DOI: 10.7860/JCDR/2023/63746.18535

Original Article

Obstetrics and Gynaecology Section

Management of Dermoid Cysts in Pregnancy at a Tertiary Care Centre: A Retrospective Observational Study

TAMMA ANUSHA REDDY[1], SL ARATHY RAJ[2], MINAKSHI KUMARI[3], SWATI RATHORE[4], K BEENA[5]

ABSTRACT

Introduction: Ovarian masses are not uncommon in pregnancy. The increased use of Ultrasonography (USG) in recent years has led to the detection of asymptomatic ovarian masses in pregnant women. Dermoid cysts are the most common type of ovarian germ cell tumour in pregnancy. Most of them are asymptomatic and are incidental findings. However, a few can present with complications such as torsion and rupture. The diagnosis and management of dermoid cysts in pregnancy present a clinical dilemma.

Aim: To evaluate the management and outcomes of antenatal patients diagnosed with dermoid cysts.

Materials and Methods: A retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at Christian Medical College, Vellore, Tamil Nadu, India, from January 2015 to January 2022. The study included 37 patients, and data regarding the diagnosis of dermoid cysts, their radiological and clinical characteristics, management, and pregnancy outcomes were collected from the electronic database. Descriptive statistics were used for reporting demographic and clinical characteristics. Categorical variables were presented as numbers with percentages, while continuous variables were presented as mean with Standard Deviation (SD) or median with Interquartile Range (IQR).

Results: The dermoid cysts ranged in size from 2.2 cm to 30 cm, with a mean size of 7.28±4.51 cm. A total of 35 (95%) of them were incidentally detected. USG was the imaging modality used for diagnosis and follow-up. Only 30% (11/37) of the patients required surgical intervention during the antenatal period. Torsion was the indication for emergency surgical intervention in 46% (5/11) of cases. Laparoscopy was the preferred approach for surgical intervention in 91% (10/11) of patients. The remaining 70% (26/37) of patients were managed conservatively with serial USG, and no adverse outcomes were reported. Among the patients who underwent caesarean section for obstetric indications, 35% (13/37) also underwent surgical intervention for the dermoid cyst (either cystectomy or oophorectomy) during the same procedure.

Conclusion: Antenatal patients diagnosed with dermoid cysts during pregnancy can be managed conservatively with serial USG, with a plan for surgical intervention if needed. In cases where surgical intervention is required, it can be safely performed as a laparoscopic procedure. In case of complications such as torsion, laparoscopy can be performed during pregnancy with appropriate precautionary measures.

Keywords: Laparoscopic surgery, Mature cystic teratoma, Ovarian dermoid cyst, Ultrasound

INTRODUCTION

The incidence of adnexal masses during pregnancy is estimated to be 1.5%-3%, of which only 5% are malignant [1]. Dermoid cysts account for 10%-25% of these masses and occur bilaterally in 10%-15% of cases [2]. Dermoid cysts are the most common non-functional benign ovarian tumours in premenopausal women, representing 70% of premenopausal women with an adnexal mass [3]. The majority of adnexal masses in pregnancy are diagnosed incidentally during ultrasound examinations conducted as part of routine pregnancy evaluation [4].

However, the management of dermoid cysts during pregnancy can be challenging. The choice of diagnostic tests, such as imaging modalities and tumour markers, and their interpretation and usefulness are varied due to physiological changes in pregnancy. The management of incidentally detected dermoid cysts during pregnancy poses a dilemma in clinical practice. The decision between immediate surgical intervention and conservative management is challenging for both clinicians and patients [5]. Surgical intervention performed in early gestations carries a risk of abortion [6]. On the contrary, keeping patients on conservative management carries inherent risk of torsion, haemorrhage, or cyst rupture, potentially necessitating unplanned and emergency surgery later in advanced gestational ages. This can be quite detrimental to the mother and the foetus [1]. Most of literature suggests that a patient can be kept of conservative management if the adnexal mass is ≤5 cm [7-9]. However, for larger dimensions, there is an in diagnosis of dermoid ovarian cyst in the record during their antenatal period were creased risk of torsion and a higher likelihood of surgical intervention. Therefore, the present study was designed to evaluate the management approaches and outcomes of pregnant patients diagnosed with dermoid cysts.

