Case Report

Strategic Surgical Management of Complex Ovarian Masses During Second-Trimester Pregnancy: A Serial Case Report

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Abstract
Introduction: Ovarian masses are found in about 1.5% – 5.7% of pregnancies, with suspicion of malignancy in 1% – 6% of cases. Large or complex adnexal masses can increase the risk of torsion, rupture, or malignant transformation. This report aims to highlight the importance of personalized surgical management of ovarian masses during pregnancy, particularly emphasizing the benefits of second-trimester intervention, and to explore the research question: *Can elective adnexal surgery during the second trimester improve maternal and fetal outcomes in high-risk pregnancies?*
Case Report: Two pregnant patients with adnexal masses were evaluated clinically and radiologically. Decision-making was based on gestational age, mass characteristics, and maternal-fetal considerations. Both underwent surgical management in the second trimester, with histopathological confirmation obtained. Case 1: A 37-year-old G5P3A1 at 16 weeks' gestation presented with a multilocular cystic mass (25×12×8 cm) in the right ovary. Salpingo-oophorectomy at 19 weeks revealed a benign non-papillary cyst. Case 2: A 24-year-old G3P2A0 at 23 weeks' gestation had a complex adnexal mass (20×20×15 cm). Partial oophorectomy revealed sebaceous material, hair, and cartilage. Histopathology confirmed a mature cystic teratoma. The pregnancy progressed uneventfully, culminating in spontaneous vaginal delivery at term.
Conclusion: This case report emphasizes the importance of prompt surgical intervention during the second trimester of pregnancy. It offers unique insights into the strategic management of complex ovarian masses, contributing valuable information to the limited literature and guiding clinical decision-making in similar cases.

Keywords: Adnexal surgery; ovarian mass; second-trimester pregnancy; teratoma

Manajemen Bedah Strategis Massa Ovarium Kompleks pada Kehamilan Trimester Kedua: Laporan Kasus Serial

Abstrak
Pendahuluan: Massa ovarium ditemukan pada sekira 1,5% – 5,7% kehamilan, dengan kecurigaan keganasan pada 1% – 6% kasus. Massa adneksa yang besar atau kompleks dapat menimbulkan risiko torsi, ruptur, atau transformasi ganas. Laporan ini bertujuan untuk menyoroti peran penatalaksanaan bedah individual pada massa ovarium selama kehamilan, khususnya dengan menekankan keuntungan intervensi pada trimester kedua, serta menjawab pertanyaan penelitian: Dapatkah pembedahan adneksa elektif pada trimester kedua mengoptimalkan luaran maternal dan janin pada kehamilan berisiko tinggi?
Laporan Kasus: Dua pasien hamil dengan massa adneksa dievaluasi secara klinis dan radiologis. Pengambilan keputusan didasarkan pada usia kehamilan, karakteristik massa, dan pertimbangan maternal-janin. Keduanya menjalani penatalaksanaan bedah pada trimester kedua, dan konfirmasi histopatologi diperoleh. Kasus 1: Wanita 37 tahun G5P3A1 pada usia kehamilan 16 minggu dengan massa kistik multilokular (25×12×8 cm) pada ovarium kanan. Salpingo-ooforektomi pada usia kehamilan 19 minggu menunjukkan kista jinak non-papiler. Kasus 2: Wanita 24 tahun G3P2A0 pada usia kehamilan 23 minggu dengan massa adneksa kompleks (20×20×15 cm). Ooforektomi parsial menunjukkan adanya material sebaceous, rambut, dan kartilago. Histopatologi mengonfirmasi teratoma kistik matur. Kehamilan berlangsung tanpa komplikasi dan berakhir dengan persalinan spontan pervaginam aterm.
Kesimpulan: Pembedahan adneksa elektif pada trimester kedua memberikan kondisi anatomi dan obstetri yang optimal, serta meminimalkan risiko teratogenik dan persalinan prematur. Dengan pendekatan individual, multidisipliner, dan berbasis bukti, strategi ini dapat memberikan luaran maternal dan neonatal yang baik pada kehamilan berisiko tinggi terpilih.

