

Acute abdomen in pregnancy in a tertiary referral center: diagnostic challenges and surgical outcomes

 Neval Çayönü Kahraman*,  Zeynep Şeyhanlı,  Ümran Özcan,  Dilara Duygulu Bulan,  Ali Turhan Çağlar

Department of Perinatology, Ankara Etlik City Hospital, University of Health Sciences, Ankara, Türkiye

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*Corresponding Author: Neval Çayönü Kahraman, nevalcayonu@gmail.com

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ABSTRACT

Aims: Acute abdomen during pregnancy is a challenging clinical condition requiring prompt diagnosis and management to prevent adverse maternal and fetal outcomes. This study aimed to evaluate the clinical characteristics, diagnostic approaches, and surgical outcomes of pregnant patients presenting with acute abdomen.

Methods: This single-center retrospective study included 13 pregnant patients diagnosed with acute abdomen who underwent surgical intervention (laparotomy or laparoscopy) between October 2025 and January 2026. Demographic, clinical, laboratory, imaging, surgical, and obstetric outcomes were analyzed. Statistical analyses were performed using non-parametric tests, and correlations were assessed using Spearman's method.

Results: The median maternal age was 29 years, and the median gestational age at admission was 24 weeks. The most common diagnosis was ovarian torsion (53.8%), followed by less frequent conditions including appendicitis and other etiologies. Ultrasound was used in all patients, while magnetic resonance imaging (MRI) was performed in selected cases (15.4%). Laparotomy was the predominant surgical approach (92.3%). Maternal and neonatal outcomes were generally favorable, with a median delivery at 37 weeks and a low rate of neonatal intensive care unit (NICU) admission (15.4%). A significant association was observed between trimester and pain duration ($p=0.027$). Additionally, a strong negative correlation was found between gestational age at admission and the interval from diagnosis to delivery ($\rho=-0.97$, $p<0.001$).

Conclusion: Acute abdomen in pregnancy requires timely diagnosis and a multidisciplinary approach. Gynecological causes, particularly ovarian torsion, may predominate in surgically managed cases. Generally favorable maternal and neonatal outcomes were observed following surgical management in this small retrospective case series.

Keywords: Acute abdomen, pregnancy, adnexal torsion, ultrasonography, magnetic resonance imaging

INTRODUCTION

Acute abdomen in pregnancy constitutes a complex clinical scenario necessitating immediate diagnosis and intervention due to the potential for considerable maternal and fetal morbidity.¹ The differential diagnosis is extensive and encompasses both obstetric and non-obstetric etiologies, many of which may require immediate surgical intervention.² The assessment of abdominal pain in pregnant individuals is frequently complicated by the physiological and anatomical alterations that occur during pregnancy.^{3,4}

Pregnancy-induced changes, including the displacement of abdominal organs by the expanding uterus, physiological leukocytosis, and nonspecific gastrointestinal symptoms, may conceal traditional clinical findings and postpone diagnosis.⁵ Moreover, symptoms including nausea, vomiting, and abdominal discomfort often coincide with typical pregnancy-related illnesses, so complicating clinical evaluation.⁶

Acute appendicitis is the predominant non-obstetric surgical emergency in pregnancy, representing a substantial fraction of cases. A delayed diagnosis of appendicitis may lead to perforation, resulting in heightened maternal morbidity and negative fetal outcomes, such as preterm labor and fetal demise.^{7,8} Consequently, timely and precise diagnosis is crucial for enhancing outcomes.⁸ Beyond appendicitis, a variety of obstetric and non-obstetric causes can result in acute abdomen during pregnancy, a clinical disease that can be difficult to diagnose. Biliary tract disorders, acute pancreatitis, intestinal blockage, urinary tract pathologies (such as urolithiasis and pyelonephritis), and gynecologic illnesses including adnexal torsion and rupture are some of the most significant non-obstetric causes. Optimizing maternal and fetal outcomes requires a multidisciplinary approach, early and thorough differential diagnosis, and the use of safe and appropriate imaging modalities.