MATERIALS AND METHODS

This retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at Christian Medical College, Vellore, Tamil Nadu, India, from January 2015 to January 2022. Institutional review board clearance (IRB Min number 14950 dated 26.10.2022) was obtained. Collection of data was done from the electronic database and analysed for the specified study duration. The data collection and analysis were conducted from October 2022 to December 2022.

Inclusion criteria: All patients with a documented diagnosis of dermoid ovarian cyst during their antenatal period were included in the study.

Exclusion criteria: Since the present study was an observational study, no patients were excluded.

Study Procedure

Information pertaining to the gestational age at the diagnosis of the dermoid cyst, its size, various USG characteristics, subsequent follow-up, pregnancy outcomes, the need for surgical intervention, intraoperative findings, and final histopathological reports for surgically excised cysts were noted and analysed.

STATISTICAL ANALYSIS

Descriptive statistics were used to report demographic and clinical characteristics. Categorical variables were presented as numbers with percentages, while continuous variables were presented as means with SD and medians with IQR. All statistical analyses were performed using Statistical Package for Social Sciences (SPSS) version 25.0.

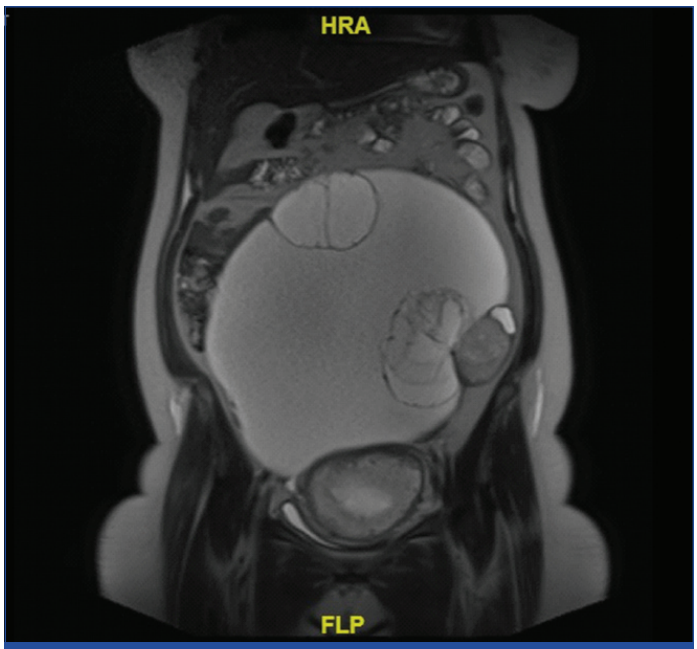
RESULTS

During the study period, a total of 37 patients were diagnosed with dermoid cysts during the antenatal period. The mean age of the patients was 26 years (±3.7 SD). Incidental detection accounted for 35 (95%) of the cases. The majority of the cysts were diagnosed during the first trimester scan (28 patients, 76%). The size of the dermoid cysts ranged from 2.2 cm to 30 cm, with a mean size of 7.28±4.51 cm. Two patients were found to have bilateral dermoid cysts [Table/Fig-1].

Characteristics	Frequency n (%)
Age (in years)	
20-25	18 (48.6)
26-30	10 (27)
>30	9 (24.3)
Mean±SD	26.94±3.70
Median (IQR)	26 (24,30.5)
Parity	
Nulliparous	27 (73)
Multiparous	10 (27)
Gestation age at diagnosis*	
1st trimester	28 (75.7)
2nd trimester	8 (21.6)
Size of cyst at diagnosis†	
≤5 cm	11 (29.7)
>5-≤10 cm	22 (59.5)
>10 cm	4 (10.8)
Mean±SD	7.28±4.51
Median (IQR)	6.5 (4.98, 8.30)
Clinical presentation	
Incidental finding	35 (94.6)
Vague abdomen pain/mass perception	1 (2.7)
Acute abdomen pain-suggestive of torsion	1 (2.7)
Overall surgical intervention for cyst (antenatal and postnatal period)‡§	
During pregnancy as an emergency intervention	5 (13.5)
During pregnancy as a planned surgery	6 (16.2)
At the time of LSCS	13 (35.1)
After delivery as an elective procedure	5 (13.5)
Route of surgery for cyst	
During antenatal period- (11)	
Laparoscopic	10 (90.9)
Laparotomy	1 (9)
After delivery- (5)	
Laparoscopic	4 (80)
Laparotomy	1 (20)
Outcome of pregnancy	
Abortion	2 (5.4)
Preterm delivery	1 (2.7)
Full-term delivery	33 (89.2)
Lost to follow-up	1 (2.7)

