Thailand (0.45%) and Naing et al. from Japan (0.8%), but higher than the prevalence reported by Sunanda et al. from India (0.025%).^[3,5,9] Variations in prevalence across studies may be attributed to differences in study design, population characteristics, referral patterns, and the widespread use of routine antenatal ultrasonography.

The present study had one case of epithelial ovarian cancer during pregnancy which was operated during postpartum period. A 28-year-old female, three months postpartum, presented with S/O intermittent lower abdominal pain, abdominal distension since 3 months, weakness and loss of appetite since 2 months. She had h/o high grade fever since 15 days- typhoid positive. The patient was booked in a private hospital. Early ANC USG showed evidence of serous ovarian cyst of 4cm size which increased during pregnancy. She had full term vaginal delivery at a private hospital. Examination revealed a cystic mass corresponding to 30-weeks gravid uterus with smooth margin and regular surface. Imaging -large cystic mass of 18x24x27cm in the right ovary with papillary projections, pus like flakes, indicating ?mucinous cystic neoplasm &/or ? infected ovarian mass(1a,1b). All tumor markers- WNL. Endoscopy

UGIE & LGIE –normal finding. RMI-114, IOTA-indeterminate. Exploratory laparotomy with peritoneal fluid cytology with USO done at 3 weeks postpartum. Intraoperatively, cut section showed a large unilocular cyst with fluid like early pus and mucinous fluid with solid area of 5 x 5 cm figure (1c,1d). HPE- mucinous cystadenocarcinoma with abundant necrosis. IHC markers negative for CK20 and CEA. Postoperative recovery was uneventful. Post op PET CT and tumor markers were WNL. Adjuvant chemotherapy given and patient is being followed up in gynaecologic cancer clinic without any complication.

Mucinous cystadenocarcinoma of the ovary remains challenging to diagnose in postpartum females due to its infrequent occurrence. Future research is needed to enhance our understanding and management of this rare malignancy in postpartum females.

All the parameters of this study were compared with other published studies of different countries in Table-4. The mean age at diagnosis in the present study was 25.5 ± 4.7 years, which is lower than that reported in studies from Thailand, China, Italy, and Japan, but comparable to the Indian study by Sunanda et al.^[9] This reflects the younger maternal age at conception in the Indian population. A high proportion of patients in the present study were nulliparous (84.6%), similar to the findings of Bruno et al.^[6] (88.2%), suggesting that ovarian tumors in pregnancy are more frequently detected in first pregnancies, possibly due to increased surveillance and earlier antenatal registration.

In the present study, ovarian tumors were most commonly diagnosed in the first trimester, which is consistent with the findings of Bruno et al.,^[6] whereas Zhang et al.^[8] and Sunanda et al.^[9] reported a higher detection rate in the second trimester, and Ritta et al.^[3] observed most diagnoses in the third trimester. These differences likely reflect variations in antenatal screening practices and the timing of routine ultrasound examinations.

CONCLUSION

Ovarian tumors are rare during pregnancy, with most being benign. Early detection, careful ultrasonographic evaluation, and individualized management based on gestational age, tumor characteristics, and clinical presentation are crucial.

Surgical intervention, when indicated, can be performed safely during pregnancy, preferably in the second trimester or at the time of cesarean section, without adversely affecting obstetric or neonatal outcomes. A multidisciplinary patient-centered approach allows optimal management of ovarian tumors in pregnancy, intervention in proper time and ensuring timely treatment of complications.

Table 1: Distribution of demographic details, tumor markers, IOTA classification (Simple Rules) and interpretation of RMI of study participants.