Despite technological advances in imaging and clinical care, the diagnosis and treatment of acute abdomen in pregnancy remain challenging, and there is still a need for better characterization of clinical presentation, diagnostic techniques, and surgical results. In this context, the present study aims to analyze the clinical characteristics, diagnostic procedures, and surgical results of pregnant women presenting with acute abdomen at a tertiary care hospital.

METHODS

The study was approved by the Scientific Researches Evaluation and Ethics Committee of Ankara Etlik City Hospital (Date: 17.02.2026, Decision No: AEŞH-BADEK2-2026-160). The ethics committee approval explicitly covered the retrospective use of medical records from the study period, preceding the approval date. All study procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki. The requirement for informed consent was waived by the ethics committee, as documented in the approval.

This single-center, retrospective, descriptive-analytical study was conducted at the Perinatology Clinic of Ankara Etlik City Hospital, a tertiary referral center for advanced maternal-fetal medicine care in Türkiye. Medical records of pregnant women evaluated for acute abdomen between October 1, 2025, and January 1, 2026, were retrospectively reviewed. Acute abdomen was defined as acute abdominal pain requiring immediate diagnostic evaluation and/or surgical intervention.⁹

The study population consisted of all 13 consecutive pregnant patients who underwent emergency surgical intervention for acute abdomen during the study period. Patients with abdominal pain who were managed conservatively were not included, as the study specifically focused on surgically managed acute abdominal emergencies. Exclusions were made for patients not pregnant, those lacking complete or accessible critical clinical data (such as gestational age, surgical indication, or operative findings), and those who underwent surgery for obstetric reasons (e.g., uterine rupture or placenta accreta spectrum).

The subsequent variables were documented, demographic and obstetric information, maternal age, gravida, parity, gestational week at admission and delivery, trimester at admission, gestational duration from diagnosis to delivery, and presence of comorbidities. Clinical data, duration of symptoms, pain localization, body temperature, and laboratory findings including hemoglobin (HGB), white blood cell (WBC) count, C-reactive protein (CRP), platelet count (PLT), aspartate aminotransferase (AST), and alanine aminotransferase (ALT).

Imaging and diagnostic data included the imaging modalities used, such as ultrasound and/or magnetic resonance imaging (MRI), as well as the associated radiological findings (Figure 1). Surgical data comprised the surgical approach (laparotomy or laparoscopy), operation duration, intraoperative findings, and the final diagnosis confirmed by intraoperative and/or histopathological evaluation (Figure 2).

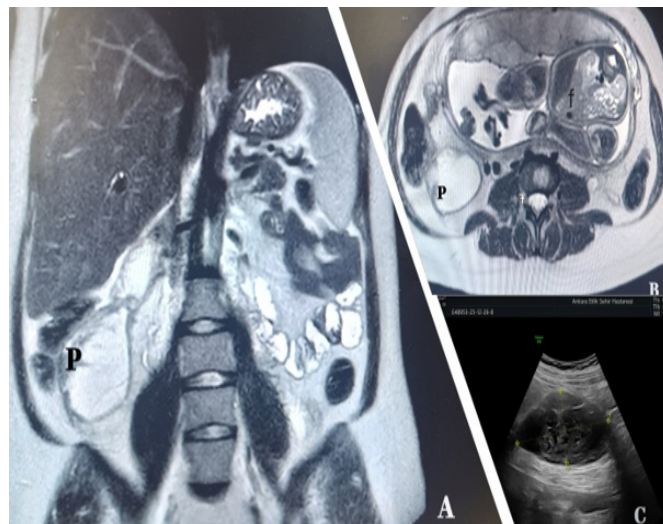


Figure 1. Magnetic resonance imaging and ultrasonographic findings of a pancreatic pseudocyst during pregnancy (A) Magnetic resonance imaging (MRI) demonstrating a bilobulated pancreatic pseudocyst extending from the pancreatic head to the right adnexal region. (B) MRI showing the pancreatic pseudocyst (P) and its anatomical relationship with the fetus (F) (C) Transabdominal ultrasonography demonstrating the extension of the pancreatic pseudocyst into the right adnexal region