[Table/Fig-1]: Demographic characteristics of the study population.
*Information for gestation age at diagnosis of dermoid cyst in pregnancy was missing for one patient; †Two patients had bilateral dermoid cysts; 1 patient had dermoid cyst one side with mucinous cyst on the other side; ‡One patient lost to follow-up; §Six patients were planned for elective surgery which was not yet performed, 2 patients were lost to follow-up after delivery

Out of the 37 patients, a total of 26 were managed conservatively and did not require antenatal surgery for the dermoid cyst. Among them, 13 patients underwent surgery for the dermoid cyst during Low Segment Caesarean Section (LSCS), five patients underwent planned elective surgery for the cyst after vaginal delivery, six patients were scheduled for elective surgery but it had not been performed at the time of the study, and two patients were lost to follow-up. One patient presented with mass perception and had a large 30 cm cyst. The Magnetic Resonance Imaging (MRI) findings of this patient are shown in [Table/Fig-2].



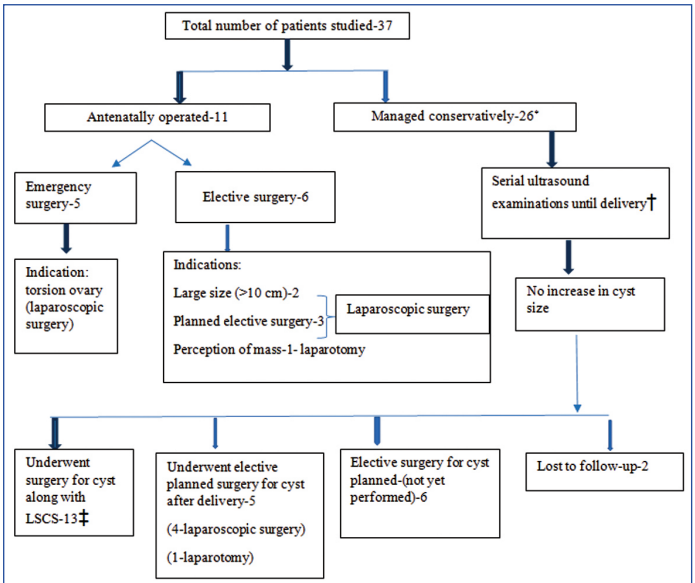
[Table/Fig-2]: T2 weighted MRI image- showing a large complex cyst with a fat containing solid component in the lower abdomen and pelvis.

Ultrasound was the chosen imaging modality for diagnosis and follow-up in all patients except one who had suspicious findings on the scan, leading to the use of a higher imaging modality, MRI, for better characterisation of the cyst. Tumour markers were not routinely performed for all patients. Only five patients had tumour markers {mainly Cancer Antigen-125 (CA-125) and Carcinoembryonic Antigen (CEA)} tested, and the results were within the normal range. This was due to one patient having a large cyst with suspicious features on USG and another patient having tumour markers obtained from a previous evaluation. The three remaining patients who had tumour markers tested had cyst sizes ≥10 cm. A significant proportion of patients (26/37, 70%) were managed conservatively with serial ultrasound examinations throughout the antenatal period. The plan was to perform either cystectomy or oophorectomy along with LSCS if needed for obstetric indications. There was no increase in the size of the cysts among those managed conservatively.

Only 11 out of 37 patients (30%) underwent surgical intervention for the dermoid cyst during the antenatal period. The most common indication for surgery was torsion, accounting for 5 out of

11 cases (46%). One patient required laparotomy and oophorectomy for a suspicious-looking, large (30 cm) cyst. Among the remaining cases, 10 out of 11 (91%) underwent laparoscopic surgery. The planned laparoscopic surgeries were performed between 12 to 21 weeks of gestation.

