

Safety and feasibility of laparoscopic cholecystectomy during pregnancy

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Background/aim

Symptomatic biliary diseases in pregnant women remain a great challenge to surgeons. The present study aimed to evaluate the safety and feasibility of laparoscopic cholecystectomy (LC) during pregnancy.

Patients and methods

This prospective, observational study was conducted on 27 pregnant women with a mean age of 27.3 ± 4.1 (range 21–36) years who presented with symptomatic gallbladder diseases (stones or cholecystitis) and underwent LC. Gestational age, operative time, and maternal and fetal outcomes were noted.

Results

The mean operative time was 58.7 (range 32–78.5) min. Conversion to open cholecystectomy occurred only in one patient with acute cholecystitis due to the presence of severe adhesions (3.7%). No intraoperative or postoperative complications were observed, except for mild wound infection in only one patient (3.7%) and mild uterine contractions in two patients (7.4%). All patients went on to deliver at full term with no abortion or preterm labor.

Conclusion

Pregnant women with repeated attacks of biliary colic and/or cholecystitis after failure of conservative treatment can undergo LC easily and safely without hazardous effects on either mothers or fetuses, especially in the second trimester.

Keywords:

cholecystitis, laparoscopic cholecystectomy, pregnancy

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Introduction

Not only the diagnosis but also the treatment of abdominal surgical diseases in pregnant women remains a great challenge to both surgeon and obstetrician. Among pregnant women, approximately one in 500 to one in 635 will require nonobstetrical abdominal surgery during their pregnancies [1]. Biliary tract disease is the second most common surgical condition encountered in obstetrical patients after acute appendicitis [2]. The high risk for the formation of biliary sludge and stones during pregnancy is due to the high level of estrogen and progesterone, which increases the secretion of cholesterol compared with bile acids and gallbladder stasis [3]. Pregnancy is also associated with decreased enterohepatic circulation, decreased level of chenodeoxycholic acid, and increased bile stasis [4].

Conservative treatment has been traditionally used as an initial management of symptomatic cholelithiasis during pregnancy. It has been reported that recurrence rate after conservative treatment seem to be trimester dependent and range between 40 and 92% [5,6]. If conservative management fails and in all complicated forms, such as acute cholecystitis or acute biliary

pancreatitis, most surgeons agree that cholecystectomy should be performed [7,8].

Pregnancy was once considered an absolute contraindication for laparoscopic procedures because of fetal wastage, effects of carbon dioxide on the developing fetus (fetal acidosis), and long-term sequelae during childhood development. These concerns have proven to be false as surgical skills have been developed and more experience has been obtained [9]. In recent times, it has been suggested that in symptomatic benign biliary disease during pregnancy the fetal death rate is much higher with conservative treatment than after laparoscopic cholecystectomy (LC) [6].

Laparoscopic surgery during pregnancy should result in the proven advantages of laparoscopy seen in the nonpregnant patient: decreased postoperative pain, faster return of gastrointestinal function, earlier

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ambulation, decreased hospital stay, and return to routine activity, in addition to decreased fetal respiratory depression due to diminished postoperative narcotics, lower risk for wound complications [10], diminished postoperative maternal hypoventilation, and decreased risk for thromboembolic manifestations. The better visualization in laparoscopy may reduce the risk for uterine irritability by decreasing the unnecessary uterine manipulation [11]. Decreased uterine irritability results in lower rates of spontaneous abortion and preterm delivery [12].

LC in the second trimester is most feasible and safe [13,14]. Fetal malformation associated with anesthesia and abdominal surgery is a major concern in the first trimester because of ongoing organogenesis. In the third trimester, the large uterine size may obstruct the operative visual field or affect surgical technique. Premature labor is the most important complication of cholecystectomy due to excess uterine manipulation, although many successful LCs during that trimester have been reported [15].

Current recommendations for biliary tract disease during pregnancy vary depending on trimester. In the first trimester a trial of conservative management followed by LC in the second trimester is recommended [16–18].