Kata kunci: Kehamilan trimester kedua; massa ovarium, pembedahan adneksa, teratoma

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Introduction

Ovarian tumors are a heterogeneous group of neoplasms arising from various histological origins, including epithelial, connective, germ cell, and embryonal components. Among these, epithelial tumors account for approximately 80% of all ovarian neoplasms. Of these, 80% are benign, and 20% are malignant. Notably, 90% of malignant ovarian tumors originate from epithelial tissues, with 80% classified as primary ovarian malignancies and the remaining 20% as secondary tumors metastasizing from other organs such as the breast, gastrointestinal tract, or colon. Moreover, certain benign ovarian tumors possess the potential for secondary malignant transformation.[1,2]

The occurrence of ovarian tumors during pregnancy is relatively rare, accounting for about 2.4% to 5.7% of all pregnancies.[1,3] Most of these tumors (80–85%) are benign, whereas about 1–6% are malignant.[3–5] Diagnosing adnexal masses during pregnancy presents a significant clinical challenge due to the enlarging uterus and changes related to gestation. These changes can make it difficult to evaluate ovarian masses through physical exam and ultrasonography. Persistent ovarian masses, especially those with suspicious features, must be carefully examined to prevent delays in diagnosing potential malignancies.[5]

Ovarian cysts larger than 10 cm are typically recommended for surgical removal due to the higher risks of malignancy, torsion, or rupture. Surgery is also advised when a cyst shows complex features like septations, nodules, papillary projections, or solid parts. The removal of ovarian tumors or cysts is ideally done before 28 weeks of gestation, as the masses are more accessible at this stage. After 28 weeks, the enlarging uterus can block the surgical view, making the procedure more difficult and increasing the risk of preterm labor.[6,7]

Significant physiological and anatomical changes during pregnancy must be carefully considered when planning gynecological surgery. Pregnant patients requiring surgical intervention demand meticulous perioperative management and an individual approach. Previous studies have demonstrated the relative safety of both laparotomy and laparoscopy during pregnancy. The decision between cystectomy and salpingo-oophorectomy, performed via laparotomy or laparoscopy, depends on several factors, including the size of the mass, the availability of surgical equipment, and the surgeon's expertise.[4]

This case report covers the clinical decision-making process and maternal-fetal outcomes in managing ovarian tumors during pregnancy, focusing on a patient eventually diagnosed with a mature cystic teratoma.

Figure 1 G5P3A1 Gravida 15-16 Weeks; Multilocular Ovarian Cyst on USG

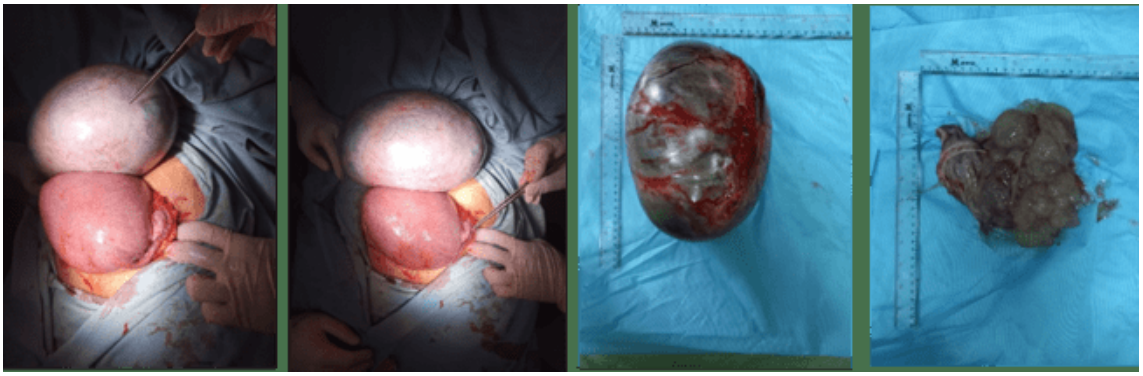

Figure 2 G5P3A1 Gravida 18-19 Weeks; Right Nonpapillary Multilocular Ovarian Cyst Post-Surgery

