Laparoscopic Cholecystectomy In Pregnancy: Personal Experience And Review Of The Literature

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Abstract: Introduction: Symptomatic gallbladder disease is the second most common abdominal emergency in pregnant women. Laparoscopic surgery in pregnant women was considered to be a contraindication. However, the safety of laparoscopy in this population has been widely accepted. This study shows our experience of laparoscopic cholecystectomy during pregnancy in 11 patients. **Material and Methods:** Patients who underwent laparoscopic cholecystectomy between January 1, 2008 to April 30, 2014 were selected from databases of three private hospital in Jeddah, KSA, only 11 were performed during pregnancy. Medical records were then analyzed to identify estimated gestational age at surgery and delivery, operative data, postoperative follow up and complications from surgery. We also reviewed the literature regarding this topic. **Results:** Out of the 11 pregnant patients who underwent laparoscopic cholecystectomy, one patient was in the first trimester, 9 patients were in the second trimester and one was in the third trimester. Eight patients were operated for recurrent attacks of biliary colic, two patients for acute cholecystitis and one patient for gallstone pancreatitis. Tocolytic agents was used in one patient and all the patients went on to deliver at the full term. There was no abortion or fetal loss, and no maternal mortality. **Conclusion:** Laparoscopic cholecystectomy can be safely conducted in pregnant patients, in any trimester. It has to be done by an experienced surgeon in cooperation with an obstetrician. However the indications should be restricted to patients with complications or to those suffering from repeated and persistent symptoms not responding to medical management.

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1. Introduction:

Biliary tract disease is only second to acute appendicitis as the most common cause of surgical condition encountered in obstetrical patients [(1,2)].

There is a strong association between pregnancy and gallstones. Pregnancy is a high-risk period for formation of biliary sludge and stones. Increased estrogen and progesterone levels lead to increased secretion of cholesterol compared with bile acids and gallbladder stasis [(3)], as well as an increase in gallbladder size during fasting, higher volume emptying and decrease in the circulating pool of bile salt contribute to the large number of pregnant women with cholelithiasis [(4)].

The initial management of symptomatic cholelithiasis in pregnancy is conservative. It has been reported that recurrence rates after conservative treatment seem to be trimester dependent, and range between 40% and 92% [(5,6)]. For this reason, Most agree cholecystectomy should be performed if conservative management fails and in all complicated forms, such as acute cholecystitis or acute biliary pancreatitis [(7,8)].

Although pregnancy was once considered an absolute contraindication to the performance of laparoscopic procedures, these concerns have proven to be false as surgical skills have increased and more experience has been gained [(9)]. The second trimester is the best time to do surgery because in this period, the risk of complication due to surgery is low [(2)]. However, it can be done any trimester[(10).]

2. Patients and methods:

This is a retrospective study reviewing all pregnant women at three private hospitals in Jeddah, KSA who underwent a laparoscopic cholecystectomy between January 1, 2008 to April 30, 2014. The study includes 11 pregnant patients with symptomatic gallstones, 9 of whom were operated in the second trimester one was operated in the first trimester and one was operated in the third trimester. The mean age of patients was 33 (range from 25- 41) years, and duration of gestation was 20 weeks (range from 12-

28). The main indications for cholecystectomy were: repeated episodes of biliary colic, acute cholecystitis (patients who were managed conservatively on the first attack but who had a second episode of acute cholecystitis during pregnancy), and gallstone pancreatitis.

A detailed informed consent for laparoscopy with explanation of maternal and fetal complications was obtained from all patients. Before surgery, patients were evaluated by the obstetrician consultant in order to rule out problems during pregnancy. In all cases an obstetric ultrasound was performed to establish gestational age and fetal vitality, scan was repeated after surgery and prior to discharge.

Fetal heart monitoring was initiated on the morning of surgery and continued at an interval of 4 hours in the postoperative period until discharge. Tocolytic agents were not utilized prophylactically.

All patients received a first generation cephalosporin as prophylaxis.

Standard inhalational anesthesia was induced with controlled ventilation and monitoring of end-tidal carbon dioxide by Capnography.

Sequential compression pneumatic devices were placed on both lower extremities, as were a Foley catheter and gastric tube.