Thus, the present study aimed to evaluate the safety and feasibility of LC during pregnancy.

Patients and methods

Study design and population

This study was a prospective, observational study performed at the Department of Surgery, Al-Azhar University Hospital and Aswan University Hospital during the period between October 2012 and November 2015. It was carried out on 27 pregnant women with a mean age of 27.3 ± 4.1 (range 21–36) years who presented with symptomatic gallbladder diseases (stones or cholecystitis) and underwent LC. The following factors were noted: patient age, gestational age, presenting symptoms, ultrasound findings, laboratory findings, operative time, pregnancy outcome, hospital length of stay, and complications.

Inclusion criteria: patients with biliary colic or acute cholecystitis after failure of proper conservative treatment were included in the study.

Exclusion criteria: patients with biliary obstruction, previous repeated upper abdominal surgery, severe

cardiac or respiratory disorders, severe impairment of renal function and coagulopathy were excluded.

Study protocol

The study was approved by the Local Ethics Committee of Surgery Department. All patients were interviewed with a standardized questionnaire, which inquired about the history as regards symptoms, onset, course, and duration, previous attacks of biliary colic or cholecystitis, and previous treatment.

Complete physical examination (general and local), complete laboratory tests, ECG, and abdominopelvic ultrasound were carried out for all patients.

Diagnosis of biliary colic shows the clinical differences between biliary colic and acute cholecystitis when combination of pain in the presence of gallbladder stones by ultrasound. Diagnosis of acute cholecystitis when biliary pain was associated with the presence of gallbladder stones and signs of inflammation by ultrasound (wall edema, gallbladder distension, etc.) as well as laboratory findings (leukocytosis).

All patients were initially managed conservatively. Conservative management varied according to the admission diagnosis. Patients unresponsive or relapsing after medical treatment were considered conservative treatment failures and were planned for LC.

Patients were counseled as regards the procedure, outcome, and possible complications, and they signed a detailed informed written consent.

Before surgery, patients were evaluated by the obstetrician consultant to rule out problems during pregnancy. An obstetric ultrasound was performed to confirm gestational age and fetal vitality, and repeated after surgery and before discharge. Fetal heart monitoring was initiated on the morning of surgery and continued at an interval of 4 h in the postoperative period until discharge. Tocolytic agents were administered in the form of indomethacin per/rectal dose of 50 mg one time. Indomethacin is an effective tocolytic agent due to antiprostaglandin effect.

Operative procedure

Assessment for general anesthesia was performed. Preoperative preparations such as showering, cleaning of the umbilicus, and fasting 8 h before surgery were carried out. An intravenous antibiotic (1 g of third-generation cephalosporin) was administered once at the induction of anesthesia as prophylaxis.

Standard endotracheal general anesthesia was induced with controlled ventilation and monitoring of end-tidal CO₂. The patient was placed on the operating table in Trendelenburg position and the operating table was tilted to the left. After cleaning and draping the patient, the abdomen was palpated under anesthesia to palpate the level of the uterus. If the uterus was less than 18 weeks, the initial trocar placement was at the umbilicus, whereas in pregnancies associated with a uterine size of 18 weeks or greater the initial trocar placement was above the umbilicus.

The open Hasson technique was used for initial trocar placement. Pneumoperitoneum was created by means of insufflation with CO₂ at an average intra-abdominal pressure of 12 mmHg. The other three trocars were placed under direct vision. Using multiple graspers and manipulators, the gallbladder was removed as in the case of a nonpregnant patient. After completion of the procedure, local anesthesia was utilized in port sites for improved postoperative analgesia, which minimized narcotic requirements after surgery.

During surgery, the procedure followed was meticulous and precise. It was ensured that all recommended precautions are taken.

Patients were started on liquids on the evening of surgery and they were followed up in the hospital by both surgeon and obstetrician for signs of abortion, preterm labor, and fetal and surgical complications. Effective postoperative analgesia was ensured and tocolytic agents were continued during the first postoperative day. Most of the patients were discharged on the second postoperative day (Fig. 1).

