Original Article

# Safety of Laparoscopic Cholecystectomy for Cholecystitis during Pregnancy

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## Abstract

**Objectives:** The aim of this study is to evaluate the safety of laparoscopic cholecystectomy to treat acute cholecystitis during pregnancy.
**Materials and Methods:** We conducted a retrospective multicenter study including pregnant women with acute cholecystitis managed in surgery departments in Tunisia from January 1, 2015, to December 31, 2019.
**Results:** Seventeen centers of surgery department participated in this study including 107 cases of acute cholecystitis. The average maternal age was 30.5 years. Nonoperative management was performed in eight patients, whereas 99 other patients had surgery. Postoperative follow-up was uneventful in 93.8% of cases and eventful in 6.2% of cases. There was no mortality as far. A medical complication occurred in two patients with a medical morbidity rate of 1.7%. It was about thromboembolic disease. A surgical complication occurred in two other patients with a surgical morbidity rate of 1.7%. It was about intraperitoneal infection in one case and biliary collection in the other case. In univariate analysis, variables related significantly to maternal complication were: age equal or over 35 years old ($P = 0.001$), jaundice ($P = 0.024$), C-reactive protein value equal or over 20 mg/L ($P = 0.05$), and biliary peritonitis ($P = 0.05$). In multivariate analysis, independent variable predictive of maternal complications was age equal or over 35 years old ($P = 0.003$), jaundice ($P = 0.003$), and biliary peritonitis ($P = 0.011$).
**Conclusion:** Laparoscopic cholecystectomy for cholecystitis can be safely achieved in pregnant women with low rates of morbidity and mortality. This study showed that independent variable predictive of maternal complications was age equal or over 35 years old, jaundice, and biliary peritonitis.

**Keywords:** Cholecystitis, morbidity, mortality, pregnancy

## Introduction

Hepatopancreatobiliary emergencies are common among surgery departments. Acute cholecystitis is the second abdominal emergency in pregnant women after acute appendicitis.[1] The occurrence of acute cholecystitis in pregnancy may affect the maternal and fetal prognosis. There are few studies that are interested in analyzing the safety of laparoscopic surgery and determining prognostic factors of maternal and fetal morbidity and mortality during acute cholecystitis. The identification of these factors makes it possible to classify patients, according to the prognostic risk, and to better codify the management and the therapeutic protocols.

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The aim of our study is to evaluate the safety of laparoscopic cholecystectomy to treat acute cholecystitis during pregnancy. The second objective is to determine the predictive factors of maternal morbidity and mortality in acute cholecystitis during pregnancy.

## Materials and Methods

We conducted a retrospective multicenter study including pregnant women with acute cholecystitis managed in surgery departments in Tunisia from January 1, 2015, to December 31, 2019.

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### Inclusion criteria

Women presenting with acute cholecystitis during pregnancy or immediately postpartum were included in this study.

### Exclusion criteria

Pregnant women managed for noncomplicated gallstones and medical folders in which the diagnosis of acute cholecystitis were not confirmed preoperatively.

### Data collection

We used canvas with 157 variables tracked in an Excel file. Items were related to:

- Patients: age, medical history, gravidity, and parity
- Pregnancy: age of gestation and medical follow-up
- Biliary emergency: symptoms, clinical presentation, laboratory evaluation, radiologic investigation, severity of cholecystitis, medical management, complications, morbidity, and mortality.

### Therapeutic strategies

#### *Nonoperative management*

Nonoperative management is based on the administration of broad-spectrum antibiotics, intravenous fluids, and spasmolytics. Antibiotics used were cefotaxime and metronidazole. Patients proposed for conservative management were closely supervised by surgeon and obstetrician. Patient monitoring was based on clinical examination (temperature, vital signs four times a day, and abdominal examination two times a day) and radiological evaluation (by abdominal and obstetrical ultrasonography). Patients who were over 30 weeks of gestation had one fetal heart rate a day.

#### *Surgical management*

The surgical management consisted on cholecystectomy by open or laparoscopic approach. In the laparoscopic approach, we started by palpating the bottom of the uterus and the introduction of the first trocar by an open laparoscopy. Gas pressure should be maintained between 10 and 12 mm of mercury. All patients who had surgical management had an obstetrical ultrasonography before and after operation to detect fetal complications.[2,3]

### Statistical analysis

We collected patient's data retrospectively, tracked them in an Excel file and treated them by SPSS version 20 (SPSS Inc. USA). Results were given by percentages or averages. We used the test of Pearson in the comparison between the continuous variable and the Chi-squared test to compare the ordinal variables and in case of no validity of this test, we used Fischer's test. For all statistical tests, signification was fixed at a value of $P < 0.05$. Univariate analysis was used to study the factors of morbidity and mortality. To identify the risk factors related independently to the event, we conducted a logistic and multiple regression analyses top-down approach (first we insert all factors with $P = 0.05$ in univariable and those with "*P*" between 0.05 and 0.15 and step by step we delete factors with less significant "*P*"). Multivariable analysis allowed us to calculate the adjusted odds ratios (ORs), to measure the own role of each factor, and to identify independent predictive factor of specific morbidity and mortality, whenever possible.