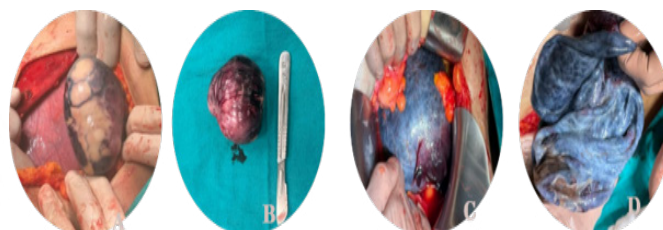


Figure 2. Intraoperative findings of pedunculated uterine myoma torsion and ovarian torsion during pregnancy (A) Intraoperative view demonstrating torsion of a pedunculated uterine myoma at 30 weeks of gestation. (B) Gross appearance of the torsioned pedunculated uterine myoma. (C) Intraoperative view showing torsion of a large left ovarian cyst at 12 weeks of gestation. (D) Gross appearance of the excised torsioned ovary

Maternal and neonatal outcomes included length of hospital stay, mode of delivery, gestational age at delivery, birth weight, Apgar scores, and admission to the neonatal intensive care unit (NICU). Diagnoses were classified based on system involvement as either pertaining to the female reproductive system or the gastrointestinal system (GIS). Trimesters were delineated as first (≤ 13 weeks), second (14–27 weeks), and third (≥ 28 weeks).

Statistical Analysis

The data analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as median (minimum–maximum), whereas categorical variables were represented as count (n) and percentage (%). The normality of the distribution was assessed, and due to the non-normal distribution of variables, non-parametric tests were utilized. Comparisons between groups were performed using the Kruskal–Wallis test for continuous variables. Given the small sample size and low expected cell frequencies, the Fisher–Freeman–Halton exact test was used for categorical comparisons across trimesters.

Following the identification of a statistically significant difference, post hoc pairwise comparisons were performed using the Bonferroni-adjusted Mann–Whitney U test.

Spearman correlation analysis was employed to evaluate the relationships between gestational week of admission and specific clinical indicators, as well as between pain duration and laboratory data. A p-value below 0.05 was considered statistically significant.

RESULTS

Thirteen pregnant individuals with acute abdomen were included in the study. The median maternal age was 29 (26–39) years, and the median gestational age at admission was 24 (6–34) weeks. In the population, most patients were in the third trimester (n=6, 46.2%), followed by the first trimester (n=5, 38.5%) and the second trimester (n=2, 15.4%). Comorbid conditions were present in six patients (46.2%) (Table 1).

Table 1. Demographic, obstetric, and neonatal outcome characteristics of pregnant patients presenting with acute abdomen (n=13)

Maternal age (years)	29 (26-39)
Gravida	4 (1-6)
Parity	1 (0-4)
Presence of comorbidity, n (%)	6 (46.2)
Gestational age at admission (weeks)	24 (6-34)
Gestational age at delivery (weeks)	37 (33-40)
Diagnosis-to-delivery interval (weeks)	10 (1-34)
Birth weight (g)	2980 (2030-3400)
Mode of delivery, n (%)	
Vaginal delivery	6 (46.2)
Cesarean section	7 (53.8)
Apgar score at 1 minute	9 (7-10)
Apgar score at 5 minutes	10 (7-10)
NICU admission, n (%)	2 (15.4)
Values are presented as median (minimum–maximum) or n (%), as appropriate. Apgar: Appearance, Pulse, Grimace, Activity, Respiration, NICU: Neonatal intensive care unit	

The median gestational week at delivery was 37 (33–40) weeks, and the median interval from diagnosis to delivery was 10 (1–34) weeks. The median birth weight was 2980 (2030–3400) grams. Cesarean delivery occurred in 53.8% of patients, whilst 46.2% underwent vaginal delivery. The median Apgar values at 1 minute and 5 minutes were 9 (7–10) and 10 (7–10), respectively. Two neonates (15.4%) required admission to the NICU due to respiratory distress associated with preterm birth. One neonate was delivered at 33 weeks of gestation following maternal laparotomy and detorsion for ovarian torsion at 24 weeks, with Apgar scores of 7 at both 1 and 5 minutes. The other neonate was delivered approximately one week after maternal surgery for a pancreatic pseudocyst at 34 weeks of gestation. No surgery-related postoperative maternal complications were observed among the 13 patients (Table 1).