Results

A total of 27 pregnant women were subjected to LC; their mean age was 27.3 ± 4.1 (range 21–36) years. The

mean gestational age was 16 (range from 6 to 26) weeks. The analysis of the results was based on the following.

Preoperative data

In 17 patients (63%), LC was indicated due to repeated attacks of biliary colic, whereas in 10 patients (37%) the indication was due to acute calcular cholecystitis. The operation was performed during second trimester in 22 (81.49%) patients, and during first trimester in three patients (11.11%). In two patients the surgeon was not aware of the patients being pregnant, as the gestational age was 6 weeks, and two patients (7.4%) were operated in the early third trimester (Table 1).

Operative and postoperative data

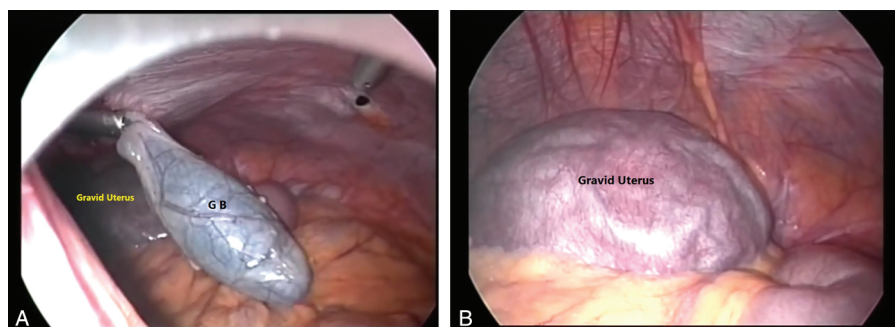
The intra-abdominal pressure was not more than 12 mmHg. The mean operative time was 58.7 (range 32–78.5) min. There was no mortality or intraoperative complications (bleeding, biliary injury, etc.). Conversion to open cholecystectomy occurred only in one patient with acute cholecystitis due to the presence of severe adhesions

Table 1 Preoperative data of pregnant women who were candidates for laparoscopic cholecystectomy

Parameter	Value
Sample size	27
Age (years)	27.3 ± 4.1 (range 21–36)
Mean gestational age (weeks)	16 (range 6–26)
Indications of LC [n (%)]	
Repeated biliary colic	17 (63)
Acute calcular cholecystitis	10 (37)
Time of operation [n (%)]	
First trimester	3 (11.11)
Second trimester	22 (81.49)
Third trimester	2 (7.4)

LC, laparoscopic cholecystectomy.

Figure 1



Laparoscopic cholecystectomy at 24 weeks of pregnancy.

Table 2 Operative and postoperative data of pregnant women who underwent laparoscopic cholecystectomy

Parameter	Value [n (%)]
Operative time (min)	58.7 (range 32–78.5)
Conversion to open cholecystectomy	1 (3.7)
Wound infection	1 (3.7)
Uterine contraction	2 (7.4)
Hospital stay (days)	
1	24 (88.9)
2	1 (3.7)
3	2 (7.4)
Mortality	0 (0)
Major intraoperative complications	
Bleeding, biliary injury, etc.	0 (0)
Postoperative surgical complications	0 (0)
Maternal or fetal complications	
Abortion	0 (0)
Premature labor	0 (0)
Antepartum hemorrhage	0 (0)
Fetal loss or malformations, etc.	0 (0)
Full-term delivery	27 (100)

(3.7%). No major postoperative surgical complications were observed, except for mild wound infection in only one patient (3.7%).

There were no maternal or fetal complications (abortion, preterm labor, antepartum hemorrhage, fetal loss or malformations, etc.), except for mild uterine contractions in two patients (7.4%) who were treated with tocolytics and rest. Hospital stay was only 1 day in 24 patients (88.9%), 2 days in one patient who converted to open cholecystectomy (3.7%), and 3 days in two patients due to uterine contraction (7.4%); all patients went on to deliver at the full term (Table 2).