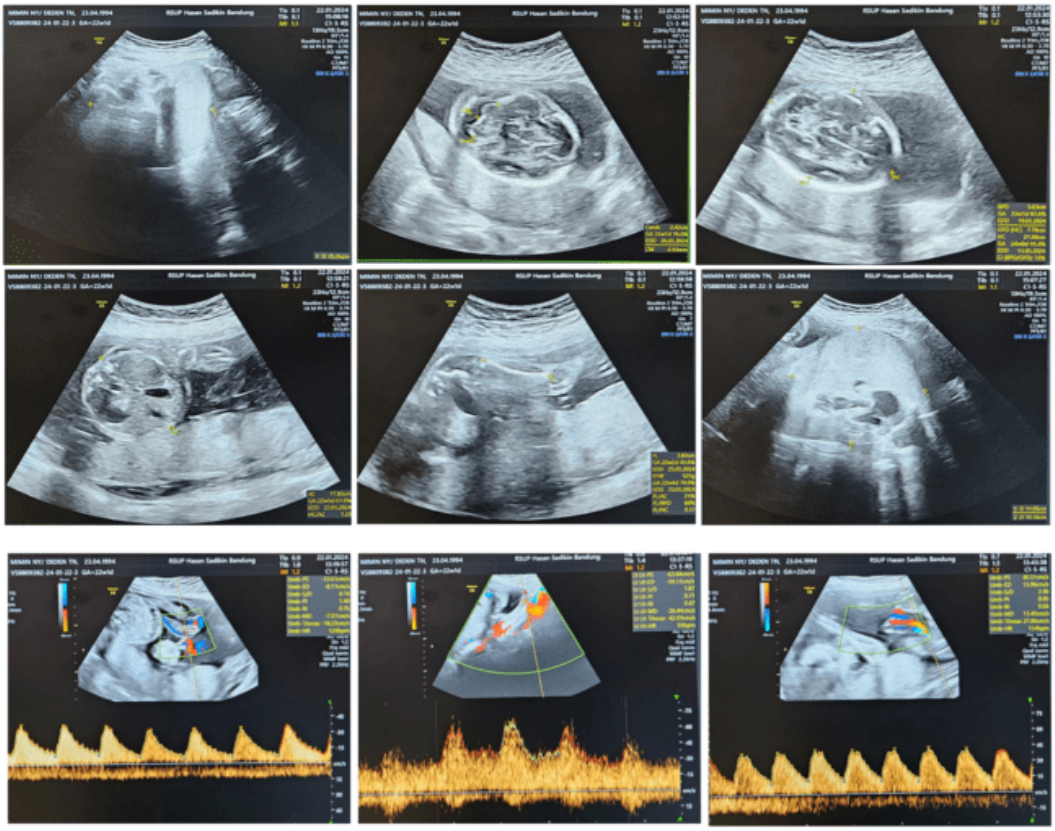

Figure 3 Fetomaternal Ultrasonography

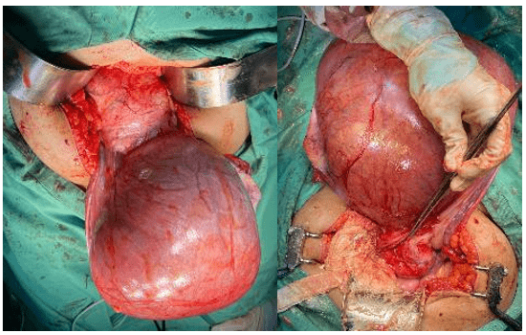

Figure 4 Intraoperative findings: Gray-white, Bumpy Mass Measuring 15x10x8 cm

Clinical Cases

This study was conducted in accordance with the Declaration of Helsinki, Good Clinical Practices, and local regulatory requirements. Ethics Committee approval from Dr. Hasan Sadikin Hospital, Bandung, Indonesia (No: LB.02.01/X.6.5/219/2020) was obtained. All patients signed informed consent forms that included permission for the publication of all case details and accompanying images.