Out of the 26 patients who were managed conservatively and did not undergo antenatal surgical intervention or deliver vaginally, 13 of them underwent either cystectomy or oophorectomy as a concomitant procedure during LSCS performed for obstetric indications. Four patients out of the 26 who did not undergo antenatal surgical intervention or deliver vaginally underwent planned laparoscopic surgery for the dermoid cyst at a later date. Staging laparotomy was performed for one patient after LSCS due to a suspicious-looking cyst, and the histopathological report revealed a dermoid cyst on one side and a mucinous cyst on the other side. The surgical management of the study population is represented as a flowchart shown in [Table/Fig-3].



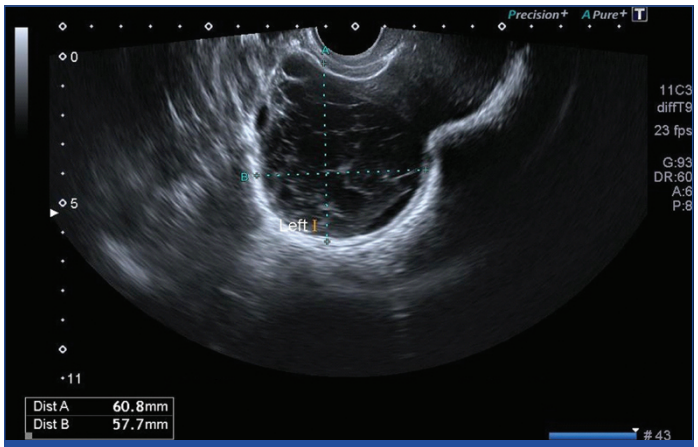
[Table/Fig-3]: Management of the study population.
*one patient lost to follow-up; †one patient not yet delivered; ‡Oophorectomy was attempted for one more patient but could not be performed due to dense adhesions of the cyst with the uterus

All surgical histopathology reports confirmed the presence of mature cystic teratoma. One of the reports indicated the additional component of mucinous cystadenoma within the mature cystic teratoma, while another patient had a mucinous cystadenoma in one ovary and a mature cystic teratoma in the other. The pregnancy outcomes were favourable for all patients, except for two who experienced foetal expulsion two days after emergency laparoscopic surgery for ovarian torsion in the second trimester. One patient included in the study was lost to follow-up.

DISCUSSION

Dermoid cyst is the most common ovarian tumor in pregnancy [1] with 65%-85% being asymptomatic, as in the present study- where 95% were incidentally detected. In the rare instance of being symptomatic - they generally have non specific complaints (such as vague, non severe abdominal pain). In case of a large cyst there can be a palpable adnexal mass on clinical examination in early gestation.

Rarely these patients can present with a cute abdomen pain due to either torsion or rupture of cyst or haemorrhage into the cyst. The occurrence of torsion in pregnancy has a varied percentage in literature. The incidence of torsion and rupture of cyst in pregnancy has been estimated to be around 5% and less than 1%, respectively [1]. This risk of torsion has been estimated to be as high as 20% when the cyst is larger than 6 cm [6,9,10]. This rises the need for an emergency surgical intervention during the antenatal period. In the present study only 5/37- 14% patients needed an emergency surgery for torsion. Similar incidence of torsion was seen in another large study which quoted that 12%-18% of patients with ovarian torsion were pregnant [11]. Another study in 2020 confirmed that although torsion ovary is a known complication for adnexal masses in pregnancy it more frequently occurs in the first trimester as compared to later gestation ages [12]. USG features of adnexal masses has been proven to be accurate and considered to be a safe imaging modality in pregnancy [13]. It is easily available, non invasive and is part of the routine antenatal care [14]. The characteristic USG feature of dermoid cyst is the presence of 'Rokitansky nodule' - a hyperechoic nodule with acoustic shadowing in a background of low-level echoes. This is the 'tip of the iceberg phenomenon' which is an echogenic cyst with posterior attenuation of sound caused by sebum and hair contents. 'Dermoid mesh pattern' which is seen as multiple interdigitating lines and dots occur when hair is floating in sebum. as shown in [Table/Fig-4] [15]. Presence of 2 /3 features on USG was shown to have a 100% positive predictive value [4]. The contents of the cyst are predominantly-sebaceous material with hair and rarely - bone, teeth, thyroid cartilage, etc. While assessing an adnexal cyst in pregnancy the Ovarian Tumor Analysis (IOTA) simple rules form an acceptable guidance to decide on the benign nature of the cyst [16,17]. When USG is inconclusive or for evaluation of large masses for adjacent organ invasion- MRI is the higher imaging to be done [1]. In the present study population USG was the imaging modality that was used for diagnosis and follow-up. This test being easily accessible, economical and non invasive yet accurate, and can be part of the routine evaluation done during pregnancy as part of the foetal morphology and growth scans. The role of tumor markers in evaluation of adnexal masses in pregnancy is challenging as they can be normally raised due to pregnancy and therefore lack specificity [1,18]. Their levels can fluctuate with gestational age and are also elevated due to abnormal placentation or foetal abnormalities [19]. Hence, tumor markers need to be done only when the cyst looks suspicious of malignancy. In the present study one patient had suspicious looking features on USG needing MRI and tumor markers for further evaluation. However, all the other patients did not require a higher imaging modality for characterising the cyst. The management depends mainly on symptomatology and radiological features. They can be offered conservative management with serial USG provided they remain asymptomatic and there is no increase in size of the cyst [1,20,21]. Although the risk of torsion in adnexal masses in pregnancy is estimated to be