Discussion

Biliary colic during pregnancy can most often be treated successfully with conservative management. If acute cholecystitis is suspected, antibiotics can be added, and cholecystectomy can be postponed until after delivery [19]. However, more than one-third of the symptomatic patients fail conservative medical management [8] and the incidence of risk for symptom recurrence after medical treatment is 92% in the first trimester, 64% in the second trimester, and 44% in the third trimester [5]. Moreover, delay in treatment of biliary disease during pregnancy has been related to increased morbidity, and to rate of complications for both the mother and the fetus [20,21] and hence require cholecystectomy.

The most common cause of biliary surgery during pregnancy is recurrent attacks of biliary colic (70%), followed by acute cholecystitis (20%), choledocholithiasis (7%), and acute biliary pancreatitis (3%) [22]. In our study, the most common cause of LC was recurrent attacks of biliary colic not responding to conservative treatment (63%), followed by acute cholecystitis (37%).

Historical recommendations were to delay surgery until the second trimester, to reduce the rates of spontaneous abortion and preterm labor [23]. Recent literature has shown that pregnant patients may undergo laparoscopic surgery safely during any trimester without any increase risk to the mother or fetus [14,24]. The Society of American Gastrointestinal and Endoscopic Surgeons published guidelines in 2007 that stated the following: 'LC is the treatment of choice in pregnant patient with gallbladder disease, regardless of trimester' [25]. In our study, 22 patients were operated in second trimester, three patients in first trimester, and two patients in early third trimester. There were no difference between trimesters as regards feasibility and safety.

During laparoscopy, pregnant women should be placed in the left lateral decubitus position to minimize compression of the vena cava [26]. In our study Trendelenburg's position with lateral tilt was used.

Initial abdominal trocar can be safely accomplished with an open (Hasson) technique, Veress needle, or optical trocar [26]. The open (Hasson) technique was preferred in our study.

CO₂ insufflation of 10–15 mmHg can be safely used for laparoscopy in pregnant patients [26]. Some authors have recommended intra-abdominal insufflation pressures maintained at less than 12 mmHg to avoid affecting pulmonary and circulatory physiology in gravid women [27]. There are no data showing harmful effects to human fetuses from CO₂ pneumoperitoneum [28]. Some authors have reported the use of gasless laparoscopy in patients who cannot tolerate the pneumoperitoneum and that the results were good, but the technique was limited and needed very expert surgeons in laparoscopy [29]. The average intra-abdominal pressure was adjusted at 12 mmHg in the present study.

The mean operative time in the present study was 58.7 (range 32–78.5) min. It is nearly in agreement with that reported in other studies: 54 min in a study performed

by Sharouda *et al.* [30] and ranged from 55 to 62 min in a study by Sungler *et al.* [4].

In a study performed by Rollins *et al.* [17] on 31 patients who underwent LCs during pregnancy, the rate of preterm delivery was 20% and one fetal loss was observed. However, Muench *et al.* [20], in their series on 16 cases, reported that two patients were converted to open approach, but they did not observe maternal or fetal morbidity or mortality. Nine LCs were performed by Palanivelu *et al.* [31], who reported one wound infection, but no fetal loss and no conversions were reported. Sharouda *et al.* [30] observed only one premature contraction with no other complications related to pregnancy in their study on 11 patients.

In our study, there were no operative or postoperative complications, except for wound infection in only one patient (3.7%). Rate of conversion to open cholecystectomy was 3.7% due to the presence of severe adhesions. Hospital stay was only 1 day in 24 patients (88.9%), 2 days in one patient (3.7%), and 3 days in two patients due to uterine contraction (7.4%). There was no maternal mortality, abortion, preterm labor, or fetal loss, and all patients went on to deliver at full term.

Conclusion

Pregnant women with repeated attacks of biliary colic and/or cholecystitis after failure of conservative treatment can undergo LC easily and safely without hazardous effects on either mothers or fetuses, especially in the second trimester.

Conflicts of interest

A multidisciplinary coordinated team work between competent laparoscopic surgeon, anesthesiologist and obstetrician is very important to accomplish safe LC during pregnancy.

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