Case 1

A 37-year-old female, G5P3A1 at 18-19 weeks of gestation, presented with a progressively enlarging abdominal mass over the past two months. The mass, initially egg-sized, grew to the size of a baby's head without causing pain, bleeding, or systemic symptoms. Obstetric examination revealed a singleton live fetus consistent with 14-15 weeks of gestation, and adnexal ultrasonography showed a multilocular ovarian cyst measuring 16.88×8.48×12.83 cm, with no solid components.

On June 14, 2023, an exploratory laparotomy was performed. During surgery, a right ovarian multilocular cystic mass measuring 25×12×8 cm was identified and removed via salpingo-oophorectomy. The uterus was enlarged, consistent with 18-20 weeks of gestation, and the left adnexa appeared normal. Estimated blood loss was 150 cc. The postoperative diagnosis was G5P3A1 at 18-19 weeks of gestation with a right ovarian multilocular non-papillary cyst.

Case 2

A 21-year-old female, G3P2A0 at 22-23 weeks of gestation, presented with an adnexal mass that has been present since 8 weeks of pregnancy.

The patient denied contractions, vaginal discharge, or decreased fetal movement. Ultrasonography revealed a live singleton fetus and a right ovarian mass measuring 11×10×10 cm, with solid and cystic components but no neovascularization. Tumor markers showed elevated LDH (118 U/L) and AFP (111.1 ng/mL), while CA-125 was normal.

On February 22, 2024, a laparotomy was performed. A right adnexal mass measuring 15×10×8 cm was found adherent to the uterus and rectosigmoid. During adhesiolysis, the mass ruptured, releasing sebaceous material, hair, teeth, and cartilage. A partial right oophorectomy was completed. Histopathology confirmed a mature cystic teratoma. The postoperative course was uneventful.

At 38 weeks of gestation, labor was induced with misoprostol. The patient delivered a male infant weighing 2575 grams, with Apgar scores of 7 and 9. Both mother and baby were discharged in good condition without any complications.

Discussion

Ovarian masses are found in approximately 1.5% to 5.7% of pregnancies, with 1% to 6% suspected of malignancy.[9] Management requires personalized consideration of gestational age, mass characteristics, and maternal-fetal risks. Elective surgery during pregnancy is usually avoided unless necessary, but when intervention is needed, timing is vital to reduce adverse outcomes. Surgery in the first trimester carries a higher risk of miscarriage and disrupts luteal function, while surgery in the third trimester increases the risk of preterm labor, torsion, rupture, hemorrhage, and delivery complications.[9–14]Therefore, the second trimester, particularly between 16 and 20 weeks of gestation, is commonly recommended for semi-elective adnexal surgery, balancing maternal-fetal safety with surgical urgency.[13,14]

Ovarian cysts less than 6 cm with benign features on ultrasound are usually managed conservatively because they can resolve on their own, especially corpus luteum cysts, which often shrink by 12–16 weeks of gestation.[6,12,15] However, large or complex masses require surgical assessment. Masses >10 cm, or those with solid parts, septations, papillary projections, or neovascularization, pose significant risks for malignancy, torsion, rupture, or labor obstruction, and are often recommended for removal.[6,12,15] In this case, a complex ovarian mass measuring 11.05×10.16×10.26 cm was detected at 22 weeks of gestation, raising suspicion of malignancy and justifying surgical intervention. The management followed the guidelines for operative treatment of adnexal masses that persist after the first trimester and are larger than 10 cm.[13]approximately 2 to 20 times more frequently than in the age-matched general population. The most common types of adnexal masses in pregnancy requiring surgical management are dermoid cysts (32%

Operative management of adnexal masses during pregnancy must account for the physiological changes that occur in gestation, including increased hemostatic capacity, altered fibrinolysis, cardiovascular adaptations, and anatomical shifts caused by uterine enlargement.[10] Laparotomy remains the standard surgical approach for large ovarian masses, especially those >10 cm, with a midline incision recommended to enhance access and reduce uterine manipulation.[10,11,16] In this case, a midline laparotomy was performed at 22 weeks of gestation, enabling a successful partial oophorectomy without intraoperative complications.