[Table/Fig-4]: Ultrasonography image of a dermoid cyst depicting the 'Dermoid Mesh Pattern'.

as high as 20% for cysts larger than 6 cm, studies has shown that it is not justified to perform an elective surgery in larger cysts in the absence of suggestive symptoms and complications [10,22]. Complimenting this thought is also the proven evidence in literature that the chance of torsion in pregnancy decreases as the gestation advances with a maximum occurrence in the first trimester [12]. The role of conservative management was evident in the present study- 70% of the patients were managed conservatively with no adverse outcome. Thereby, avoiding surgical intervention antenatally and its associated co-morbidities. The cyst can be operated concomitantly at delivery among patients undergoing LSCS for obstetric indications. In the present study, 13/26 -50% patients were managed in this manner. Of these patients two had bilateral dermoid cyst and underwent bilateral cystectomy during LSCS. Contrary to this literature states that bilateral dermoid cyst is an indication for surgery during the antenatal period especially for cyst of size >6 cm [23].

Among those needing emergency surgery (11/37-30%) the most common indication was torsion ovary (5/11-46%). None of them had rupture or haemorrhage in cyst which is similar to the incidence stated in literature - torsion being the most common as compared to the others [1]. According to recent literature, laparoscopy, if surgical intervention is indicated, is proven to be a safe option for surgical approach during pregnancy [1,18]. Laparoscopy is preferred over laparotomy in pregnancy as a safer alternative [24]. It can be performed as an emergency or elective procedure provided the needed precautionary methods are followed. In the present study 10/11- (91%) patients underwent laparoscopic surgery for the cyst antenatally. The outcome of pregnancy was favorable in all of them except two patients who aborted postoperatively.

Safety measures to be considered while planning a laparoscopic surgery antenatally are: availability of surgical expertise, open technique for primary port placement in the supraumbilical region, maintaining low and stable CO_2 insufflation pressure (below 12 mmHg), slow inclination to Trendelenburg position, use of left lateral tilt in pregnancies that are beyond 20 weeks of gestation and careful monitoring of mother and foetus during the procedure [25]. However, beyond 28 weeks of gestation there is an increased risk of preterm labor [1]. however there is now growing evidence to prove the safety of laparoscopy in any trimester [26,27].

Limitation(s)

The retrospective design of the study itself was a limitation. A prospective study to assess the fears experienced by patients as they go through pregnancy with a dermoid cyst would also be helpful in counselling such patients in the future.

CONCLUSION(S)

The study supports the role of conservative management with serial USG for benign-looking dermoid cysts diagnosed during pregnancy, following the IOTA rules. The intention was to offer planned surgical intervention either at the time of LSCS done for obstetric indications or at a later date after delivery. Laparoscopy can be safely performed during pregnancy while adhering to certain precautionary measures. In cases where there is suspicion of malignancy or when complications such as necrosis, rupture, or haemorrhage occur, laparotomy should be considered regardless of the gestational age.