Variables		Frequency	Percentage
1.Age group	≤20 years	2	14.29%
	21 to 30 years	10	71.42%
	31 to 40 years	2	14.29%
	Mean ± SD in year	25.71 ± 4.68	
	Median (25th–75th percentile)	24.5 (24–28)	
	Range in year	18–34	
2.Residence	Urban	10	71.4%
	Rural	4	28.5%
3.Religion	Hindu	8	57.1%
	Muslim	6	42.8%
4.Socio-economic status	Lower	11	78.5%
	Upper-middle	3	21.4%
	Upper	0	0
5.Menstrual History	Regular	11	78.57%
	Irregular	3	21.42%
6.Obstetric History	Primigravida	12	85.71%
	Multigravida	2	14.29%
7.Presenting Complaint	Asymptomatic/Incidental	12	85.71%
	Pain abdomen	2	14.29%
8.Period of Gestation at Diagnosis	1st trimester	6	42.85%
	2nd trimester	4	28.57%
	Before conception	2	14.29%
	During caesarean section	1	7.14%
	3rd trimester	1	7.14%
9.Tumor Marker Distribution	Normal range	5	35.64%
	Raised values	9	64.3%
10.IOTA Classification Interpretation	Benign	7	49.9%
	Malignant	1	7.1%
	Inconclusive	4	28.5%
11.Interpretation of RMI	Low risk	9	64.3%
	Intermediate risk	4	28.5%
	High risk	01	7.1%%

Table 2: Maternal Outcome of all study participants.

Maternal parameter		Frequency	Percentage
1.POG at delivery	Preterm	1	7%
	Term	13	92.8%
2.Mode of delivery	Vaginal	10	71.4%
	Emergency LSCS	3	21.4%
	Elective LSCS	1	7.1%
3.Type of labor onset	Spontaneous	8	57.1%
	Induced	6	42.8%
4.Indication for IOL	HDP	2	33.3%
	GDM	1	16.6%
	Postdatism	3	50%
5.Indication for Cesarean Section	Failed induction	1	25%
	Fetal distress	3	75%
6) Timing of surgery for ovarian tumor	2 nd trimester	3	21.43%
	With Emergency LSCS	2	14.29%
	With elective LSCS	1	7.14%
	postpartum	3	21.43%
	Not operated on follow up	5	35.71%
7.Type of Surgery for ovarian tumor	Cystectomy	6	42.8%
	Unilateral salpingo-oophorectomy	3	21.4%
	Not done	5	35.7%

8.Complications	Torsion	3	21.4%
9.Duration of hospital stay	Less than 5 days	11	78.6%
	More than 5 days	3	21.4%
10.Histopathological finding of ovarian tumor	Serous cystadenoma	4	28.57%
	Mucinous cystadenoma	3	21.4%
	Dermoid cyst	1	7.14%
	Mucinous cystadenocarcinoma	1	7.14%
11.Short term outcome- Post surgery USG	residual disease	0	0%

Table 3: Perinatal outcome of all study participants.

Parameters	Variables	Frequency	Percentage
1.Period of gestation (at delivery)	Preterm	1	7.1%
	Term	13	92.7%
2.Live birth	Term + Preterm	14	100%
3.Birth weight (in grams)	<2500	2	14.29%
	2500–2999	6	42.85%
	3000–3499	5	35.71%
	3500–3999	1	7.14%
4.APGAR score at 1 min	9	12	85.71%
	8	2	16.6%
5.NICU admission		0	0%

Table 4: Comparison of outcomes of different studies on pregnancy with ovarian tumor.