The median duration of pain was 12 (2–96) hours, with the right lower quadrant being the most common site of pain localization (69.2%). The median body temperature was 36.2 °C, with a range of 36 to 36.9 °C. Laboratory results indicated a median WBC count of 14.5 (7.7–23.0) $\times 10^9/L$ and a CRP level of 11 (1–46) mg/L (Table 2).

The most frequent diagnosis was ovarian torsion (53.8%), followed by ovarian cyst rupture (7.7%), acute appendicitis (7.7%), pedunculated fibroid torsion (7.7%), heterotopic

Table 2. Clinical presentation and laboratory findings of pregnant patients diagnosed with acute abdomen (n=13)

Pain duration (hours)	12 (2-96)
Pain localization, n (%)	
Right lower quadrant	9 (69.2)
Left lower quadrant	4 (30.8)
Body temperature (°C)	36.2 (36-36.9)
Hemoglobin (g/dl)	10.8 (9.1-13)
White blood cell count ($\times 10^9/L$)	14.5 (7.7-23.0)
C-reactive protein (mg/L)	11 (1-46)
Platelet count ($\times 10^3/\mu L$)	221 (143-570)
Aspartate Aminotransferase (U/L)	14 (9-38)
Alanine Aminotransferase (U/L)	10 (7-48)
Values are presented as median (minimum–maximum) or n (%), as appropriate.	

pregnancy (7.7%), acute cholecystitis (7.7%), and pancreatic pseudocyst (7.7%). Ultrasound was utilized in all patients, whereas MRI was conducted in 15.4% of cases. MRI was performed in two clinically stable patients with suspected non-gynecological causes of acute abdomen, namely acute appendicitis and pancreatic pseudocyst, because of diagnostic uncertainty following ultrasonographic evaluation. Both examinations were performed during daytime hours when MRI was available. In both cases, MRI provided additional diagnostic information, and the MRI findings were confirmed by intraoperative findings.

Laparotomy was the primary surgical method (92.3%). The median time of the procedure was 70 (30–140) minutes, and the median hospital stay was 3 (2–12) days (Table 3, Figure 3).

Table 3. Final diagnoses, imaging modalities, and surgical characteristics of pregnant patients with acute abdomen (n=13)

Final diagnosis, n (%)	
Acute appendicitis	1 (7.7)
Ovarian torsion	7 (53.8)
Ovarian cyst rupture	1 (7.7)
Pedunculated fibroid torsion	1 (7.7)
Heterotopic pregnancy	1 (7.7)
Acute cholecystitis	1 (7.7)
Pancreatic pseudocyst	1 (7.7)
Female reproductive system disorders, n (%)	10 (76.9)
Gastrointestinal system disorders, n (%)	3 (23.1)
Imaging modality used, n (%)	
Ultrasound	13 (100)
Magnetic Resonance Imaging	2 (15.4)
Surgical approach, n (%)	
Laparotomy	12 (92.3)
Laparoscopy	1 (7.7)
Operation duration (minutes)	70 (30-140)
Length of hospital stay (days)	3 (2-12)
Values are presented as median (minimum–maximum) or n (%), as appropriate. Imaging modalities are not mutually exclusive.	