After cleaning and draping the patient, abdomen was palpated under anesthesia to palpate the level of the uterus and the first port was placed at 3-4 cm above the uterine fundus by open technique in 8 cases, using Veress needle technique in 2 cases and by the optical trocar technique in one case. This was according to experience and preference of the operating surgeon. Pneumoperitoneum was created by insufflation with carbon dioxide, The abdomen was then examined for any injury from this trocar insertion, and the rest of the abdomen was inspected. Intra-abdominal pressure was kept as low as possible in the range of 8-12 mmHg, while maintaining the adequate visualization. Rest of the ports were placed under direct vision as in the case of non-pregnant patients. The placement of ports were modified, depending on uterine size and gestational age.

The patient was positioned in an anti-Trendlenburg position with the left side down. After completion of the procedure, Local anesthesia was utilized in port sites for improved postoperative analgesia, which minimized narcotic requirements after surgery. Patients started liquids on the evening of surgery and was discharged 48 hours postoperatively.

3. Result

During a 6- year period, 11 pregnant women underwent laparoscopic cholecystectomy. The main features of our patients are summarized in (Table 1). The average age of patients was 33 years. The minimum estimated gestational age at surgery was 12 weeks and the maximum was 28 weeks.

One patient required surgery during her first trimester of pregnancy, one underwent surgery during their third trimester and 9 patients underwent surgery during the second trimester.

Mean operative time was 54 min, which varied from 45 to 70 min.

In all the patients, intra-abdominal pressure was kept less than 12 mm of Hg. All patients were discharged within the first 48 h after surgery, no surgical complications were registered during this period and during follow-up. All the patients went on to deliver at the full term.

Eight patients were operated for recurrent attacks of biliary colic, two patients for acute cholecystitis and one patient underwent laparoscopic cholecystectomy for gallstone pancreatitis. Patient presented with acute pancreatitis was managed conservatively until complete clinical and biochemical recovery was achieved. Intra and extra biliary radicles dilatation were excluded by abdominal ultrasound.

Tocolytic agents was used in one patient in the 15th week but the contractions were controlled and she also delivered at the full term. There was no abortion or fetal loss, and no maternal mortality.

Table 1 : N: Number. G.A = Gestational Age, T/ min = Time per minutes, P. I = Method of port insertion. P = pressure / mmHg, Comp = complication, S&S = Symptoms & signs

N	Age	G. A	T/min	P. I	P mmHg	Comp	S&S
1	25	16	60 Min	open	10	NO	Repeated biliary colic
2	30	19	70 Min	open	12	NO	Repeated biliary colic
3	36	15	45 Min	open	12	Uterine contraction	Repeated biliary colic
4	41	20	50 Min	open	10	NO	Acute cholecystitis
5	39	24	60 Min	open	12	NO	Repeated biliary colic
6	28	12	45 Min	Verres	12	No	Repeated biliary colic
7	35	22	70 Min	open	11	NO	Acute pancreatitis
8	29	24	55 Min	optical	8	No	Repeated biliary colic
9	27	17	45 Min	Verres	12	NO	Repeated biliary colic
10	34	28	55 Min	open	8	NO	Repeated biliary colic
11	39	22	45 Min	open	10	NO	Acute cholecystitis

All patients with no complications were discharged on the third postoperative day. The only patient having uterine contractions was discharged on the fifth postoperative day after ensuring the well being of the fetus.

4. Discussion

Biliary tract disease is reported to represent the second most non obstetric surgical emergency during pregnancy [11]. The etiology of gall stones is multi-factorial, but gender and sex steroids are implicated, because gall stones are more frequent in female than male. Pregnancy, by increasing the levels of female hormones is predisposing to gall bladder disease, or increased symptoms from established stones due to diminished GB emptying and increased bile saturation with cholesterol [12].

The management of symptomatic gall bladder stones in non-pregnant women is a straightforward issue. The presence of a second entity, the fetus, complicates decisions in the management of pregnant women. Pregnancy was considered a relative contraindication for laparoscopy. Nowadays, As surgeons have gained more experience, laparoscopic cholecystectomy is becoming more widely accepted during pregnancy[9]. 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[13].

However, more than one-third of the symptomatic patients fail conservative medical management and is associated with multiple hospitalizations [8], as well as delay in treatment of biliary disease during pregnancy has been related to increased morbidity, and the rate of complications for both mother and fetus [14,15,16] and so, require cholecystectomy.

The timing of surgical intervention during pregnancy is an important variable and a determinant of some of the unwanted consequences of surgical intervention. The peak period for spontaneous abortion is common in the first trimester. While in the third trimester, the risks for prematurity are greater and the size of the uterus may pose technical problems [17,18]. Of our 11 operative cases,9 were in the second trimester of pregnancy. Many authors consider that the second trimester of pregnancy is the safest period, however, laparoscopy can be performed safely in any trimester [2,10,19,20].

