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Review Article

Acute Calculus Cholecystitis in Pregnancy: An Update on Management: Review Article

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Abstract: Acute calculus cholecystitis during pregnancy represents the second most prevalent cause of non-obstetric abdominal pain in this population. Clinically, it manifests as upper abdominal pain, with ultrasonography serving as the primary imaging technique for diagnosis. Management strategies for acute calculus cholecystitis in pregnant patients can be categorized into non-operative approaches, which include the administration of intravenous antibiotics and analgesics, and laparoscopic cholecystectomy, which is feasible across all three trimesters of pregnancy. Both therapeutic modalities are associated with potential maternal complications and fetal loss. This review aims to examine the diagnostic and therapeutic approaches for acute calculus cholecystitis in pregnancy. We will explore the roles of both conservative treatment and cholecystectomy in managing this condition, as well as the potential application of gallbladder drainage in pregnant patients with acute calculus cholecystitis.

Keywords: Acute Calculus Cholecystitis, Conservative Treatment, Gallstone Disease, Laparoscopic Cholecystectomy, Percutaneous Cholecystostomy, Pregnancy.

INTRODUCTION

Acute calculus cholecystitis represents the second most prevalent cause of non-obstetric abdominal pain in pregnant women, occurring in approximately 1 in 5,000 pregnancies. Gallstones are responsible for up to 90% of acute cholecystitis cases during pregnancy. Clinically, it presents as right upper abdominal pain, often accompanied by nausea and vomiting. Due to the displacement of the gravid uterus, Murphy's sign is typically not positive upon abdominal examination. Blood investigations, such as leukocytosis, are less sensitive due to their elevation during pregnancy(Bouyou *et al*., 2015; Gilo *et al*.,2009). Ultrasound remains the most commonly employed imaging modality for diagnosing acute cholecystitis in pregnancy, offering a sensitivity of 90% and being safe for use during pregnancy(Augustin & Majerovic, 2007; Hess *et al*., 2021). Management of acute cholecystitis in pregnancy generally involves conservative treatment with intravenous fluids, antibiotics, and analgesics, although this approach is associated with a high recurrence rate. Cholecystectomy is recommended for patients with acute cholecystitis, with the laparoscopic method being the preferred surgical approach. Laparoscopic cholecystectomy can be safely performed during all three trimesters of pregnancy and is associated with reduced maternal and fetal complications(Schwulst & Son, 2020).

The 2020 guidelines issued by the World Society of Emergency Surgery (WSES) regarding the diagnosis and management of acute calculus cholecystitis assert that laparoscopic cholecystectomy is a safe procedure that can be conducted in pregnant patients with this condition(Pisano *et al*., 2020). Similarly, the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), in their guidelines concerning the use of laparoscopy during pregnancy, advocate for the performance of laparoscopic cholecystectomy in all pregnant patients with acute cholecystitis, as opposed to opting for non-operative treatment(Kumar *et al*., 2024). Furthermore, the American College of Gastroenterology (ACG) recommends early laparoscopic cholecystectomy for patients exhibiting symptoms of acute cholecystitis(Tran *et al*., 2016).

Currently, there is no established consensus regarding the management of acute cholecystitis during

pregnancy, and the role of conservative treatment remains insufficiently defined. The optimal timing for performing a laparoscopic cholecystectomy is also ambiguous; it may be conducted during any trimester of pregnancy, yet the consequences of deferring the procedure until the postpartum period are not well understood. This review article seeks to address these considerations in the management of acute cholecystitis in pregnancy. We conducted a comprehensive literature review utilizing PUBMED, the Cochrane Database of Systematic Reviews, Google Scholar, and Semantic Scholar, focusing on randomized controlled trials, non-randomized trials, observational and cohort studies, clinical reviews, systematic reviews, case reports, and meta-analyses from 1980 to 2025. The search employed the following keywords: "Acute calculus cholecystitis," "Gallstone disease," "Conservative treatment," "Laparoscopic cholecystectomy," "Pregnancy," and "Percutaneous cholecystostomy." All articles were in English and were assessed through manual cross-referencing of the literature. Commentaries and editorials were excluded from this review. Only pregnant patients presenting with symptoms of non-obstetric abdominal pain were included in this study.