A statistically significant variation in pain duration was seen among trimesters (p=0.027). The post hoc analysis revealed that the difference occurred between the first and third trimesters (p=0.017). The duration of gestation from diagnosis to delivery varied considerably across trimesters (p=0.011), with post hoc analysis revealing a significant

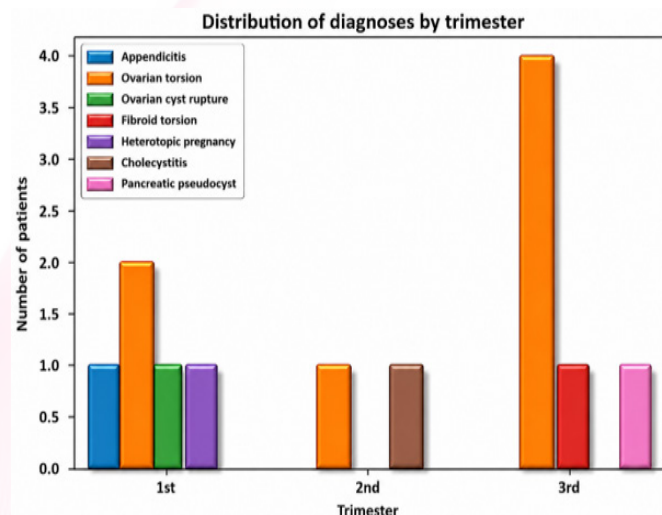


Figure 3. Distribution of surgically confirmed diagnoses according to trimester of pregnancy at admission. The figure illustrates the distribution of surgical diagnoses among pregnant patients presenting with acute abdomen during the first (n=5), second (n=2), and third (n=6) trimesters. Diagnoses were established based on intraoperative findings and/or histopathological evaluation

difference between the first and third trimesters ($p=0.006$). No notable variations were detected in maternal age, duration of operation, rates of preterm birth, mode of delivery, length of hospital stay, or system involvement throughout trimesters ($p>0.05$, **Table 4**).

Table 4. Comparison of demographic, clinical, and obstetric outcomes according to trimester of admission

	1 st trimester n=5	2 nd trimester n=2	3 rd trimester n=6	p value
Maternal Age (years)	29 (27-36)	33.5 (28-39)	28.5 (26-34)	0.481 ^a
Pain duration (hours)	4 (1-9)	35 (24-46)	24.5 (4-96)	0.027 ^{a,c}
Operation duration, (minutes)	60 (50-140)	100 (80-120)	70 (30-90)	0.424 ^a
Preterm birth n (%)				
<37 weeks	1 (20)	1 (50)	3 (50)	0.767 ^b
≥37 weeks	4 (80)	1 (50)	3 (50)	
Mode of delivery, n (%)				
Vaginal delivery	4 (80)	1 (50)	1 (16.7)	0.111 ^b
Cesarean section	1 (20)	1 (50)	5 (83.3)	
Length of hospital stay (days)	4 (2-6)	2 (2-2)	3 (2-12)	0.256 ^a
Diagnosis-to-delivery interval (weeks)	29 (23-34)	17 (9-25)	4.5(1-10)	0.011 ^{a,d}
Female reproductive system disorders, n (%)	4 (80)	1 (50)	5 (83.3)	0.738 ^b
Gastrointestinal system disorders, n (%)	1 (20)	1 (50)	1 (16.7)	

Values are presented as median (minimum–maximum) or n (%), as appropriate. a: Kruskal Wallis test, b: Fisher–Freeman–Halton exact test, c: Post hoc Bonferroni-corrected Mann–Whitney U test showed a significant difference between G1 and G3 ($p=0.017$). No statistically significant difference was found between G1 and G2 ($p=0.051$). d: Post hoc Bonferroni-corrected Mann–Whitney U test showed a significant difference between G1 and G3 ($p=0.006$). G1: First trimester, G2: Second trimester, G3: Third trimester

Spearman correlation analysis demonstrated a robust negative association between the gestational week at admission and the interval from diagnosis to birth ($\rho=-0.97$, $p<0.001$). A moderate positive connection was identified between gestational week and pain duration ($\rho=0.59$, $p=0.034$). No statistically significant relationships were seen between pain duration and CRP ($\rho=-0.36$, $p=0.224$) or WBC levels ($\rho=-0.41$, $p=0.161$, **Table 5**).