Perioperative management requires meticulous planning to avoid maternal and fetal complications. This involves careful anesthesia choices, thromboembolism prophylaxis, infection control, and hemodynamic monitoring.[11,16] Postoperative care in this case involved progesterone administration to reduce the risk of preterm labor, in line with guidelines recommending progesterone supplementation when adnexal surgery occurs during pregnancy. Progesterone therapy is generally started between 16 and 24 weeks and continued until 34 to 36 weeks to help prevent preterm contractions.[10,17](ii Postoperative care in both cases included progesterone administration to reduce the risk of preterm labor, in line with current guidelines recommending supplementation after adnexal surgery during pregnancy. Progesterone therapy was started in the second trimester and continued into the third trimester, helping to maintain stable uterine conditions and promote positive pregnancy outcomes.

Regarding anesthesia, current evidence shows no teratogenic effects from standard anesthetic agents used during pregnancy, regardless of gestational age. In this case, general anesthesia with isoflurane and propofol was used, which is considered safe and complies with current obstetric anesthetic guidelines. Although animal

studies suggest potential neurotoxic effects of GABA- and NMDA-mediated anesthetics on fetal development, human research has not demonstrated long-term neurocognitive impairments linked to prenatal exposure to these agents. During surgery, fetal well-being was monitored through continuous fetal heart rate surveillance. It is important to note that transient reductions in fetal heart rate variability after anesthesia can occur due to sedative effects but usually resolve postoperatively.[8,19]but also for the involved surgeons and anesthesiologists. Appendectomy, followed by cholecystectomy are the two most common types of operation performed during pregnancy. Special questions arise with regard to the peri- and intraoperative management and the optimal surgical approach. METHOD This review is based on pertinent articles retrieved by a selective search in the PubMed database. RESULTS The question of laparoscopy versus laparotomy during pregnancy has been addressed to date only in case series and a few meta-analyses. Two meta-analyses have shown a significantly higher rate of miscarriage after laparoscopic, compared to open, appendectomy (relative risk [RR] 1.91, 95% confidence interval [CI] 1.31-2.77

Delaying surgery until six weeks postpartum may be considered in non-urgent cases to allow for postpartum physiological stabilization. However, in this case, the mass's size, complex features, and potential complications required surgical management during the second trimester.[20,21]but absolute measures of risk required to guide perioperative management are lacking. Methods: We systematically searched MEDLINE, EMBASE, and EvidenceBased Medicine Reviews from January 1, 2000, to December 9, 2020, for observational studies and randomized trials of pregnant patients undergoing nonobstetric abdominopelvic surgery. We determined the pooled proportions of fetal loss, preterm birth, and maternal mortality using a generalized linear random/mixed effects model with a logit link. Results: We identified 114 observational studies (52 [46%] appendectomy, 34 [30%] adnexal, 8 [7%] cholecystectomy, 20 [17%] mixed types Elective surgery during this period lowers maternal and neonatal risks compared to emergency procedures, which are linked to higher rates of miscarriage, preterm delivery, and maternal complications. A meta-analysis by Cusimano et al. involving 67,111 pregnant patients found significantly higher risks of miscarriage (5% vs 1%) and preterm delivery (12% vs 4%) in emergency surgery compared to elective adnexal surgery.[21]but absolute measures of risk required to guide perioperative management are lacking. Methods: We systematically searched MEDLINE, EMBASE, and EvidenceBased Medicine Reviews from January 1, 2000, to December 9, 2020, for observational studies and randomized trials of pregnant patients undergoing nonobstetric abdominopelvic surgery. We determined the pooled proportions of fetal loss, preterm birth, and maternal mortality using a generalized linear random/mixed effects model with a logit link. Results: We identified 114 observational studies (52 [46%] appendectomy, 34 [30%] adnexal, 8 [7%] cholecystectomy, 20 [17%] mixed types