DISCUSSION

Diagnosis of Acute Calculus Cholecystitis in Pregnancy

The diagnosis of acute calculus cholecystitis during pregnancy is primarily confirmed through imaging techniques, with ultrasonography being the most prevalent. Ultrasonography is easily performed, does not involve radiation, and poses no risk to the fetus. It is capable of detecting gallstones, inflammation of the gallbladder wall, and the presence of pericholecystic fluid collection, with a sensitivity of 95% for diagnosing acute calculus cholecystitis(Diegelmann, 2012; Glanc & Maxwell, 2010; Katz *et al*., 2012). Magnetic resonance imaging (MRI) is typically employed as a secondary investigation for pregnant patients when ultrasound results are inconclusive. In such cases, gadolinium is not used, and MRI is more effective in diagnosing complications of gallstone disease, such as choledocholithiasis and gallstone pancreatitis(Khandelwal *et al*., 2013; Masselli *et al*., 2015).

The updated Clinical Practice Guideline by the Society of America concerning complicated intra-abdominal infections addresses diagnostic imaging for pregnant patients with acute cholecystitis. It recommends the use of ultrasonography and magnetic resonance imaging as initial diagnostic modalities. However, the panel was unable to determine a preference for which investigative modality should be employed first(Bonomo *et al*., 2024).

Non- Operative Treatment for Acute Cholecystitis in Pregnancy

Pregnant patients exhibiting symptoms of acute cholecystitis are often managed through conservative treatment strategies. This approach generally includes the administration of intravenous antibiotics and analgesics, with the addition of intravenous fluids if the patient experiences persistent nausea and vomiting. The choice of antibiotics is limited by pregnancy-related considerations, with second and third-generation cephalosporins frequently utilized due to their favorable safety profile(Augustin & Majerovic, 2007; El-Messidi *et al*., 2018; Ibiebele *et al*., 2017). Analgesia is typically provided using opioids and paracetamol, while non-steroidal anti-inflammatory drugs (NSAIDs) are contraindicated due to potential fetal complications, such as oligohydramnios and premature closure of the patent ductus arteriosus. Conservative management is associated with a high recurrence rate, ranging from 40% to 77%, which may negatively impact both maternal and fetal health(Gilo *et al*., 2009.; Jorge *et al*., 2015; Selzer & Stefanidis, 2019).

A retrospective study by Othman et al. on conservative treatment during pregnancy concluded that patients who underwent such management exhibited a higher frequency of emergency department visits and increased readmission rates(Othman *et al*., 2012). Furthermore, a nationwide analysis by Rios-Diaz *et al*., investigated the morbidity associated with the conservative management of acute cholecystitis in pregnancy. This study, which included 6390 patients, found that conservative treatment was associated with increased fetal-maternal complications, premature labor, elevated caesarean section rates, and poor fetal health outcomes(Rios-Diaz *et al*., 2020). Zhang *et al*., conducted a retrospective investigation into management strategies for acute cholecystitis in the third trimester of pregnancy. A total of 102 pregnant patients with acute cholecystitis were divided into three groups: one undergoing cholecystectomy, another undergoing gallbladder drainage, and a third receiving conservative treatment. The readmission and preterm delivery rates were highest in the conservative treatment group, leading to the conclusion that mild acute cholecystitis can be managed conservatively(Zhang *et al*., 2023).

A review conducted by Date *et al*., on the management of complicated gallstone disease during pregnancy concluded that up to 27% of patients did not respond to conservative treatment, with maternal and fetal mortality rates being comparable between those who underwent conservative and surgical interventions. Similarly, a review by Lu *et al*., comparing conservative and surgical treatments for acute cholecystitis in pregnancy reported a recurrence rate of 38%, with the highest recurrence observed in patients during the second trimester(Date *et al*., 2008; Lu *et al*., 2004). Furthermore, a retrospective study by Hassanesfahani *et al*., examined decision-making in cases of acute cholecystitis during pregnancy, specifically adherence to clinical guidelines. Among the 220 patients who received conservative

treatment, the recurrence rate was 77%; however, there were no maternal-fetal complications reported(Hassanesfahani *et al.*, 2025). Weaver *et al*., investigated the intervention rates for pregnant patients with acute calculus cholecystitis. A total of 1,349 patients were included in this study, with 959 undergoing conservative treatment and 390 undergoing cholecystectomies. Only 6% of the patients who initially received conservative treatment subsequently underwent cholecystectomy, with the second trimester being the most common period for this procedure(Weaver *et al*., 2025).