### Committee approval

Ethical approval for this study was provided by the Ethical Committee of Habib Bougatfa University Hospital of Bizerte. The approval number is 263. Written informed consent was obtained.

## Results

Seventeen centers of surgery department participated in this study including 107 cases of acute cholecystitis. The average maternal age was 30.5 years. Patients were primiparous in 16.8% of cases and multiparous in 83.2% of cases. Acute cholecystitis was diagnosed in the first, second, and third trimesters of pregnancy, respectively, in 25.2%, 36.4%, and 33.7% of cases. In 4.7% of cases, the diagnosis was performed after birth. The average gestational age was 21.3 weeks at the moment of diagnosis.

Patients were complaining about right hypochondrium pain in 70.1% of cases, fever in 65.4% of cases, and jaundice in 5.6% of cases. We found out a palpable mass in the right hypochondrium in 12.1% of cases.

In biological data, we found hyperleukocytosis in 59.8% of patients and a C-reactive protein (CRP) value over 20 mg/mL in 38.3% of them. Thrombopenia was recorded only once. Hyperbilirubinemia with higher levels of conjugated bilirubin was found in 19.6% of cases. Gamma-glutamyl transferase was high in 14 patients. Increased alkaline phosphatase was found in 35 patients and cytolysis in two patients.

Abdominal ultrasonography showed gallstones in 96.2% of cases, gallbladder distension in 52.3% of cases, thickening of the lining of the gallbladder in 50.5% of cases, impacted stone in 14% of cases, effusion in 9.3% of cases, and a common bile duct over 8 mm in 6.5% of cases.

In our series, nonoperative management was performed in eight patients, whereas 99 other patients had surgery.

Surgery was performed after an average of 2.6 days with extremes going from 1 to 20 days.

Laparotomy was used in 25.8% of cases and laparoscopy in 74.2% of them. Conversion to laparotomy was recorded in four patients because of difficulties in dissection in two cases and hemorrhage in two other cases. Cholangiography through a transcystic drain was performed in 12 patients, respecting rules of radiation protection, and was normal in 10 cases,

showed dilataion of biliary ducts without evident of stone image in two other cases. Five days after, cholangiography was normal in these two past patients.

Postoperative follow-up was uneventful in 94.4% of cases and eventful in 5.6% of cases. There was no mortality as far.

A medical complication occurred in two patients with a medical morbidity rate of 1.7%. It was about thromboembolic disease. A surgical complication occurred in two other patients with a surgical morbidity rate of 1.7%. It was about intraperitoneal infection in one case and subhepatic bile collection in the other case.

The average hospital stay was 8 days with a median of 7 days and extremes varying from 2 to 30 days. An intensive care unit stay was about 1 day with extremes from one to 14 days.

Fetal complications were observed in 5 (4.7%) cases. Table 1 is a summary of fetal complication types.

In univariate analysis, variables related significantly to maternal complication were: age equal or over 35 years old ($P$ = 0.001), jaundice ($P$ = 0.024), CR*P* value equal or over 20 mg/L ($P$ = 0.05), and biliary peritonitis ($P$ = 0.05) [Table 2].

In multivariate analysis, independent variable predictive of maternal complications were age equal or over 35-year-old ($P$ = 0.003; OR: 15,429; confidence interval [CI] at 95% [1.637–145.398]), jaundice ($P$ = 0.003; OR: 16.333; IC at 95% [2.104–126.822]); and biliary peritonitis ($P$ = 0.011; OR: 9.048; IC at 95% (1.291–63.396]).

## Discussion

This study showed that laparoscopic cholecystectomy for cholecystitis during pregnancy is safe. Predictive factors affecting maternal morbidity in acute cholecystitis during pregnancy were the maternal age equal or over 35 years old, jaundice, and biliary peritonitis. Moreover, no maternal mortality was observed.

**Table 1: Fetal complications**

| Number of case | Age | Term (weeks) | Maternal complications | Neonatal complications |
|---|---|---|---|---|
| 1 | 42 | 29 | None | Fetal death *in utero* |
| 2 | 36 | 17 | None | Abortion |
| 3 | 37 | 30 | Medical | Prematurity |
| 4 | 32 | 30 | Surgical | Fetal death *in utero* |
| 5 | 35 | 20 | Médical | Abortion |

**Table 2: Predictive maternal morbidity factors in multivariate study**

| Variables | *P* | OR (IC at 95%) |
|---|---|---|
| Age ≥35 years old | 0.003 | 15.429 (1.637–145.398) |
| Jaundice | 0.003 | 16.333 (2.104–126.822) |
| Biliary peritonitis | 0.011 | 9.048 (1.291–63.396) |

OR: Odds ratio, IC: Confidence interval

Although this study is interesting, it has some limitations. In fact, it is a retrospective and descriptive study collecting a small number of patients.