The technique of access to the abdomen and pneumoperitoneum in the pregnant patients is controversial as complications have been reported with any technique. Some authors have advised to place the first trocar just below the xiphi-sternum[21]. Others advocate the use an optical trocar which allows the surgeon to see the tissue planes and the intra-abdominal organs as the trocar is advanced[22]. Verres needle or Hasson technique which is reproducible and safe, and has been recommended by many authors in the literature [20, 23-25].

In our study and according to the experience and preference of the operating surgeon, we used different techniques. Eight cases with the open technique for the port placement to create the pneumoperitoneum, 2 cases with Verres needle and one case with optical trocar with no bowel injury or uterine injury. But as a general if the gestational age was more than 18 weeks we used open method.

Increased intra-abdominal pressure due to pneumoperitoneum and pressure from the gravid uterus on IVC may reduce the venous return, which can lead to decreased cardiac output and to reduced uterine flow. A combination of reduced uterine flow and increased intrauterine pressure secondary to pneumoperitoneum may lead to fetal hypoxia [26]. For these reasons, a general consensus has been reached to use abdominal pressures no greater than 14 mm Hg during laparoscopy [24]. 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 has a higher conversion rate than conventional laparoscopy [27]. In our cases, pneumoperitoneum pressure did not exceed 12 mmHg and in 2 cases was as low as 8 mm Hg while maintaining adequate visualization and exposure of the operative field for conducting a safe procedure.

Careful monitoring of both the fetus and the mother is essential to maximize safety when performing laparoscopic procedures. Fetal heart rate was assessed with obstetrical colleagues and was evaluated by ultrasound before and after the surgery. Trans-vaginal ultrasound has been recommended to monitor fetal heart rate during laparoscopic surgery [20], however, this measure was difficult to implement in our study.

Acid-base disturbances, such as acidosis and hypercapnia, can result from absorption of CO2. Capnography which is a procedure for calculating end tidal CO2 [28] was utilized to prevent acidosis. If maternal acidosis does occur, it can be overcome with mild hyperventilation.

The average operating time in our series was 54 min, which is nearly the same as obtained in the literature review (ranged from 55min- 62min)[29].

However, this data is usually heterogeneous in all series and dependent on multiple factors.
Pregnancy along with pneumoperitoneum, may increase the risk of deep vein thrombosis [30]. To mitigate this risk, elastic compression of the lower limbs was used as well as placing the patients in the

lateral decubitus position to allow the gravid uterus to fall away from the inferior vena cava.

We used tocolytics in only one patient to control the uterine contractions. The routine use of tocolytics is not warranted in patients undergoing laparoscopy in pregnancy, as recommended by recent SAGES guidelines [20].

To reduce the postoperative pain, all the carbon dioxide was carefully evacuated at the end of the surgery and the surgical incisions were infiltrated with local anesthetic. Regarding postoperative analgesia,10 patients in first and second trimester received NSAIDs and one patient in third trimester (case 10) received Perfalgan injection. The use of opioid analgesics was avoided as it can lead to fetal respiratory depression [19].

Rollins *et al.* [24] described 31 laparoscopic cholecystectomies with a 20% preterm delivery rate and 1 fetal loss, while Muench *et al.* [15] described 16 cases and reported 2 conversions to open, but they did not observe maternal or fetal morbidity or mortality. Palanivelu *et al.* [18] described 9 laparoscopic cholecystectomies and reported 1 wound infection, but no conversions and no fetal loss. In our series we observed only 1 premature contraction event with no other complications related to pregnancy.

The advantages of laparoscopic cholecystectomy in the general population are well described. All the advantages of this technique exist for the pregnant patient also which include earlier return of the gastrointestinal function, earlier ambulation, decreased fetal respiratory depression due to diminished postoperative narcotic requirements, decreased hospital stay, and quicker return to routine activity. The improved visualization in laparoscopy reduce the risk of uterine irritability by decreasing the need for uterine manipulation which results in lower rates of spontaneous abortion and preterm delivery [31].

Conclusion:

Pregnancy should no longer be considered as a contraindication to laparoscopic cholecystectomy which is reserved only for cases refractory to conservative treatment. Laparoscopic cholecystectomy during pregnancy is safe for the mother and the fetus, provided the specific issues of anesthesia, peri-operative fetal monitoring, and surgical technique are addressed properly. Such operations must however be performed by an experienced surgical team in cooperation with an obstetrician.

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