Characteristic	Present Study	Ritta et al. ³ , 2024 Thailand	Zhang et al. ⁸ , 2021 China	Bruno et al. ⁶ , 2023 Italy	Naing et al. ⁵ , 2023 Japan	Sunanda et al. ⁹ , 2015 India
Number of cases	14	113	228	17	126	17
Prevalence (%)	0.73	0.45			0.8	0.025
Age at diagnosis (years)						
Mean	25.5 ± 4.7	29.6	30.8	33	30.5	23.47
Parity, n (%)						
Nulliparous	84.6	57.9		88.2		47.05%
Gestational age at diagnosis (mean)	1st trimester	3 rd trimester	2 nd trimester	1 st trimester		2 nd trimester
Timing of surgery, n (%)						
During cesarean section	21.43	75.4	72.8	23.5		
Antepartum	21.43	24.6	25.4	0	100	
Postpartum	21.43		0.01	23.5		
Conservative	35.71		0	53	28	
Complications (n (%))						
Ovarian torsion	21%	7.1%	9.6%	5.6%	3.9%	47%
Histopathology, n(%)						
Benign tumors	92.9	99.86	96.5	99.9	99.9	94.2
Malignant tumors	7.1%	0.14%	3.51%	0.01%	0.01%	5.8%
Most common histopathology	Serous cystadenoma	Teratoma	Teratoma	Teratoma	Teratoma	Serous cystadenoma
Mode of delivery						
Normal vaginal	71.4%			35.3%	70.4%	
Instrumental delivery	0				8.7%	
Caesarean section	28.57%			29.4%	20.9%	

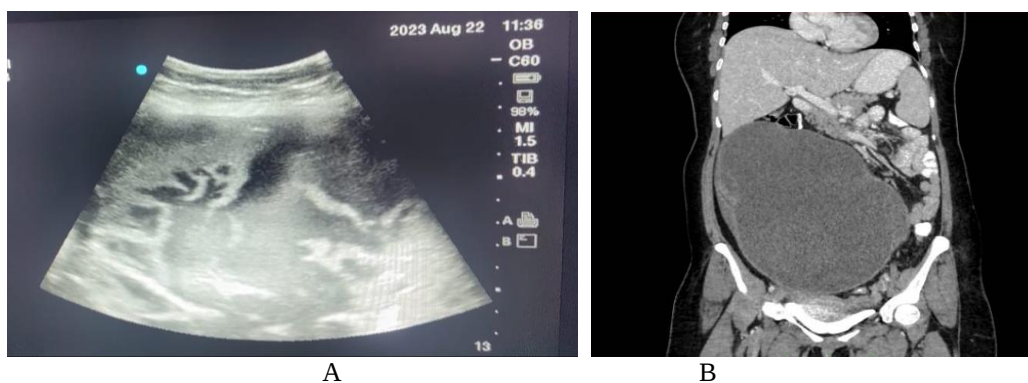


Fig. 1 a) USG finding –huge ovarian cyst with papillary projections, 1b) CECT abdomen showing ovarian tumor.

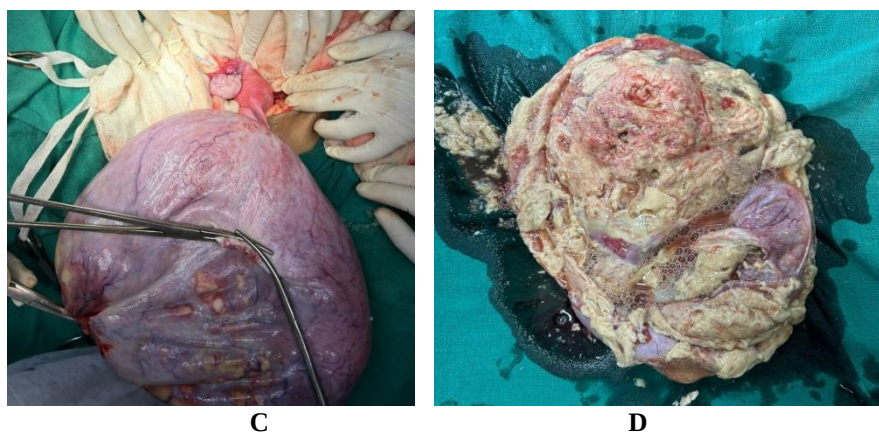


Fig. 1: C) Intraoperative finding of huge ovarian cyst. 1 D) Cut-section of ovarian tumor showing flakes like mucinous material.

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