Gallstones are more frequent in women.[4] Besides alimental, genetic, and medical factors (hormones) during pregnancy cause atony of the gallbladder and chemical modifications of bile, which explains the promotional role of pregnancy in stone formation. There are still controversies about the management of acute cholecystitis in pregnant women. The nonoperative approach consists of fasting, hydration, analgesia, and intravenous antibiotics with clinical and biological close follow-up. Cholecystectomy will be scheduled after birth. The surgical approach consists of conventional or laparoscopic cholecystectomy. In our series, surgical treatment was performed in 93% of our patients.

Many studies were carried out to confront the two approaches comparing the maternal morbidity observed in each approach.

Lee *et al*.[5] compared medical and surgical management in biliary disease during pregnancy. There was not an augmentation in maternal mortality in the group managed surgically. On the other hand, there was maternal mortality in the group of nonoperative treatment. Several studies showed that medical management exposed to high risks of recurrence of symptoms with higher number of hospital admissions.[6,7]

Swisher *et al*.,[6] in series of 72 patients treated for biliary diseases with 9 of them for acute cholecystitis, showed that medical treatment exposed to high risks of complicated forms of cholecystitis, especially biliary peritonitis. On the other hand, he did not prove enhancement in maternal complications in the group managed surgically.

Literature showed that medical management in acute cholecystitis during pregnancy exposes to higher risks of recurrence with more serious forms and to recurrent hospital admissions.

Paramanathan *et al*.[8] in their retrospective study including 22 pregnant women to whom cholecystectomy were performed did not report any postoperative complication.

In a cohort study including 32,479 nonpregnant patients and 436 pregnant women managed surgically, there was not observed a significant difference in morbidity between the two groups. The author concluded that the pregnancy does not increase the risk of postoperative complications after cholecystectomy.

To conclude, surgical management in acute cholecystitis in pregnant women does not increase the maternal morbidity.

In this study, the laparoscopic approach was performed in 74.2% of cases with a rate of conversion of 5.5%. Studies showed no significant difference in maternal morbidity and mortality between the two approaches. Besides, the laparoscopic approach is associated with a faster alimentation introduction and a shorter hospital stay. It also allows a faster perambulation, which is important in pregnancy as the thromboembolic risk is higher.[7,9]

Weiner *et al*.[10] compared the result of laparoscopic surgery when performed during the first trimester and over the second trimester; they concluded to no significant difference between the two groups in birth term, prematurity, and abortion.

## Conclusion

Acute cholecystitis in pregnant women is rare. There are still controversies about treatment management between surgical and nonsurgical treatment. Nonsurgical treatment exposes to a high risk of recurrence and many complications. This study showed that surgical management, especially the laparoscopic approach can be safely achieved in pregnant women with low rates of morbidity and mortality.

The independent variable predictive of maternal complications was age equal or over 35 years old, jaundice, and biliary peritonitis.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. Landers D, Carmona R, Crombleholme W, Lim R. Acute cholecystitis in pregnancy. Obstet Gynecol 1987;69:131-3.
2. Thepsuwan J, Huang KG, Wilamarta M, Adlan AS, Manvelyan V, Lee CL Principles of safe abdominal entry in laparoscopic gynecologic surgery. Gynecol Minim Invasive Ther 2013;2:105-9.
3. Luay AA, Khan S, Huang KG. Isolated fallopian tube torsion with gangrenous necrosis. Gynecol Minim Invasive Ther 2022;11:70.
4. Ko CW, Beresford SA, Schulte SJ, Matsumoto AM, Lee SP. Incidence, natural history, and risk factors for biliary sludge and stones during pregnancy. Hepatology 2005;41:359-65.
5. Lee S, Bradly JP, Mele MM, Sehdev HM, Ludmir J. Cholelithiasis in pregnancy: Surgical versus medicam management. Obstet Gynecol 2000;95:70-1.
6. Swisher SG, Schmit PJ, Hunt KK, Hiyama DT, Bennion RS, Swisher EM, *et al.* Biliary disease during pregnancy. Am J Surg 1994;168:576-9.
7. Lu EJ, Curet MJ, El-Sayed YY, Kirkwood KS. Medical versus surgical management of biliary tract disease in pregnancy. Am J Surg 2004;188:755-9.
8. Paramanathan A, Walsh SZ, Zhou J, Chan S. Laparoscopic cholecystectomy in pregnancy: An Australian retrospective cohort study. Int J Surg 2015;18:220-3.
9. Cox TC, Huntington CR, Blair LJ, Prasad T, Lincourt AE, Augenstein VA, *et al.* Laparoscopic appendectomy and cholecystectomy versus open: A study in 1999 pregnant patients. Surg Endosc 2016;30:593-602.
10. 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;292:1063-8.