DISCUSSION

Acute abdomen during pregnancy remains a significant diagnostic and therapeutic challenge due to physiological, anatomical, and biochemical changes that may obscure classical clinical findings.³ In the present study, we evaluated

Table 5. Spearman correlation analysis of gestational age at admission, diagnosis-to-delivery interval, and selected clinical variables (n = 13)

	Spearman's ρ	p-value
Gestational age at admission vs. diagnosis-to-delivery interval	-0.97	<0.001
Gestational age at admission vs. pain duration	0.59	0.034
Pain duration vs. C-reactive protein	-0.36	0.224
Pain duration vs. white blood cell count	-0.41	0.161

Spearman's rank correlation coefficient (ρ) was used to assess associations between continuous variables. A p value less than 0.05 was considered statistically significant

the clinical characteristics, diagnostic approaches, and surgical outcomes of pregnant patients presenting with acute abdomen, and our findings are largely consistent with the existing literature.^{9,10}

One of the most notable findings of our study was that gynecological causes, particularly ovarian torsion, constituted the most common etiology (53.8%), whereas acute appendicitis accounted for a relatively small proportion of cases (7.7%). This differs from the majority of the literature, where acute appendicitis is reported as the most common non-obstetric surgical emergency in pregnancy.^{11,12} As our institution is a tertiary referral center specializing in maternal–fetal medicine, its referral patterns may have contributed to a higher representation of gynecological

emergencies, particularly ovarian torsion. Furthermore, the inclusion of only surgically managed patients, the small sample size, and the relatively short three-month study period may have influenced the distribution of diagnoses. Therefore, the predominance of ovarian torsion in our cohort should be interpreted within the context of these selection and institutional factors rather than as representative of the general pregnant population. Nevertheless, the predominance of adnexal pathologies in our cohort highlights the importance of considering gynecologic causes alongside gastrointestinal etiologies in pregnant patients presenting with acute abdomen.

Consistent with previous reports, clinical evaluation alone was insufficient for definitive diagnosis. Pregnancy-related physiological changes, including leukocytosis and displacement

of abdominal organs, may mask or mimic pathological findings.¹³⁻¹⁵ In our study, laboratory parameters such as WBC count and CRP levels demonstrated variability and were not significantly correlated with symptom duration, supporting the limited specificity of inflammatory markers in pregnancy.

With regard to imaging, ultrasonography was utilized in all patients, in line with current recommendations as the first-line modality due to its safety and accessibility.¹⁶ However, MRI was performed in a limited number of cases (15.4%). While this may reflect adequate diagnostic yield of ultrasonography in our cohort or limited availability of MRI, the literature supports MRI as a valuable problem-solving tool when ultrasound findings are inconclusive, given its superior soft-tissue resolution and lack of ionizing radiation.¹⁷ Increased use of MRI may further improve diagnostic accuracy and reduce unnecessary surgical interventions.¹⁸

In terms of surgical management, laparotomy was the predominant approach (92.3%) in our study. Although laparoscopy has been associated with shorter hospital stay and reduced blood loss in several studies, concerns regarding fetal safety and technical challenges persist.^{18,19} The choice of surgical approach was influenced by several factors, including advanced gestational age, large adnexal masses, and the need for emergency surgical intervention. In contrast, laparoscopy was performed in one patient at six weeks of gestation for ovarian torsion, and successful detorsion was achieved. These observations suggest that the surgical approach was individualized according to gestational age, underlying pathology, and clinical circumstances. Nevertheless, both approaches are considered safe when performed with appropriate indications and expertise.^{20,21}

Maternal and neonatal outcomes in our study were generally favorable. The median gestational age at delivery was 37 weeks, with low rates of NICU admission (15.4%) and high Apgar scores. However, given the small sample size, retrospective design, and absence of a comparison group, these observations cannot establish an association between the timing of surgical intervention and maternal or neonatal outcomes.

An additional noteworthy aspect of our study is the presence of rare causes of acute abdomen. Conditions such as pedunculated fibroid torsion and heterotopic pregnancy, although uncommon, may lead to significant maternal morbidity if not promptly recognized.^{22,23} Pedunculated fibroid torsion can occur due to uterine enlargement and anatomical displacement during pregnancy and often requires urgent surgical intervention.²² Similarly, heterotopic pregnancy poses a diagnostic challenge, particularly in early gestation, and delayed diagnosis may result in serious complications.²³ These rare entities emphasize the importance of maintaining a broad differential diagnosis and highlight the critical role of imaging and clinical suspicion. The imaging findings presented in this study may contribute to improved recognition and management of such uncommon conditions.