Histopathological analysis confirmed a mature cystic teratoma, which is the most common benign ovarian tumor found during pregnancy, representing approximately 46% of adnexal masses.[22]which have a small diameter and disappear spontaneously, those that do persist into the second and third trimester require ultrasound surveillance for proper management. The presence of a large adnexal mass in the third trimester of pregnancy represents solid grounds for delivery via Caesarean section (C-section Most studies report positive outcomes for mature cystic teratomas, including term deliveries, normal Apgar scores, and no

rise in congenital anomalies or perinatal mortality.[22,23]which have a small diameter and disappear spontaneously, those that do persist into the second and third trimester require ultrasound surveillance for proper management. The presence of a large adnexal mass in the third trimester of pregnancy represents solid grounds for delivery via Caesarean section (C-section Complications such as torsion, rupture, hemorrhage, and compression of the bowel or urinary tract may occur, especially when the mass exceeds 8–10 cm or occupies the pelvis, potentially leading to labor dystocia or obstruction of fetal descent.[22–24]which have a small diameter and disappear spontaneously, those that do persist into the second and third trimester require ultrasound surveillance for proper management. The presence of a large adnexal mass in the third trimester of pregnancy represents solid grounds for delivery via Caesarean section (C-section In this case, no complications arose, and the patient delivered vaginally at term without any issues.

Adnexal masses are also associated with increased cesarean section rates, especially when malignancy is suspected. Nazer et al. reported increased cesarean delivery rates in women with ovarian tumors compared to controls.[25] In this case, despite the large ovarian mass and surgical history, the patient successfully underwent vaginal delivery. No other maternal complications, such as thromboembolism, postpartum hemorrhage, or transfusion needs, were observed in this patient, aligning with literature that shows these events are not significantly increased in women with adnexal masses.[25]

Prematurity is a major concern in pregnancies with adnexal masses, particularly when emergency surgery is needed due to torsion, rupture, or bleeding. However, when managed electively in the second trimester, as in this case, the chance of preterm labor is much lower.[23,25]Ninth Revision, Clinical Modification (ICD-9-CM No intrauterine growth restriction, fetal distress, or perinatal mortality was observed in this patient, consistent with outcomes reported in previous studies.[25]

Overall, this case emphasizes the importance of a multidisciplinary, evidence-based approach in managing complex ovarian masses during pregnancy. Elective second-trimester surgery, combined with high-resolution imaging, tumor marker assessment, and careful surgical planning, enhances both maternal and fetal outcomes. This aligns with recommendations from ACOG and recent literature supporting personalized management strategies to ensure safe pregnancy continuation and delivery in high-risk cases.[13,18,22,23]24%–40% of the cases are benign tumors; up to 8% are malignant tumors. Adnexal masses are usually asymptomatic, but sometimes can be responsible for abdominal or pelvic pain. Transvaginal and transabdominal ultrasound is essential to define the morphology of pelvic masses and to distinguish between benign and malignant cases. Magnetic resonance imaging can be a complementary examination when ultrasound findings are equivocal and a useful additional examination to better define tissue planes and relations with other organs. Patient counseling can be challenging because there is no clear consensus on the management of adnexal masses during pregnancy. Treatment options consist of observational management (in case of asymptomatic women with reassuring instrumental findings

Conclusion

This case report highlights that effective management of complex ovarian masses during second-trimester pregnancy requires careful timing and procedure selection based on intraoperative findings. In Case 1, an exploratory midline laparotomy followed by right salpingo-oophorectomy was performed

for a large multilocular ovarian cyst measuring 25×12×8 cm. In Case 2, a midline laparotomy with adhesiolysis and right partial oophorectomy was performed for a complex adnexal mass, with histopathology confirming a mature cystic teratoma. Perioperative maternal–fetal monitoring and additional postoperative progesterone support were used to ensure uterine stability. Overall, these strategies were associated with favorable maternal recovery and full-term pregnancy outcomes.

Advice and Thanks

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