Cholecystectomy for Acute Cholecystitis in Pregnancy

The surgical management of acute cholecystitis during pregnancy involves performing a cholecystectomy, which can be executed as either an open or laparoscopic procedure. The timing of the surgery is critical, with the second trimester identified as the optimal period for achieving the most favorable outcomes. The risk of spontaneous abortion is heightened during the first trimester, whereas the likelihood of premature labor increases if the surgery is conducted in the third trimester. Laparoscopic cholecystectomy is not contraindicated for pregnant patients, and the second trimester is the most appropriate time for its performance, as trocar placement can be achieved without interference from the uterine size(Barber-Millet *et al*., 2016; Cheng *et al*., 2021; Chiedozi *et al*., 2001.; Cost Antino *et al*., 1994; Glasgow *et al*., 1998.; Hedström *et al.*, 2024; Mazza *et al*., 2024; Paramanathan *et al*., 2015; Quesada *et al*., 2009).

A meta-analysis conducted by Athwal *et al*., investigated the safety of surgical intervention for symptomatic gallstone disease during pregnancy. This study included a total of 470 patients and reported a pre-term delivery rate of 6.8%, with no significant differences in maternal and fetal mortality rates. The meta-analysis concluded that cholecystectomy can be safely performed during pregnancy.(Athwal *et al*., 2016). Additionally, a systematic review and meta-analysis by Sedaghat *et al*., compared laparoscopic versus open cholecystectomy in the surgical management of acute cholecystitis in pregnant patients. This analysis encompassed 10,632 patients and found that laparoscopic cholecystectomy was associated with reduced maternal and fetal complications. The conversion rate was 3.8%, and the average length of hospital stay was three days. The study concluded that laparoscopic cholecystectomy is safe to perform, although it did not determine the optimal timing for surgery, as most procedures were conducted during the first and second trimesters(Sedaghat *et al*., 2017). Furthermore, a systematic review by Nasioudis *et al*., focused on laparoscopic cholecystectomy during pregnancy, including 590 patients. Many operations were performed in the second trimester, with postoperative complication rates at 4% and a conversion rate to open cholecystectomy of 2.2%. The preterm delivery rate was 5.7%, indicating that laparoscopic cholecystectomy can be safely performed in cases of acute cholecystitis during pregnancy(Nasioudis *et al*., 2016).

Laparoscopic cholecystectomy during pregnancy should be performed with the patient in the supine position, employing the open Hassan technique for port placement. Pneumoperitoneum should be maintained at a pressure of 8-12 mmHg. Additionally, tocolytics should be administered, and fetal heart rate monitoring should be conducted(Halkic *et al*., 2006; Rollins *et al*., 2004). This procedure has been demonstrated to be safe during pregnancy, as it is associated with reduced short-term fetal adverse effects, shorter operative time, decreased length of hospital stay, and a diminished need for blood transfusion. Furthermore, there is a reduced risk of miscarriage. Other factors that may influence the outcome include independent variables such as age over 35 years, the presence of jaundice, and biliary peritonitis.(Itaimi *et al*., 2023; Nan *et al*., 2023; Palanivelu *et al*., 2007; Shigemi *et al*., 2019; Vujic *et al*., 2019).