Acknowledgement

The authors would like to acknowledge the medical records staff who helped in retrieving the data, as well as, all the doctors, sonologists, and clerical staff who contributed to the care of the patients and the collection of the present data.

REFERENCES

[1] Martone S, Troia L, Luisi S. Adnexal masses during pregnancy: Management for a better approach. Gynecol Surg. 2021;18:3. https://doi.org/10.1186/s10397-021-01084-9.
[2] Njoku C, Oriji PC, Afolabi AS, Kuete E. Bilateral dermoid cyst of the ovary: A case report. Yen Med J. 2020;2(1):190-92.
[3] St. Louis M, Mangal R, Stead TS, Sosa M, Ganti L. Ovarian dermoid tumour. Cureus. 2022;14(7):e27233. https://doi.org/10.7759/cureus.27233.
[4] de Haan J, Verheecke M, Amant F. Management of ovarian cysts and cancer in pregnancy. Facts Views Vis ObGyn. 2015;7:25-31.
[5] Hakoun AM, AbouAl-Shaar I, Zaza KJ, Abou-Al-Shaar H, ASalloum MN. Adnexal masses in pregnancy: An updated review. Avicenna J Med. 2017;7:153-57. https://doi.org/10.4103/ajm.AJM_22_17.
[6] Rottenstreich M, Rotem R, Hirsch A, Moran I, Ben-Shushan A, Armon S, et al. Maternal and perinatal outcomes following laparoscopy for suspected adnexal torsion during pregnancy: A multicenter cohort study. Arch Gynecol Obstet. 2020;302:1413-19. https://doi.org/10.1007/s00404-020-05752-7.
[7] Caspi B, Levi R, Appelman Z, Rabinerson D, Goldman G, Hagay Z. Conservative management of ovarian cystic teratoma during pregnancy and labor. Am J Obstet Gynecol 2000;182:503-5. https://doi.org/10.1067/mob.2000.103768.
[8] Osto M, Brooks A, Khan A. Ovarian cystic teratoma in pregnant women: Conservative management or prophylactic oophorectomy? Cureus. 2021;13(8):e17354. https://doi.org/10.7759/cureus.17354.
[9] Schmeler KM, Mayo-Smith WW, Peipert JF, Weitzen S, Manuel MD, Gordinier ME. Adnexal masses in pregnancy: Surgery compared with observation. Obstet Gynecol 2005;105:1098. https://doi.org/10.1097/01.AOG.0000157465.99639.e5.
[10] Koo YJ, Kim TJ, Lee JE, Kwon YS, Kim HJ, Lee IH, et al. Risk of torsion and malignancy by adnexal mass size in pregnant women. Acta Obstet Gynecol Scand 2011;90:358-61. https://doi.org/10.1111/j.1600-0412.2011.01070.x.
[11] Houry D, Abbott JT. Ovarian torsion: A fifteen-year review. Annals of Emergency Medicine. 2001;38(2):156-59. Available from: https://www.sciencedirect.com/science/article/abs/pii/S019606440188971X. (Accessed June 12, 2023).
[12] Feng JL, Zheng J, Lei T, Xu YJ, Pang H, Xie HN. Comparison of ovarian torsion between pregnant and non-pregnant women at reproductive ages: Sonographic and pathological findings. Quant Imaging Med Surg. 2020;10:137-47. https://doi.org/10.21037/qims.2019.11.06.
[13] Nick AM, Schmeler K. Adnexal masses in pregnancy. Perinatology. 2010;1(2):13-19. Available from: https://www.perinatology.com/perinatology/Volume1-Issue2/Adnexal%20Masses%20in%20Pregnancy.htm. (Accessed October 6, 2022).
[14] Sarbhai MYV. Diagnostic accuracy of ultrasonography with laparoscopy for assessment of benign adnexal masses. Int J Reprod Contracept Obstet Gynecol. 2020;9:283-88.
[15] Sahin H, Abdullazade S, Sanci M. Mature cystic teratoma of the ovary: A cutting edge overview on imaging features. Insights Imaging. 2017;8:227-41.
[16] Auekitrungrueng R, Tinnangwattana D, Tantipalakorn C, Charoenratana C, Lerthiranwong T, Wanapirak C, et al. Comparison of the diagnostic accuracy of International Ovarian Tumor Analysis simple rules and the risk of malignancy index to discriminate between benign and malignant adnexal masses. Int J Gynaecol Obstet. 2019;146(3):364-69.
[17] Timmerman D, Ameye L, Fischerova D, Epstein E, Melis GB, Guerriero S, et al. Simple ultrasound rules to distinguish between benign and malignant adnexal masses before surgery: Prospective validation by IOTA group. BMJ. 2010;341:c6839. https://doi.org/10.1136/bmj.c6839.
[18] Cavaco-Gomes J, Jorge Moreira C, Rocha A, Mota R, Paiva V, Costa A. Investigation and management of adnexal masses in pregnancy. Scientifica. 2016;2016:3012802. https://doi.org/10.1155/2016/3012802.
[19] Sarandakou A, Protonotariou E, Rizos D. Tumour markers in biological fluids associated with pregnancy. Crit Rev Clin Lab Sci. 2007;44:151-78. https://doi.org/10.1080/10408360601003143.
[20] Hoo WL, Yazbek J, Holland T, Mavrelos D, Tong ENC, Jurkovic D. Expectant management of ultrasonically diagnosed ovarian dermoid cysts: Is it possible to predict outcome? Ultrasound Obstet Gynecol. 2010;36:235-40. https://doi.org/10.1002/uog.7610.
[21] Rao DT. TOG article: Management of adnexal masses in pregnancy. Dr Tanushree Rao Women Health Blog 2017. https://medgyne.com/tog-article-management-of-adnexal-masses-in-pregnancy/. (Accessed September 30, 2023).
[22] Mukhopadhyay A, Shinde A, Naik R. Ovarian cysts and cancer in pregnancy. Best Pract Res Clin Obstet Gynaecol. 2016;33:58-72. https://doi.org/10.1016/j.bpobgyn.2015.10.015.
[23] Moradan S. Surgical management of an ovarian bilateral multiple dermoid cyst during pregnancy: A case report study. Middle East J Rehabil Health Stud. 2016;3(2):e36097. https://doi.org/10.17795/mejrh-36097.
[24] Ribic-Pucelj M, Kobal B, Peternelj-Marinsek S. Surgical treatment of adnexal masses in pregnancy: Indications, surgical approach and pregnancy outcome. J Reprod Med. 2007;52:273-79.
[25] Dizon AM, Carey ET. Minimally invasive gynecologic surgery in the pregnant patient: considerations, techniques, and postoperative management per trimester. Curr Opin Obstet Gynecol. 2018;30(4):267-71.