Furthermore, we observed a significant association between trimester and pain duration, with longer symptom duration

in later gestational weeks. A strong negative correlation was observed between gestational age at admission and the diagnosis-to-delivery interval ($\rho=-0.97$, $p<0.001$). However, this finding should be interpreted cautiously, as the interval from diagnosis to delivery is mathematically dependent on gestational age at admission and gestational age at delivery. Therefore, the observed correlation may primarily reflect this inherent mathematical relationship rather than an effect of the acute abdominal condition or surgical intervention on delivery timing. No causal inference can be drawn from this association.

Limitations

This study has several limitations. First, the small sample size, particularly the inclusion of only two patients in the second-trimester group, limits the statistical power and generalizability of our findings. Therefore, comparisons between trimester groups should be interpreted cautiously, as the small number of observations increases statistical uncertainty and limits the ability to detect potentially meaningful differences. Second, the retrospective and single-center design introduces potential selection and information biases. Third, the inclusion of only surgically managed patients may underestimate the full clinical spectrum of acute abdomen in pregnancy, particularly those managed conservatively.

In addition, the inclusion of rare and clinically challenging cases may contribute to the literature by highlighting uncommon etiologies and real-life decision-making processes in this complex patient population. Further multicenter studies with larger cohorts are needed to better define optimal diagnostic pathways and to clarify the role of advanced imaging and minimally invasive surgical techniques in this patient population.

CONCLUSION

Acute abdomen during pregnancy is a complex clinical condition that requires prompt diagnosis and a multidisciplinary approach. In surgically managed patients, gynecologic etiologies—particularly ovarian torsion—may be more common than expected. In this small retrospective case series, generally favorable maternal and neonatal outcomes were observed following surgical management; however, the study design does not allow conclusions regarding the effects of intervention timing on these outcomes. Increased clinical awareness and appropriate use of imaging are essential to improve diagnostic accuracy and patient outcomes.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study was approved by the Scientific Researches Evaluation and Ethics Committee of Ankara Etlik City Hospital (Date: 17.02.2026, Decision No: AEŞH-BADEK2-2026-160).

Informed Consent

Written informed consent was obtained from all individual participants prior to their inclusion in the study. Participants were fully informed about the study's aims, procedures, potential risks and benefits, and their rights—including the right to withdraw at any time without consequence. All

participants voluntarily signed a written informed consent form.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

The authors received no financial support for the conduct or publication of this research.

Author Contributions

Concept: NÇK, ATÇ; Design: NÇK, ZŞ, ATÇ; Control: ATÇ; Data Collection and/or Processing: NÇK, ZŞ, ÜÖ, DDB; Analysis and/or Interpretation: NÇK, DDB, ATÇ; Literature Review: NÇK; Article Writing: NÇK; Critical Review: NÇK, ZŞ, ÜÖ, ATÇ.

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Neval Çayönü Kahraman

Dr. Neval Çayönü Kahraman is a Maternal-Fetal Medicine (Perinatology) subspecialist at the University of Health Sciences Etlik City Hospital, Ankara, Türkiye. She completed her subspecialty training in Maternal-Fetal Medicine and has extensive clinical experience in the management of high-risk pregnancies, prenatal diagnosis, fetal ultrasonography, and invasive prenatal procedures. Her research interests include maternal-fetal medicine, placental disorders, fetal growth abnormalities, preterm birth, twin pregnancies, pregnancy-related inflammatory and hematological biomarkers, and prenatal imaging. Dr. Çayönü Kahraman has published numerous articles in national and international peer-reviewed journals and actively contributes to research in obstetrics and perinatology. She also serves as a reviewer for several international medical journals and is committed to advancing evidence-based clinical practice through clinical research and interdisciplinary collaboration.