Martins *et al*., conducted a systematic review and meta-analysis to compare operative versus non-operative treatment of acute cholecystitis. This study incorporated a total of 9 studies involving 45,883 pregnant patients. The findings indicated that operative treatment was associated with a reduction in complications and a shorter hospital stay compared to non-operative treatment. However, maternal mortality, fetal loss, pre-term delivery, and readmission rates were comparable between the two treatment modalities. The study concluded that cholecystectomy should be considered the preferred treatment for acute cholecystitis during pregnancy(Martins *et al*., 2025). Additionally, a retrospective study examined the management of acute cholecystitis in pregnancy across different trimesters. This study followed 3,426 patients for one year, with 34.5% undergoing cholecystectomy, of which 40.4% were in the second trimester and 12% in the third trimester. Cholecystectomy was associated with a reduction in adverse pregnancy outcomes compared to conservative treatment(Hantouli *et al*., 2024). Furthermore, a retrospective study on the outcomes of laparoscopic cholecystectomy in pregnant women concluded that this procedure is both safe and feasible for managing acute cholecystitis during pregnancy(Singhal *et al*., 2025).

Gallbladder Drainage for Acute Cholecystitis in Pregnancy

Percutaneous cholecystostomy represents a viable intervention for stabilizing pregnant patients with acute cholecystitis. This procedure can be effectively integrated with conservative management strategies to address acute cholecystitis in pregnant individuals. In the first trimester, percutaneous cholecystostomy may

facilitate an elective cholecystectomy in the second trimester. For those presenting in the third trimester, it serves as a temporary measure until a postpartum cholecystectomy can be performed. The literature on the application of percutaneous cholecystostomy in the context of acute cholecystitis during pregnancy is limited, primarily comprising case reports and series. Consequently, large-scale studies are warranted to evaluate their efficacy, as there is currently no consensus on its management(Greer, 2018.; Allmendinger, 1995.; Caliskan, 2017; Hojberg *et al*., 2022; Little *et al*., 2013.).

Table 1: Comparison Table: Nonoperative Management vs. Cholecystectomy for Acute Cholecystitis in Pregnancy

Domain	Non-operative Management (NOM)	Cholecystectomy (Operative Management)
Primary Recommendation Status	Despite safety concerns, Non-Operative Management is still widely practiced in real-world settings (Weaver *et al*.,)	Strongly recommended by modern guidelines (SAGES) over Non-Operative Management for acute cholecystitis in all trimesters. (Kumar *et al*.,)
Maternal and Fetal Outcomes (APOs)	Associated with higher composite adverse pregnancy outcomes compared to surgery. (Hantouli *et al*.,)	Significantly lowers adverse pregnancy outcomes (OR ≈ 0.56–0.60). (Martins *et al*.,)
Pregnancy Loss / Preterm Birth	Comparable to surgery in some meta-analyses, but overall worse composite outcomes. (Martine *et al*.,)	Shown to decrease preterm delivery risk in sensitivity analyses; no increase in pregnancy loss. (Martins *et al*.,)
Readmission Rate	Higher readmission rates (including for interval cholecystectomy). (Weaver *et al*.,)	Trend toward lower readmissions (OR ≈ 0.15). (Martins *et al*.,)
Length of Hospital Stay	Shorter Length of Hospital Stay than cholecystostomy, but longer than uncomplicated surgical courses. (Weaver *et al*.,)	Significantly reduced Length of Hospital Stay compared to Non-Operative Management (mean −7 days) (Martins *et al*.,)
Safety Across Trimesters	Often chosen in the 3rd trimester due to perceived fetal risk, but it is associated with more recurrence and complications. (Weaver *et al*.,)	Demonstrated to be safe across all trimesters; guidelines endorse laparoscopic cholecystectomy throughout pregnancy. (Kumar *et al*.,)

CONCLUSIONS

The management of acute cholecystitis during pregnancy remains a contentious issue, with non-operative treatment being the predominant approach adopted by most general surgeons. However, conservative management is linked to a high recurrence rate, which correlates with increased readmission rates and adverse fetal and maternal outcomes. Laparoscopic cholecystectomy has been demonstrated to be safe and feasible across all trimesters of pregnancy, yet many surgeons exhibit reluctance to perform it during this period. Percutaneous cholecystostomy may function as a stabilizing interim procedure, but it is not widely preferred due to the complexities of trocar insertion and the contraindication of tube cholangiography, given the radiation risk to the fetus. Pregnant patients with cholelithiasis should be informed about the risks associated with gallstone disease complications and the available treatment options. Further large-scale studies are essential to ascertain whether surgical intervention is the optimal treatment for acute cholecystitis in pregnancy.

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