[26] Minig L, Otaño L, Cruz P, Patrono MG, Botazzi C, Zapardiel I. Laparoscopic surgery for treating adnexal masses during the first trimester of pregnancy. J Minimal Access Surg. 2016;12:22-25. https://doi.org/10.4103/0972-9941.171960.

[27] Weiner E, Mizrachi Y, Keidar R, Kerner R, Golan A, Sagiv R. Laparoscopic surgery performed in advanced pregnancy compared to early pregnancy. Arch Gynecol Obstet. 2015;292(5):1063-8.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Obstetrics and Gynaecology, Christian Medical College, Vellore, Tamil Nadu, India.
2. Assistant Professor, Department of Obstetrics and Gynaecology, Christian Medical College, Vellore, Tamil Nadu, India.
3. Assistant Professor, Department of Obstetrics and Gynaecology, Christian Medical College, Vellore, Tamil Nadu, India.
4. Professor, Department of Obstetrics and Gynaecology, Christian Medical College, Vellore, Tamil Nadu, India.
5. Associate Professor, Department of Obstetrics and Gynaecology, Christian Medical College, Vellore, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
K Beena,
7th Floor, OG1 Office, ISSC Building, CMCH, Vellore-632002, Tamil Nadu, India.
E-mail: beenaruthk@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 02, 2023
- Manual Googling: Jun 10, 2023
- iThenticate Software: Jul 08, 2023 (6%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Feb 24, 2023**
Date of Peer Review: **May 22, 2023**
Date of Acceptance: **Jul 11, 2023**
Date of Publishing: **Oct 01, 2023**